3 1761 07825063 6

Digitized by the Internet Archive
in 2011 with funding from
University of Toronto

http://www.archive.org/details/cyclopaediaorun30rees

9

104

THE

CYCLOPÆDIA;

OR,

Universal Dictionary

OF

ARTS, SCIENCES, AND LITERATURE.

VOL. XXX.

Printed by A. Strahan,
New-Street-Square, London.

THE

CYCLOPÆDIA;

OR,

UNIVERSAL DICTIONARY

OF

Arts, Sciences, and Literature.

BY

ABRAHAM REES, D.D. F.R.S. F.L.S. *S. Amer. Soc.*

WITH THE ASSISTANCE OF

EMINENT PROFESSIONAL GENTLEMEN.

ILLUSTRATED WITH NUMEROUS ENGRAVINGS,

BY THE MOST DISTINGUISHED ARTISTS.

IN THIRTY-NINE VOLUMES.

VOL. XXX.

LONDON:

PRINTED FOR LONGMAN, HURST, REES, ORME, & BROWN, PATERNOSTER-ROW,

F.C. AND J. RIVINGTON, A. STRAHAN, PAYNE AND FOSS, SCATCHERD AND LETTERMAN, J. CUTHELL, CLARKE AND SONS, LACKINGTON HUGHES HARDING MAVOR AND JONES, J. AND A. ARCH, CADELL AND DAVIES, S. BAGSTER, J. MAWMAN, JAMES BLACK AND SON, BLACK KINGSBURY PARBURY AND ALLEN, R. SCHOLEY, J. BOOTH, J. BOOKER, SUTTABY EVANCE AND FOX, BALDWIN CRADOCK AND JOY, SHERWOOD NEELY AND JONES, R. SAUNDERS, HURST ROBINSON AND CO., J. DICKINSON, J. PATERSON, E. WHITESIDE, WILSON AND SONS, AND BRODIE AND DOWDING.

1819.

LIBRARY
OCT 21 1965
UNIVERSITY OF TORONTO

AE
5
R329
V. 30

1016071

CYCLOPÆDIA:

OR, A NEW

UNIVERSAL DICTIONARY

OF

ARTS and SCIENCES.

REPUBLIC.

REPUBLIC, Respublica, *commonwealth*, a popular ſtate or government; or a nation where the body, or only a part of the people, have the government in their own hands.

When the body of the people is poſſeſſed of the ſupreme power, this is called a *democracy*. When the ſupreme power is lodged in the hands of a part of the people, it is then an *ariſtocracy*. See Aristocracy and Democracy.

The celebrated republics of antiquity are thoſe of Athens, Sparta, Rome, and Carthage. At preſent, there is ſcarcely any ſuch thing as a real republic, *i. e.* a ſtrictly popular ſtate. Indeed, the Venetians and Genoeſe have called their ſtates republics; but their government was apparently *oligarchic*.

The Dutch, in their former ſtate, came the neareſt to the character of a republic; yet they were very defective, at leaſt in the ſenſe and ſeverity with which Rome, Carthage, &c. were republics. See States-*General*.

It is a remark of M. St. Evremont, that if the Dutch love the republican form, it is more for the ſake of their trade than of their liberty.

Holland, which was compoſed of about fifty republics, all different from one another, might be conſidered as a confederate republic; or a convention by which ſeveral petty ſtates agree to become members of a larger one, which they intend to eſtabliſh. When ſeveral ſovereign and independent ſtates unite themſelves together by a perpetual confederacy, whilſt each of them continues to be a perfect ſtate, they will form together a federal republic: the deliberations in common will offer no violence to the ſovereignty of each member, though they may, in certain reſpects, put ſome conſtraint on the exerciſe of it, in virtue of voluntary engagements. A perſon does not ceaſe to be free and independent when he is obliged to fulfil the engagements into which he has very willingly entered. In this view, Germany, which conſiſted of free cities, and of petty ſtates, ſubject to different princes, and the Swiſs cantons, were conſidered in Europe as perpetual republics.

Of this kind were formerly the cities of Greece; and in later times were the ſeven United Provinces of the Netherlands; and ſuch, as we have juſt ſaid, were the members of the Helvetic body. To this claſs we may likewiſe refer the federal government of the United States of America. See Government.

Baron de Monteſquieu, in his "Spirit of Laws," enumerates the following diſtinctive properties of a republic. It ſhould have a ſmall territory; otherwiſe it cannot long ſubſiſt. In a large republic there are men of large fortunes, and conſequently of leſs moderation; there are too great depoſits to intruſt into the hands of a ſingle ſubject; intereſts are divided; an ambitious perſon ſoon becomes ſenſible that he may be happy, great, and glorious, by oppreſſing his fellow-citizens; and that he might raiſe himſelf to grandeur on the ruins of his country.

In a large republic, the public good is ſacrificed to a thouſand views; it is ſubordinate to exceptions; and depends on accidents. In a ſmall one, the intereſt of the public is eaſier perceived, better underſtood, and more within the reach of every citizen; abuſes have a leſſer extent, and of courſe are leſs protected.

The long duration of the republic of Sparta was owing to its having always continued with the ſame extent of territory after all its wars. The ſole aim of Sparta was liberty; and the ſole advantage of its liberty, glory.

It was the ſpirit of the Greek republics to be as contented with their territories, as with their laws. Athens was firſt fired with ambition, and gave it to Lacedæmon; but it was an ambition rather of commanding a free people, than of

governing ſlaves; rather of directing than of breaking the union. All was loſt upon the ſtarting up of monarchy, a government whoſe ſpirit is more turned to increaſe and advancement.

Excepting particular circumſtances, as when a petty ſovereign ſupports himſelf betwixt two great powers by means of their mutual jealouſy, it is difficult for any other than a republican government to ſubſiſt long in a ſingle town. A prince of ſo petty a ſtate would naturally endeavour to oppreſs, becauſe his power would be great, while the means of enjoying it, or of cauſing it to be reſpected, would be very inconſiderable. The conſequence of this would be, that he would trample upon his people. On the other hand, ſuch a prince might be eaſily cruſhed by a foreign, or even a domeſtic force; the people might every inſtant unite and riſe up againſt him. Now, as ſoon as a prince of a ſingle town is expelled, the quarrel is over; but if he has many towns, it only begins.

Republic *of Letters*, is a phraſe uſed in ſpeaking collectively of the whole body of the people of ſtudy and learning.

There is a journal, begun in Holland, by M. Bayle, and continued by M. Bernard, conſiſting of extracts of books, printed in the courſe of the year, called "Nouvelles de la Republique des Lettres," News from the Republic of Letters. See Journal.

REPUBLICATION *of a Will*. See Will.

REPUDIATION, Repudium, in the *Civil Law*, the act of divorcing. See Divorce.

REPULSE Bay, in *Geography*, a bay on the N.E. coaſt of New Holland, in the South Pacific ocean. S. lat. 20° 36′. W. long. 148° 33′. — Alſo, a bay on the coaſt of Kerguelen's land. — Alſo, a bay on the W. coaſt of America. N. lat. 66° 40′. W. long. 85°.

REPULSION, Repulsio, in *Phyſics*, the act of a repelling power, by which bodies, under certain circumſtances, naturally fly from each other.

Repulſion is the counter part to *attraction*. Attraction only reaches to a little diſtance; where that terminates, there repulſion commences. See Air and Compression.

Indeed, we meet with many obvious inſtances of repulſion among bodies, as between water and oil, and, in general, between water and all unctuous bodies; between mercury and iron, as alſo between the particles of duſt, &c.

Thus, if a fat body, lighter than water, be laid on the ſurface of it, or if a piece of iron be laid on mercury, the ſurface of the fluid will be depreſſed about the bodies laid on it. This is a plain indication of repulſion; as the riſing up of the fluid about the ſurfaces of other incumbent bodies is of attraction.

In the latter caſe, the fluid is ſuſpended, by an attractive power, above the level, and kept from falling by its gravity: in the former, a depreſſion is made by the repelling power, which the liquor, notwithſtanding its gravity, cannot run down into, and fill up.

Upon this depend all the phenomena of very light glaſs bubbles floating on water, about which, when clean, the water riſes; but when greaſed, the water ſinks into a channel all around them. Hence alſo it is, that in a glaſs-veſſel of water, the fluid ſtands higher all about the edges near the glaſs than towards the middle; but when the glaſs is filled till the water run down on all ſides, then it ſtands higher at the middle than at the ſides. Hence, alſo, in a glaſs not full of water, a clean glaſs bubble always runs to the ſide, by reaſon the preſſure, which is upon it towards the middle, is partly taken off by the attractive force with which the water is raiſed near the edge. If the glaſs be ſo full as to be ready to run over, the bubble returns from the ſide towards the middle, the force with which the water is raiſed in the middle taking off part of the preſſure.

Juſt the reverſe happens if the bubble be greaſy; becauſe there the force, by which the water and the bubble repel each other, is greateſt where the water is higheſt. Two clean bubbles and two greaſy ones always run towards each other, as being attracted; and a greaſy and a clean one always fly each other, as being repelled.

REPUTATION, *Injuries affecting*. See Injury.

REQUENA, in *Geography*, a town of Spain, in New Caſtile, ſeated on the top of a hill, near the Oliana, on the borders of Valencia. Bourgoanne, a modern traveller, ſays, that wealth and activity proclaim in this place the preſence of induſtry, and accordingly the number of ſilk looms amounts to 900. It has been ſuppoſed to be the Salaria, placed by Ptolemy in the country of the Baſtitani; 55 miles S.E. of Cuença.

REQUEST, in *Law*, a ſupplication or petition preferred to a prince, or court of juſtice, begging relief in ſome conſcionable caſes, where the common law grants no immediate redreſs.

The term requeſt is now, ſince the inſtitution of chancery, much diſuſed; together with the court of requeſts, where requeſts were cognizable.

In the old government of France, *requêtes civiles*, civil requeſts, obtained for the annulling of contracts, &c. made by ſurprize.

They had eighty maſters of requeſts to take cognizance of cauſes between the officers of the crown, the ſervants of the houſehold, &c.

Requests, *Court of*. See Court *of Requeſts*, and Court *of Conſcience*.

Request, in *Hunting*, is when the dogs have loſt the *queſt* or tract of the beaſt, and muſt *requeſt*, or *queſt* it again. They ſay, *to call to the requeſt, come to the requeſt*, &c.

To requeſt the game is chiefly uſed, when, after having run it down the night before, they ſeek it again the next morning with the blood-hound, or the like.

REQUEURIA, in *Botany*, a genus named in the Flora Peruviana, page 16, after Louis Requeur, a Spaniard, who was apothecary to king Philip V. *De Theis*. We are unacquainted with the plant, as well as with the botanical merits of the perſon to whom it is dedicated.

REQUIEM, a maſs ſung in the Romiſh church for the reſt of the ſoul of a perſon deceaſed.

It is thus called, becauſe the introit begins with "Requiem æternam dona eis, Domine," &c.

REQUINY, in *Geography*, a town of France, in the department of the Morbihan; 6 miles N.W. of Joſſelin.

REQUISTA, a town of France, in the department of the Aveiron; 18 miles S. of Rhodez.

RERE County. See Rier *County*.

Rere *Fiefs*, a name given in the Scotch laws to thoſe fiefs which were held by inferior tenants or feudatories, that cultivated the lands under the chief feudatories, who held by military ſervice.

Rere *Ward, arriere-garde*. See Rear, and Guard.

REREDOS, the ſkreen at the back of an ancient high altar, which ſeparated it from the Lady-chapel, being, for the moſt part, highly ornamented with niches, canopies, and tracery work. The richeſt of theſe which have reached our time are thoſe of Wincheſter and Durham cathedrals, and of St. Alban's abbey.

RERHUTTAN, in *Geography*, a town of Sweden, in Dalecarlia; 30 miles S.W. of Geſſle.

RERIGONIAN Bay, in *Ancient Geography*, a bay on the northern ſide of ancient Britain, now Loch-rain, formed by the Mull of Galloway.

RERIGONIUM, called by ſome *Berigonium*, a town of the Novantæ, ſituated ſomewhere in Galloway, according to Camden the preſent Bargeny in Carrict; but Horſley prefers Barton or Strathaven.

RERONE, in *Geography*, a river of Italy, which riſes in the Vicentin, and runs into the Brenta.

RERRE, a river of France, which runs into the Saudre, about a league above Romorantin.

RES, *Thing*. See Reality, Ens, Esse, Substance, &c.

Res *Mancipi*. See Abalienation.

Res *Naturales*. See Naturals.

Res *Non Naturales*, &c. See Non-*naturals*, &c.

RESAFA, in *Ancient Geography*, a town of Aſia, on the W. ſide of the Euphrates.

RESAIA, a town of Meſopotamia, in Oſrhoené.

RESAINA, or Theodosiopolis, *Ras-vin*, or *Ain-verdah*, a town of Meſopotamia, upon the banks of the river Chabotas. This town was famous on account of the victory obtained over Sapor by the younger Gordian, in the year 243. Under the empire of Severus, it was elevated to the dignity of a colony; and under Theodoſius it aſſumed the name of Theodoſiopolis.

RESAPHE, a town of Palmyrene, according to Ptolemy; but Procopius called it Sergiopolis. It was at ſome diſtance from the Euphrates.

RESAU or Rehau, in *Geography*, a town of Germany, in the principality of Culmbach; 7 miles E.S.E. of Hoff.

RESAVA, a river of Servia, which runs into the Paſſarovitz.

RESCEIT, Receptio, in *Law*, an admiſſion or receiving of a third perſon to plead his right, in a cauſe formerly commenced between other two.

As, when an action is brought againſt a tenant for life or years, and he makes default; in ſuch caſe he in the reverſion may come in and pray to be received, to defend the land, and to plead with the demandant.

Resceit is alſo ſometimes applied to an admittance of plea, though the controverſy be only between two. He in reverſion may come into court, and pray to be received in a ſuit againſt his particular tenant.

Resceit *of homage*, *receptio homagii*, denotes the lord's receiving homage of his tenant, at his admiſſion to the lands.

RESCHOUET, in *Geography*, a town of Pruſſia, in Pomerelia; 7 miles N.N.E. of Zarnowitz.

RESCIPHA, in *Ancient Geography*, a place of Meſopotamia, on the banks of the Euphrates; ſituated S. of Corſote, and near to it.

RESCISSION, Rescissio, formed of *re*, and *ſcindo*, q. d. *I cut* or *divide again*, in the *Civil Law*, an action intended for the annulling or ſetting aſide of any deed, contract, or the like.

A thing's being found damaged, or ſold at above double the juſt value, is a good cauſe of reſciſſion.

The deed or contract thus annulled, or reſcinded, is ſometimes called a *reſciſſory*; though that denomination be more properly given to the action brought for reſcinding or ſetting it aſide; which is properly called *actio reſciſſoria*.

RESCOUS, or Rescue, *Reſcuſſus*, in *Law*, an illegal taking away, and ſetting at liberty, a diſtreſs taken, or a perſon arreſted, by proceſs, or courſe of law. This is properly a *reſcous in fact*. If one diſtrain beaſts for damage feaſant in his ground, and as he drives them along the highway towards the pound, they enter into the owner's houſe, and he withholds them there, and will not deliver them upon demand; this detainer is a *reſcous in law*. For a reſcous, or the taking of goods by force, when, in a diſtreſs, they are in the cuſtody of the law, which is conſidered as an atrocious injury, the diſtreiner has a remedy in damages, either by writ of *reſcous* (F. N. B. 101.), in caſe they were going to the pound, or by writ *de parco fracto*, or pound-breach (ibid. 100.) in caſe they were actually impounded. He may alſo at his option bring an action on the caſe for this injury, and ſhall therein, if the diſtreſs were taken for rent, recover treble damages. (Stat. 2 W. & M. ſeſſ. 1. c. 5.) In caſe of the forcible delivery of a perſon arreſted from the officer who is taking him to priſon, the plaintiff has a ſimilar remedy by action on the caſe, or of reſcous (6 Mod. 201.); or, if the ſheriff makes a return to ſuch reſcous to the court out of which the proceſs iſſued, the reſcuer will be puniſhed by attachment. Cro. Jac. 419. Salk. 586. See Rescue.

He that commits a reſcue or reſcous, is called the *reſcuſſor*.

Rescous is alſo uſed for a writ which lies for this fact, called *breve de reſcuſſu*.

RESCRIPT, Rescriptum, an anſwer delivered by an emperor, or a pope, when conſulted by particular perſons, on ſome difficult queſtion or point of law, to ſerve as a deciſion of it.

The civil and canon laws are full of ſuch reſcripts.

When the reſcript was made in anſwer to the enquiry of a community, it was called a *pragmatic ſanction*.

The papal reſcripts are a kind of bulls or monitories, beginning with theſe words, "Significabit nobis dilectus filius," &c. They never obtained either in England or France, when contrary to the liberties of the Engliſh and Gallican churches; but were declared abuſive.

Among the Romans the contending parties and even the magiſtrates themſelves, frequently conſulted the emperor on the meaſures they were to take in certain and nice difficult caſes; and the anſwers returned by the emperor on ſuch conſultations, were called *reſcripts*. Theſe had not, indeed, the full force of laws; but they were deemed a ſtrong prejudice or preſumption: and in ſucceeding ages, they had the force of perpetual laws, though they ought to be carefully diſtinguiſhed, by every rational civilian, from thoſe general conſtitutions which had only the nature of things for their guides.

Juſtinian has inſerted a great number of them in the Code; and by that means given them the authority they before wanted.

The author of the life of the emperor Macrinus obſerves of that prince, that he would have his officers judge by laws, not by reſcripts; as eſteeming it abſurd to admit the wills of ignorant men, ſuch as Commodus and Caracalla, for rules of judging; and becauſe Trajan never gave any reſcripts at all, as being loth to countenance a cuſtom, where what is frequently granted as a favour, in particular caſes, might be afterwards pleaded as a precedent. It is added, that Macrinus had a deſign to ſtrip the reſcripts of all their authority.

M. Schulting, in his Diſſertations, does not at all approve of this deſign; and to the emperor's reaſons anſwers, that indeed all reſcripts are not to be admitted; that thoſe which appear dictated out of favour, are to be thrown aſide; but thoſe which appear founded in reaſon, and natural equity, are, with Juſtinian, to be allowed. He adds, that it cannot be denied but the worſt emperors have frequently made good laws, and uſeful reſcripts.

As to what is urged of the emperor Trajan's never giving any reſcripts, it appears but ill ſupported. For what is it but a reſcript that he delivers to Pliny on the ſubject of the Chriſtians, lib. x. epiſt. 28? Or that on the Iſclaſtici, lib. x. epiſt. 120? The Digeſt, and Pliny's Epiſtles, need

only to be opened and compared, to find rescripts of Trajan. The rescripts of the emperor, his grants and decrees, his edicts and pragmatic sanctions, were subscribed in purple ink, or a compound of vermilion and cinnabar; and transmitted to the provinces as general or special laws, which the magistrates were bound to execute, and the people to obey. But as their number continually multiplied, the rule of obedience became each day more doubtful and obscure, till the will of the sovereign was fixed and ascertained in the Gregorian, Hermogenian, and the Theodosian codes.

RESCUE. See Rescous. See also Distress, and Disseisin.

Rescue is one of those offences against public justice, which consists in the forcibly and knowingly freeing another from an arrest or imprisonment; and it is generally the same offence in the stranger so rescuing, as it would have been in a gaoler to have *voluntarily* permitted an escape. A rescue, therefore, of one apprehended for felony, is felony; for treason, treason; and for a misdemesnor, a misdemesnor also. But here likewise, as upon voluntary escapes, the principal must first be attainted, or receive judgment before the rescuer can be punished: and for the same reason; because perhaps in fact it may turn out that there has been no offence committed. By statute 11 Geo. II. c. 26. and 24 Geo. II. c. 40. if five or more persons assemble to rescue any retailers of spirituous liquors, or to assault the informers against them, it is felony, and subject to transportation for seven years. By the statute 16 Geo. II. c. 31, to convey to any prisoner in custody for treason or felony any arms, instruments of escape, or disguise, without the knowledge of the gaoler, though no escape be attempted, or any way to assist such prisoner to attempt an escape, though no escape be actually made, is felony, and subjects the offender to transportation for seven years: or if the prisoner be in custody for petit larceny, or other inferior offence, or charged with a debt of 100*l.*, it is then a misdemesnor, punishable with fine and imprisonment. And by several special statutes, to rescue, or attempt to rescue, any person committed for the offences enumerated in those acts, is felony without benefit of clergy; and to rescue, or attempt to rescue, the body of a felon executed for murder, is single felony, and subject to transportation for seven years. Nay, even if any person be charged with any of the offences against the black act, 9 Geo. I. c. 22, and, being required by order of the privy council to surrender himself, neglects so to do for forty days, both he and all that knowingly conceal, aid, abet, or succour him, are felons without benefit of clergy. See Contempt.

RESCUSSOR, in *Law*. See Rescous.

RESA, or Reze, in *Geography*, a town of France, which runs into the Saudre, at Romorantin.

RESEARCH, formed of the French, *recherche*, and literally denoting a *second search*, a diligent search or enquiry into any thing.

Research, in *Music*, is a kind of prelude or voluntary played on the organ, harpsichord, violin, &c. in which the composer seems to *search* or look out for the strains and touches of harmony, which he is to use in the regular piece to be played afterwards.

This is usually done off-hand; and consequently it requires a master's skill. When in a motetto, the composer takes the liberty to use any thing that comes into his head, without applying any words to it, or subjecting himself to the sense or passion of it, the Italians call it *fantasia ricercata*, the French *recherche*, and the English *research* and *voluntary*.

RESEARCHING, in *Sculpture*, the repairing of a cast, figure, &c. with proper tools; or the finishing it with art and exactness, so as that the minutest parts may be well defined.

RESEDA, in *Botany*, a name which occurs in Pliny, and is evidently derived from *resēdo*, to allay or mitigate; so that the second syllable, vulgarly pronounced short, ought to be long. Pliny reports that this herb is known in the neighbourhood of Rimini, and is used for dispersing tumours, and all kinds of inflammations. The person who applies the medicine, says "Reseda allay these diseases," repeating these words, with some others, and spitting as often. After this account, the reader may not be anxious to know what Pliny's *Reseda* was. We have certainly no more reason to believe it the same as our's, than we have to rely on his sapient prescription.—Linn. Gen. 242. Schreb. 326. Willd. Sp. Pl. v. 2. 876. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 512. Prodr. Fl. Græc. Sibth. v. 1. 322. Ait. Hort. Kew. v. 3. 153. Juss. 245. Tourn. t. 238. Lamarck Illustr. t. 410. Gærtn. t. 76. (Luteola; Tourn. t. 238. Sesamoides; Tourn. t. 238.)—Class and order, *Dodecandria Trigynia*. Nat. Ord. *Miscellaneæ*, Linn. *Capparides*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, deeply divided into narrow, erect, permanent segments, two of which are further asunder than the rest, for the accommodation of the honey-bearing petal. *Cor.* Petals several, unequal; some of them always cut half way down into three segments; the upper one gibbous at the base, bearing honey, the length of the calyx. Nectary a flat erect gland, proceeding from the receptacle, situated at the upper side of the flower, between the stamens and uppermost petal, converging with the dilated base of the petals. *Stam.* Filaments eleven or fifteen, short; anthers erect, obtuse, the length of the corolla. *Pist.* Germen gibbous, ending in three or four very short styles; stigmas simple. *Peric.* Capsule gibbous, angular, coriaceous, tipped with the styles, and gaping at the summit between them, of one cell. *Seeds* numerous, kidney-shaped, inserted into the angles of the capsule.

Obs. Linnæus observes, that there is scarcely any genus whose character is more difficult to determine, both the number and shape of the parts being different in different species. The essential character consists in the three-cleft petals, one petal bearing honey at its base, and the capsule not being closed, but always gaping.

R. Luteola has the *perianth* in four deep segments; *petals* three, the upper, or honey-bearing one, cut half way down into six segments; the lateral ones opposite, three-cleft; to which are often subjoined, by nature or luxuriance, two more, very small, undivided petals; the *styles* are three: *stamens* numerous.

R. alba has six deep segments in the *perianth*: *petals* six, nearly equal, all of them half three-cleft; *styles* four; *capsule* with four angles; *stamens* constantly eleven.

Some other species have a deeply five-cleft *perianth*; five dissimilar three-cleft *petals*; *styles* three; *stamens* numerous.

Ess. Ch. Calyx of one leaf, deeply divided. Petals laciniated. Capsule superior, gaping at the top, of one cell, with many seeds.

1. R. *Luteola*. Dyer's-weed, Yellow-weed, or Weld. Linn. Sp. Pl. 643. Willd. n. 1. Ait. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 320. Mart. Rust. t. 40. (Luteola; Ger. Em. 494. Pseudostruthium; Matth. Valgr. v. 2. 643.)—Leaves lanceolate, undivided, flat. Calyx four-cleft.—Native of waste ground, rubbish, banks, and old walls, chiefly about villages, in most of the temperate parts of Europe. About Norwich it is very common; partly perhaps from the dispersion of its seeds, in consequence of the great use made of the cultivated herb, in the woollen manufactory of that city, for dyeing yellow. The colour it affords is very bright, and is especially useful for making a good

a good green; the cloth being firſt dyed blue. The *herb* is annual, flowering in July. *Root* ſpindle-ſhaped. *Stem* erect, wand-like, two or three feet high, branched, leafy, ſtriated, ſmooth. *Leaves* linear-lanceolate, entire, ſmooth, for the moſt part furniſhed with a ſmall callous tooth, on each ſide, at the baſe. *Flowers* ſmall, cream-coloured, very numerous, in long, ſimple, ſolitary, terminal, ſlightly drooping *ſpikes*, which, according to Linnæus, follow the courſe of the ſun, even in a cloudy day—

> "True, as the dial, to the ſun,
> Although it be not ſhined upon."

2. R. *caneſcens*. Hoary Baſe Rocket. Linn. Syſt. Nat. ed. 12. v. 2. 330. Willd. n. 2. Ait. n. 2? Vahl. Symb. v. 2. 52. (R. hexagyna; Forſk. Ægypt-Arab. 92. Seſamoides ſalmanticum parvum alterum; Cluſ. Hiſt. v. 1. 296, no figure. S. flore albo, foliis caneſcentibus; Tourn. Inſt. 424.)—Leaves lanceolate, waved, ſomewhat hairy. Branches hiſpid.—Native of waſte ground near Cairo. *Forſkall.* Probably alſo of the ſouth of Europe. The *ſtems* are decumbent, branched, eighteen inches or more in length, round, leafy, rough with copious, minute, white, ſpreading, ſhort, briſtly hairs. *Leaves* ſcattered, lanceolate, one and a half or two inches long, bluntiſh, entire, wavy, and roughiſh at the edges, as well as at the midrib on both ſides; otherwiſe ſmooth, and ſomewhat glaucous; tapering at the baſe, and ſending down two elevated ribs, for ſome diſtance, along the branch. *Flowers* in long, terminal, ſtalked, hairy cluſters, on ſhort partial ſtalks. *Calyx* five-cleft. *Petals* white. *Germen*, according to Forſkal's deſcription, ſtalked, with ſix *ſtyles*.—Vahl has well remarked that *R. caneſcens* of Sp. Pl. cannot be the ſame with the above. Indeed it appears to be no other than either *R. ſeſamoides* or *purpuraſcens*, the figure of Cluſius agreeing beſt with the former; his deſcription and the Linnæan definition with the latter. Yet this ſame figure, adopted by Gerarde, ſeems to be the only foundation on which *R. caneſcens* depends for a place in Hort. Kew.—We have never ſeen the true *caneſcens* living, nor can we find a figure of it.

3. R. *glauca*. Glaucous Baſe Rocket. Linn. Sp. Pl. 644. Willd. n. 3. Ait. n. 3. (R. linariæ foliis; Bauh. Prodr. 42, no figure. Seſamoides linariæ folio glauco, pyrenaica, flore ſtamineo; Moriſ. ſect. 15. t. 1. f. 4.—Leaves linear; toothed at the baſe. Styles four.—Native of the Pyrenæan mountains; according to Burſer's herbarium, examined by Linnæus. Gathered alſo by Lœfling, in Spain. The *root* is ſaid to be perennial, but has the appearance of being annual. Whole herb glaucous, ſlender, and ſmooth. *Stem* twelve or eighteen inches high, ſimple, round, wand-like, leafy. *Leaves* about two inches long, very narrow; all nearly of equal breadth, furniſhed at the baſe with a few white briſtly teeth. *Cluſter* terminal, ſolitary, very long, of numerous white *flowers*, whoſe *petals* are leſs divided than in moſt other ſpecies.

4. R. *dipetala*. Flax-leaved Baſe Rocket. Ait. n. 4. Willd. n. 4. Vahl. Symb. v. 2. 52. (R. capenſis; Burm. Prodr. 13.)—Leaves linear, entire. Styles four. Petals two, undivided.—Native of the Cape of Good Hope, from whence its ſeeds were ſent to Kew, in 1774, by Mr. Maſſon. The plant is biennial, flowering in Auguſt, being preſerved in a greenhouſe through the winter. Vahl compares its general aſpect to *R. Seſamoides*, hereafter deſcribed. *Stem* ſomewhat ſhrubby, erect, with round branches. *Leaves* about an inch long, rather fleſhy, ſmooth. *Cluſter* terminal, lax. Segments of the *calyx* fix, minute, bordered with white. *Petals* only two, wedge-ſhaped, undivided.

5. R. *purpuraſcens*. Purpliſh Baſe Rocket. Linn. Sp. Pl. 644. Willd. n. 5. (Seſamoides ſalmanticum parvum primum; Cluſ. Hiſt. v. 1. 296, excluding the figure. S. foliis craſſis, floribus ex herbaceo purpuraſcentibus; Tourn. Inſt. 424.)—Leaves linear, obtuſe. Styles five.—Native of Spain. *Lœfling.*—*Stems* ſeveral, a ſpan high, ſimple, leafy. *Leaves* ſcattered, the length of the nail, linear, obtuſe, ſmooth. *Cluſter*, or rather *ſpike*, long, lax. *Petals* very white, much divided. *Styles* five, ſometimes, as Cluſius deſcribes them, only four. *Capſule* with as many protuberant, ſingle-ſeeded, knobs or pouches.

6. R. *Seſamoides*. Spear-leaved Baſe Rocket. Linn. Sp. Pl. 644. Willd. n. 6. Ait. n. 5. (Seſamoides parvum ſalmanticum; Cluſ. Hiſt. v. 1. 295, the figure only. Ger. Em. 493. Lob. Ic. 353.)—Stem-leaves linear-lanceolate, obtuſe, radical ones lanceolate, ſtalked, much larger. Fruit ſtellated.—Native of Barbary, and the ſouth of Europe. A hardy annual in Kew garden, flowering in July and Auguſt. The *root* is ſpindle-ſhaped, very long, tapering, and branched at the extremity. *Stems* numerous, ſpreading nearly horizontally, from three to twelve inches long, generally ſimple, ſmooth, leafy. *Radical-leaves* numerous, lanceolate or ſomewhat obovate, entire, ſmooth, an inch long, tapering down into a *footſtalk* of about the ſame length; *ſtem-leaves* much ſmaller and narrower, linear, and obtuſe. *Cluſters* terminal, rather denſe. *Petals* white. *Styles* four or five. *Capſule* of the ſame number of ſpreading lobes, fringed at the edges, and aſſuming a ſtar-like figure.—The wooden cut of Cluſius ſo exactly repreſents this plant, eſpecially the radical *leaves*, that we can take it for no other. Allioni's plate, t. 88. f. 3, does not accord with this, or any other *Reſeda* known to us, except having a general reſemblance to *caneſcens*, n. 2, without its roughneſs, or the undulations of its *leaves*.

7. R. *fruticuloſa*. Shrubby Baſe Rocket. Linn. Sp. Pl. 645. Willd. n. 7. Ait. n. 6. Jacq. Coll. v. 3. 195. Ic. Rar. t. 474.—Leaves pinnate. Stem ſhrubby in the lower part. Styles three or four. Petals all three-cleft. Calyx in five ſpreading ſegments.—Native of Spain, and other parts of the ſouth of Europe. John Symmons, eſq. is recorded by Mr. Aiton as having introduced it into England, in 1794. The *root*, and baſe of the *ſtem*, are woody and perennial, producing a number of upright, leſs durable, *branches*, two or three feet high, leafy, ſubdivided, ſmooth, round, with elevated ribs. *Leaves* alternate, ſtalked, pinnate, of five, ſeven, or many more, lanceolate, entire, decurrent, ſmooth *leaflets*, ſeldom regularly oppoſite; the terminal one much the largeſt, ſometimes, but not always, recurved at the point; the lower ones gradually ſmalleſt. *Cluſters* terminal, erect, long, and rather lax. *Petals* five, white, uniform, oblong, all cut, not nearly half way down, into three equal ſegments. *Styles* often four; ſometimes but three. *Stamens* eleven. Linnæus thought it an intermediate ſpecies between *alba* and *undata*. From the firſt of theſe it is very diſtinct. By an accidental error in Sp. Pl. the preſent ſpecies is there called *ſuffruticuloſa*, which has led to the ſame inaccuracy in the Prodr. Fl. Græc. n. 1092. The name is correct in Herb. Linn.

8. R. *alba*. White Baſe Rocket, or Upright Mignonette. Linn. Sp. Pl. 645. Willd. n. 8. Ait. n. 7. Sm. Fl. Græc. Sibth. t. 459, unpubliſhed. (R. maxima; Bauh. Pin. 100. Lob. Ic. 222. Ger. Em. 277.)—Leaves pinnate. Stem erect, branched. Styles three or four. Petals unequally and deeply five-cleft. Calyx in five ſpreading ſegments.—Native of Spain and the ſouth of France; as well as of Greece and the iſland of Zante. It has been cultivated in our gardens ever ſince the days of Gerarde, being a hardy annual or biennial, ornamented, throughout the ſummer, with copious denſe *ſpikes*, of elegant white *flowers*, whoſe *petals* have deeper, more numer-

ous

ous ſegments, than the foregoing. Otherwiſe their parts of fructification do not much differ. The number of *ſtyles*, and of ſegments of the *calyx*, varies in both, according to luxuriance. The *leaflets* of *alba* are more numerous, as well as more equal in ſize, than in *fruticuloſa*, nor is the terminal one larger than the reſt. Sometimes their edges are roughiſh. Dr. Sibthorp obſerved, that the whole herb, and alſo the bruiſed ſeed, were uſed in Zante to dye ſilk yellow.

9. R. *undata*. Wave-leaved Baſe Rocket. Linn. Sp. Pl. 644. Willd. n. 9. Ait. n. 8. (R. decurſiva; Forſk. Ægypt-Arab. cat. 66. R. minor alba, dentatis foliis; Barrel. Ic. t. 588.)—Leaves pinnate, wavy. Styles three to five. Petals unequally cut.—Native of Spain. Cultivated by Miller, at Chelſea, in 1739. A hardy perennial, flowering in ſummer. The *ſtems* are erect, branched, ſtraight and wand-like, one to two feet high. *Leaves* unequally pinnate, very much criſped, or wavy. *Flowers* ſmaller than in either of the laſt, and of a leſs pure white, compoſing very long *cluſters*, or rather *ſpikes*, for each flower is nearly ſeſſile; the lower ones very remote. Some of the *petals* appear, by the dried ſpecimens, to have three, others five, obtuſe ſegments, of which the lateral ones are broadeſt. We have great doubts, whether the ſpecimen from which Linnæus took his remark of the great ſize of the *capſules*, really belongs to this ſpecies.

10. R. *lutea*. Yellow Baſe Rocket, or Wild Mignonette. Linn. Sp. Pl. 645. Willd. n. 10. Ait. n. 9. Fl. Brit. n. 2. Engl. Bot. t. 321. Jacq. Auſtr. t. 353. Bulliard. t. 281. (R. Plinii; Ger. Em. 277.)—All the leaves three-cleft; the lower ones pinnate. Petals ſix, very unequal. Calyx in ſix ſegments.—Native of dry chalky hills in the temperate and ſouthern countries of Europe; abundant in the chalky parts of England, flowering from June to the end of autumn. The *root*, generally annual with us, often ſurvives a mild winter. *Stems* ſpreading, branched, leafy, a foot or more in height. *Leaves* tapering at the baſe; ſome of them with only one pair of lateral leaflets; others with many, which are occaſionally ſubdivided; all the leaflets, or ſegments, are linear, channelled, more or leſs wavy; frequently very much criſped or curled. Such is the variety, mentioned as a ſpecies, by Dillenius, in Raii Syn. 366, as R. *criſpa gallica*, Bocc. Sic. 77. t. 41. f. 3; but we have often ſuſpected, that Boccone's plant might be the *undata*. It is hazardous, however, to depend much on ſuch imperfect materials as he affords. The *flowers* are numerous, ſulphur-coloured, ſlightly, and not agreeably, odorous; their two upper petals with two fan-like lateral lobes, and a ſhort linear one between; two lateral petals very unequally and variouſly three-cleft; two lower ones narrow, and almoſt ſimple.

11. R. *Phyteuma*. Scentleſs Mignonette. Linn. Sp. Pl. 645. Willd. n. 11. Ait. n. 10. Jacq. Auſtr. t. 132. (Reſedæ affinis Phyteuma; Bauh. Prodr. 42. Erucago apula, trifida et quinquefolia; Column. Ecphr. 267. t. 269. f. 2.)—Leaves undivided, or three-lobed. Calyx in ſix, very large, obovate ſegments. Petals four, more or leſs pectinated.—Native of the ſouth of Europe and north of Africa. On the walls of Rome it is very common, and having a general reſemblance, without the fragrance, of our garden mignonette, it has given riſe to a report of that charming flower being deſtitute of ſcent in Italy! Miller cultivated *R. Phyteuma* at Chelſea, where it ſtill ſprings up annually in the garden. The *root* is long and tapering. *Stems* very numerous, a ſpan high, compoſing a large ſpreading tuft. *Leaves* broadiſh, tapering at the baſe; ſome of them ſimply obovate; others with a pair of lateral lobes. *Flowers* cream-coloured, in lax ſimple cluſters. *Calyx* very much enlarged, and reflexed, after flowering. *Petals* four; the lower pair, in particular, elegantly pectinated at one ſide; but all of them are liable to vary, in the number and depth of their ſegments. *Fruit* pendulous, obovate, angular. *Styles* three.

12. R. *mediterranea*. Mediterranean Mignonette. Linn. Mant. 564. Willd. n. 12. Ait. n. 11. Jacq. Coll. v. 1. 147. Ic. Rar. t. 475.—Leaves flat, undivided, or three-lobed. Calyx much ſhorter than the corolla. Petals ſix, very unequal.—Native of Paleſtine, according to Linnæus, who received it from Schreber. Dr. Sibthorp met with it in corn fields in the iſlands of the Archipelago. This is a hardy annual, flowering all ſummer long, agreeing very much in appearance with the laſt, but ſtill more with the following. The *flowers* have no ſcent. Their *petals* are ſix, moſt reſembling thoſe of *R. lutea* in figure, but white, not yellow. The *leaves* are broader, and leſs divided, than in *lutea*, as well as quite flat; they vary however greatly in breadth, but are never undulated. The *calyx* is ſhort, never enlarged like that of *R. Phyteuma*.

13. R. *odorata*. Sweet Mignonette. Linn. Sp. Pl. 646. Willd. n. 13. Ait. n. 12. Mill. Ic. t. 217. Curt. Mag. t. 29.—Leaves flat; undivided, or three-lobed. Calyx equal to the corolla. Segments of the petals all very deep, ſomewhat ſpatulate.—Native of Egypt. Well known throughout the gardens of Europe, as a hardy annual, blooming all the year round, if properly ſheltered, and exhaling from its neat unoſtentatious flowers, a moſt delicious ſcent, reſembling that of the vine-bloſſom, or the fruit of the raſpberry. This odour remains long in wooden boxes, where the flowers are dried. The *petals* are of a pale buff, prettily contraſted with the red anthers, and, as Jacquin obſerves, in deſcribing the laſt, they differ from that in their uniform, long, wedge-ſhaped, or ſpatulate ſegments.

Reseda, in *Gardening*, contains a plant of the flowering ſweet-ſcented kind, of which the ſpecies cultivated is, the ſweet reſeda, or mignonette (R. odorata).

Mr. Curtis obſerves, that the luxury of the pleaſure-garden is greatly heightened by the delightful odour which this plant diffuſes; and as it grows more readily in pots, its fragrance may be conveyed into the houſe: its perfume, though not ſo refreſhing perhaps as that of the ſweet-briar, is not apt to offend the moſt delicate olfactories.

Method of Culture.—This is raiſed from ſeed, which ſhould be ſown on a moderate hot-bed in March, and when the plants are ſtrong enough to tranſplant, be pricked out upon another moderate hot-bed to bring them forward, having a large ſhare of air in warm weather, to prevent their drawing up weak. Or they may be ſown in pots of light mould, and plunged in the hot-bed, which is probably the better practice. In the firſt mode, about the end of May the plants may be planted out, ſome into pots, to place in or near the apartments, and others into warm borders, where they may remain to flower and ſeed. The plants which grow in the full ground, often produce more ſeeds than thoſe which are in pots; but at the time when the ſeed-veſſels begin to ſwell, the plants are frequently apt to be infeſted with green caterpillars, which, if they are not deſtroyed, eat off all the ſeed-veſſels.

And when the ſeeds are ſown on a bed of light earth in April, the plants come up very well; and when not tranſplanted, grow larger than thoſe which are raiſed in the hot-bed; but they do not flower ſo early, and in cold ſeaſons ſcarcely ripen their ſeeds. In a warm dry border, however, the ſeeds often come up ſpontaneouſly, and grow very luxuriantly; but to have the flowers early in ſpring, the ſeeds ſhould be ſown in pots in autumn, being kept in frames through the winter, or on a gentle hot-bed in ſpring. The plants may alſo be preſerved through the winter in a greenhouſe, where they

they continue flowering moſt part of the year, but the ſecond year they are not ſo vigorous as in the firſt.

It is cultivated for the fine fragrant ſmell which it affords, when pots of it are ſet about the houſe.

The ſeed becomes ripe in the beginning of the autumn, when it ſhould be carefully collected in a dry ſeaſon, and put by in a dry place for future uſe, after having been properly cleaned.

RESEISER, Reseisire, in *Law*, a taking of lands into the king's hands, where a general delivery, or ouſter le main, was formerly miſuſed, contrary to order of law.

RESELE, in *Geography*, a town of Sweden, in Angermannland; 55 miles N.N.E. of Hernoſand.

RESEMBLANCE. See Similitude.

RESENIUS, John Paul, in *Biography*, a Daniſh biſhop and writer, was born at Reſen in 1561. He ſtudied at various ſchools, and in 1583 became ſubdirector of that at Viborg. Some time after he travelled into foreign countries, took a degree at Wittemberg, and returned to Denmark in 1591. He was afterwards appointed profeſſor of logic and theology in the univerſity of Copenhagen, and received orders to accompany Chriſtian IV., who propoſed a viſit to England to ſee his relation, king James. In conſequence of another royal mandate, he undertook to tranſlate the whole of the ſcriptures into Daniſh. He completed the New Teſtament firſt, which he publiſhed in two vols. 12mo. in 1605, and the Old Teſtament followed in 1607. This verſion of the bible gave riſe, in 1609, to a controverſy between Reſenius and Ivarus Stubœus, profeſſor of Hebrew at Copenhagen, the reſult of which was, that Stubœus was diſplaced from his office. In 1614 he was involved in another diſpute with Olaf Coccius, the clergyman of Nicolas' church, Copenhagen, which ended in the diſgrace and baniſhment of his opponent. Reſenius was raiſed to the epiſcopal chair. He died in 1638, and bequeathed upwards of 5000 dollars to charitable purpoſes. He was author of many works, chiefly on ſubjects connected with theology. Gen. Biog.

Resenius, Peter, counſellor of ſtate in Denmark, was born at Copenhagen in 1625, and in 1646 he went to Leyden, where he applied himſelf to the ſtudy of juriſprudence and the belles lettres during the ſpace of four years, and then made a tour to France, Spain, and Italy. He took the degree of L.L.D. at Padua, and then returned to Copenhagen, where he married in 1655, and two years after was appointed profeſſor of moral philoſophy. In 1680 he was ennobled, and in 1684 was nominated a counſellor of ſtate. This learned man died in 1688, and bequeathed a large ſum of money, and a very valuable library, to the univerſity of Copenhagen. He was author of a great number of works, the titles of which are enumerated in the General Biography.

RESENTMENT is a leſſer degree of wrath, which is violent and permanent anger, and is excited by ſmaller offences, or by offences committed againſt leſs irritable minds: it is a deep reflective diſpleaſure againſt the conduct of the offender. Indignation is a reſentment againſt a conduct that appears peculiarly unworthy:—ſome atrocious violation of the principles of gratitude, or ſomething which appears peculiarly deſpicable and baſe. Reſentment is chiefly excited by ſome perſonal offence againſt the laws of ſocial intercourſe, of friendſhip, or of gratitude, and may terminate in indifference, and, in weak minds, in malice; but it is uſually appeaſed by conceſſions and acknowledgments.

RESERVATION, Reservatio, in *Law*, an action or clauſe by which ſomething is reſerved, *i. e.* is retained, kept, or ſecured to one's ſelf.

Thus, when a man lets his land, he reſerves a rent to be paid to himſelf for his maintenance, &c.

William the Conqueror, getting all the lands of England, except thoſe belonging to the church and religious houſes, into his hands by right of conqueſt, beſtowed a great part of them among his followers, reſerving ſome retribution of rents and ſervices to him and his heirs; which reſervation is now, as it was before the Conqueſt, called the tenure of the lands.

Sometimes reſervation ſignifies as much as an exception; as, when a man lets a houſe, and reſerves to himſelf one room, that room is excepted out of the demiſe.

Reservation, *Mental*, is a propoſition, which, ſtrictly taken, and according to the natural import of the terms, is falſe; but if qualified with ſomething reſerved or concealed in the mind, becomes true.

Mental reſervations are the great refuge of religious hypocrites, who uſe them to accommodate their conſciences with their intereſts. The Jeſuits are zealous advocates for mental reſervations; yet are they ſtrictly all real lyes, as including an intention to deceive.

RESERVATORY. See Reservoir.

RESERVE, in *Law*, the ſame with *reſervation*; which ſee.

Benefices are ſometimes reſigned with reſerve of a penſion. By the canon law, no perſon may reſerve to himſelf a penſion out of a benefice, unleſs he hath ſerved it ten years.

In the Romiſh church the ordinary prieſts have only a power to abſolve, in reſerve of certain caſes, hence called *reſerved caſes*, as being reſerved to the biſhop.

The court reſerves the cognizance of ſuch an affair to itſelf. The lawyers ſay, that no prince ever granted ſuch a power by his letters or patents, but that he reſerves to himſelf a greater.

Reserve, *body of, corps de reſerve*, in *War*. See Body *of Reſerve*.

Reserve *Guard* denotes the ſame as a *picquet* guard, except that the one mounts at troop-beating, and the other at retreat-beating. See Guard.

RESERVED Cases. See Cases.

RESERVOIR, a large pond or pen of water, artificially made, in order to retain and collect it for the uſe of canals, rivers, mills, &c. See Bason and Canal.

The reſervoir in a building is a large baſon, uſually of wood, lined with lead, where water is kept to ſupply the occaſions of the houſe. At Cannons, the late noble ſeat of the duke of Chandois, there was a very large reſervoir at the top of the houſe, to which the water was raiſed by a curious engine, contrived for the purpoſe. This reſervoir was of ſuch capacity, as that, beſides ſupplying all parts of the houſe by means of pipes and cocks, it likewiſe turned a mill.

The reſervoir is ſometimes alſo a large baſon of ſtrong maſonry, clayed or paved at the bottom, where the water is reſerved to feed jets d'eau, or ſpouting fountains.

Such is that large one on the top of Marley, called *tron d'enfer, hell mouth*, whoſe ſurface, Daviler tells us, contains fifty acres, and its depth ſuch as to contain a hundred thouſand cubic fathom of water.

Reſervoirs are of great uſe in collecting and preſerving the urine or other liquid matters diſcharged from the ſheds or ſtables where cattle or other animals are kept, for the purpoſe of manure, and ſhould of courſe be formed on all farm-yards. See Farm-*Yard*.

Such a reſervoir is conceived to be eſſential, even where there are no lands proper for being overflowed by the contents of it, particularly where care is taken to ſupply it occaſionally with a bottom of ſome good rich earthy matter,

to

to be imbued with the rich particles of the more heavy ſubſtances which are let fall during the ſtagnant ſtate of the liquid. This matter ſhould be carried out in a dry time, when the water has been wholly removed by evaporation, and be ſpread out over the graſs lands, particularly thoſe under the ſcythe, as ſoon as poſſible after the hay has been taken off the ground. The benefit of a reſervoir of this nature, whether formed in the intention of flowing the land below it, or of a pond for catching the mud, will commonly be in the proportion of its extent. And the coſt of it will have a relation likewiſe to its dimenſions. It is ſuppoſed, that if the expence of one be ten pounds, and the annual increaſe of hay only one load, the farmer may well afford to pay ſix *per cent.* for the uſe of it. Therefore ſuch reſervoirs ſeldom fail to pay amply for the coſt of preparing them. In ſome ſloping ſituations they may be conſtructed at a very trifling expence, in compariſon of their uſefulneſs, when intended to be thrown over graſs lands, with a valve, by which, when full, the liquid may be let off, in a ſufficient body, to ſpread equally over the whole of the part to which it is applied, and produce the full effect that is wanted.

RESERVOIR, in *Anatomy*. See RECEPTACULUM *Chyli*.

RESET, in *Law*, the receiving or harbouring an outlawed perſon. Hence a receiver of an outlawed perſon is called a *reſetter*.

RESHD, or RESHT, in *Geography*, a town of Perſia, and capital of the province of Ghilan, built on the ſhore of the Caſpian, and carrying on a conſiderable trade in ſilk, and other articles, with Aſtrachan. The number of houſes, which lie diſperſed, is eſtimated at 2000. The heat in ſummer is hardly ſupportable, and dangerous, when a particular wind blows, but happily it does not continue above a quarter of an hour. The harbour is unſafe in ſtormy weather, ſo that the commanders of ſhips generally prefer that of Lankeroon, a ſmall port in the diſtrict of Taliſh, to the N.W. of Reſht. Rice and wheat are cultivated in its vicinity; 300 miles N. of Iſpahan. N. lat. 37° 20′. E. long. 49° 50′. The province of Ghilan yields a net revenue of 149,490 tomauns, and 9058 dinars.

RESIANCE, RESIANTIA, in *Law*, a man's abode, or continuance in a place.

The word has the ſame ſignification with regard to laymen, as *reſidence* with regard to eccleſiaſtics.

Glanville obſerves, that in the ancient law, reſiance properly ſignified a diſeaſe, by which the perſon was diſabled from ſtirring out of doors. Whence their *eſſoin de reſiantia*, was the ſame as our *eſſoin de malo lecto*.

RESIANT ROLLS, are rolls in which the reſiants of a tithing, &c. are ſet down.

RESIDENCE, RESIDENTIA, in *Canon* and *Common Law*, the abode of a perſon, or incumbent, upon his benefice; and his aſſiduity in attending on the ſame.

By the rule of the ancient canon law, beneficiaries are obliged to reſidence, without juſt and neceſſary cauſe, and eſpecially without the conſent of the dioceſan, under pain of deprivation of their benefices. The original reaſon is, that in the primitive church none were promoted to holy orders, but ſuch as had a benefice in promptu, which they were obliged to ſerve; ſo that this ſervice was neceſſarily attached to the orders; and whoever was honoured with them, at the ſame time was obliged to perſonal ſervice.

Regularly, perſonal reſidence is required of eccleſiaſtical perſons upon their cures; and to that end, by the canon law, if he that hath a benefice with cure be choſen to an office of bailiff, or beadle, or the like ſecular office, he may have the king's writ for his diſcharge. The intendment of the common law is that a clerk is reſident upon his cure. 2 Inſt. 625.

Reſidence is alſo required by ſtatute 9 Ed. II. ſtat. 1. c. 8, called the ſtatute articuli cleri. Thus alſo, by 21 Henry VIII. c. 13, commonly called the ſtatute of non-reſidence, perſons wilfully abſenting themſelves from their benefices for one month together, or two months in the year, incur a penalty of 5*l.* to the king, and 5*l.* to any perſon that will ſue for the ſame. And if any perſon or perſons ſhall procure at the court of Rome, or elſewhere, any licence or diſpenſation to be non-reſident at their ſaid dignities, prebends, or benefices, contrary to this act; every ſuch perſon, putting in execution any ſuch diſpenſation or licence for himſelf, ſhall incur the penalty of 20*l.* for every time ſo doing, to be forfeited and recovered as aforeſaid, and ſuch licence or diſpenſation ſhall be void. ſ. 27.

Provided, that this act of non-reſidence ſhall not extend nor be prejudicial to any ſuch ſpiritual perſon as ſhall chance to be in the king's ſervice beyond the ſea, nor to any perſon going to any pilgrimage or holy place beyond the ſea, during the time that they ſhall ſo be in the king's ſervice, or in the pilgrimage going and returning home; nor to any ſcholar or ſcholars being converſant and abiding for ſtudy, without fraud or covin, at any univerſity within this realm or without; nor to any of the chaplains of the king or queen, daily or quarterly attending and abiding in the king's or queen's moſt honourable houſehold; nor to any of the chaplains of the prince or princeſs, or any of the king's or queen's children, brethren, or ſiſters, attending daily in their honourable houſeholds, during ſo long as they ſhall attend in any of their houſeholds; nor to any chaplain of any archbiſhop or biſhop, or of any ſpiritual or temporal lords of the parliament, daily attending, abiding, and remaining in any of their honourable houſeholds; nor to any chaplain of any ducheſs, marqueſs, counteſs, viſcounteſs, or baroneſs, attending daily, and abiding in any of their honourable houſeholds; nor to any chaplain of the lord chancellor, or treaſurer of England, the king's chamberlain, or ſteward of his houſehold for the time being, the treaſurer and controller of the king's moſt honourable houſehold for the time being, attending daily in any of their honourable houſeholds; nor to any chaplain of any of the knights of the honourable order of the garter, or of the chief juſtice of the king's bench, warden of the ports, or of the maſter of the rolls, nor to any chaplain of the king's ſecretary, dean of the chapel, amner for the time being, daily attending and dwelling in any of their houſeholds, during the time that they ſhall ſo abide and dwell, without fraud or covin, in any of the ſaid honourable houſeholds; nor to the maſter of the rolls, or dean of the arches, nor to any chancellor or commiſſary of any archbiſhop or biſhop, nor to as many of the twelve maſters of the chancery, and twelve advocates of the arches, as ſhall be ſpiritual men, during ſo long time as they ſhall occupy their ſaid rooms and offices; nor to any ſuch ſpiritual perſons as ſhall happen by injunction of the lord chancellor, or the king's council, to be bound to any daily appearance and attendance to anſwer to the law, during the time of ſuch injunction. ſ. 28.

Provided alſo, that it ſhall be lawful to the king to give licence to every of his own chaplains, for non-reſidence upon their benefices; any thing in this act to the contrary notwithſtanding. ſ. 29.

Provided alſo, that every ducheſs, marqueſs, counteſs, baroneſs, widows, which ſhall take any huſbands under the degree of a baron, may take ſuch number of chaplains as they might have done being widows; and that every ſuch chaplain may have like liberty of non-reſidence, as they might have had if their ſaid ladies and miſtreſſes had kept themſelves widows. ſ. 33.

Legal reſidence is not only in the pariſh, but alſo in the parſonage

parſonage houſe; for it hath been reſolved, that the ſtatute intended reſidence, not only for ſerving the cure, and for hoſpitality, but alſo for maintaining the houſe, that the ſucceſſor alſo may keep hoſpitality there. 25 Hen. VIII. cap. 16. 33 Hen. VIII. cap. 28. 28 Hen. VIII. cap. 13.

On a review of theſe ſtatutes, a queſtion has occurred, how far, taken together, they ſuperſede the canon law, ſo as to take away the power which the ordinary had before, of enjoining reſidence to the clergy of his dioceſe. It ſeems to be clear, that before theſe ſtatutes, the biſhops of this realm had and exerciſed a power of calling their clergy to reſidence; but more frequently, they did not exert this power, which ſo far forth was to the clergy a virtual diſpenſation for non-reſidence. But this not exerting of their power was in them not always voluntary; for they were under the controlling influence of the pope, who granted diſpenſations of non-reſidence to as many as would purchaſe them, and diſpoſed of abundance of eccleſiaſtical preferments to foreigners, who never reſided here at all. The king alſo, as appears, had a power to require the ſervice of clergymen; and conſequently in ſuch caſe to diſpenſe with them for non reſidence upon their benefices. This power of the king is reſerved to him by the aforeſaid act of the 21 Hen. VIII. c. 13. But it is the power of diſpenſation in the two former caſes which is intended to be taken away, namely, by the biſhop, and by the pope; and by the ſaid act reſidence is injoined to the clergy, under the penalty therein mentioned, notwithſtanding any diſpenſation to the contrary, from the court of Rome or elſewhere; with a proviſo nevertheleſs, that the ſaid act ſhall not extend nor be prejudicial to the chaplains and others therein ſpecially excepted. It is argued, that this act being made to rectify what had been inſufficient or ineffectual in the canon law, and inflicting a temporal penalty to inforce the obligation of reſidence, the parliament intended that the ſaid act ſhould be, from thenceforth, if not the ſole, yet the principal rule of proceeding in this particular; and conſequently, that the perſons excepted in the act need no other exemption than what is given to them by the act of their non-reſidence. Unto this it is anſwered, that the intention of the act was not to take away any power which the biſhop had of injoining reſidence, but the contrary; namely, it was to take away that power which the biſhop or pope exerciſed, of granting diſpenſations for non-reſidence, that is to ſay, the act left to them that power which was beneficial, and only took from them that which tended to the detriment of the church; and, conſequently, that the biſhop may injoin reſidence to the clergy as he might before, only he may not diſpenſe with them as he did before for non-reſidence. And indeed, from any thing that appears upon the face of the act, the contrary ſuppoſition ſeemeth to bear ſomewhat hard againſt the rule which hath generally been adhered to in the conſtruction of acts of parliament, that an act of parliament in the affirmative doth not take away the eccleſiaſtical juriſdiction, and that the ſame ſhall not be taken away in any act of parliament, but by expreſs words. It is therefore further urged, that the three ſubſequent acts do explain this act, and by the expreſs words thereof do eſtabliſh the foregoing interpretation. In the firſt of the three it is ſaid, that the perſons therein mentioned may retain one chaplain *which may be abſent from his benefice, and not reſident upon the ſame;* in the ſecond it is ſaid, that perſons above forty years of age, reſiding in the univerſities, *ſhall not be excuſed of their non-reſidence,* and again, that perſons *under* forty years of age, *ſhall not enjoy the privilege of non-reſidence contained in the proviſo of the ſaid former act,* unleſs they perform the common exerciſes there, and the like, which implies, that if they do this, they ſhall enjoy ſuch privilege: and in the third, it is ſaid, that the perſons therein mentioned may retain one chaplain, *which may be abſent from his benefice, and non-reſident upon the ſame;* and it is not to be ſuppoſed, that the parliament intended a greater privilege to the chaplains of the inferior officers mentioned in the ſaid laſt act, than to the chaplains of the royal family and principal nobility mentioned in the firſt act. Unto this the moſt appoſite anſwer ſeemeth to be, that it is not expreſſed abſolutely in any of the ſaid three acts, that the chaplains or others therein mentioned ſhall enjoy the privilege of non-reſidence, or may be abſent from their benefices, and not reſident upon the ſame; but only this, that they may be abſent or non-reſident as aforeſaid, *the ſaid ſtatute made in the ſaid twenty-firſt year, or any other ſtatute or ordinance to the contrary notwithſtanding.* So that they are only exempted thereby from the reſtraints introduced by the ſtatute law; but in other reſpects are left as they were before.—But concerning this, although it is a caſe likely enough to happen every day, there hath been no adjudication.

By 43 Geo. III. c. 84. it is enacted, that ſo much of 21 Hen. VIII. c. 13. as impoſes the penalty of ten pounds on any ſpiritual perſon who ſhall not keep reſidence on one of his dignities, prebends, or benefices, but abſent himſelf one month together, or two months, to be accounted at ſeveral times, in any one year, ſhall be, and the ſame is hereby repealed; and that every ſpiritual perſon, being poſſeſſed of any archdeaconry, deanery, or other dignity, prebend, benefice, donative, or perpetual curacy, or parochial chapelry, who ſhall, without ſufficient cauſe, as in the ſaid act, or the 25 Hen VIII. c. 16. or in 28 Hen. VIII. c. 13. or in 33 Hen. VIII. c. 28. is ſpecified, or ſuch other ſufficient cauſe as would exempt ſuch ſpiritual perſon from any of the pains, penalties, and forfeitures under the ſaid recited acts, for any non-reſidence, and who ſhall not have any ſuch licence or exemption as is in this act mentioned, wilfully abſent himſelf therefrom for three months together, or to be accounted at ſeveral times in any one year, and make his reſidence at any other place or places, except at ſome other dignity, prebend, benefice, donative, perpetual curacy, or parochial chapelry, of which he may be poſſeſſed, ſhall, when ſuch abſence ſhall exceed ſuch period, and not exceed ſix months, forfeit and pay one-third of the annual value of the dignity, prebend, benefice, donative, perpetual curacy, or parochial chapelry, from which he ſhall ſo abſent himſelf; and when ſuch abſence ſhall exceed ſix months, and not eight months, one-half of ſuch annual value; and when ſuch abſence ſhall exceed eight months, two-thirds of ſuch annual value; and when ſuch abſence ſhall have been for the whole of the year, three-fourths of ſuch annual value; to be recovered by action of debt, bill, plaint, or information, in any of his majeſty's courts of record at Weſtminſter, or the courts of great ſeſſions in Wales, wherein no eſſoign, privilege, protection, or wager of law, or more than one imparlance, ſhall be allowed; and the whole of every ſuch penalty or forfeiture ſhall go and be paid to the perſon or perſons who ſhall inform and ſue for the ſame, together with ſuch coſts of ſuit as ſhall be allowed; provided that no parſonage that hath a vicar endowed, or perpetual curate, and having no cure of ſouls, ſhall be taken to be or be comprehended under the name of benefice, within the meaning of this act. ſ. 12.

No ſpiritual perſon holding any office, in ſuch manner as the ſame, under any of the proviſions of the ſaid recited acts, would exempt ſuch ſpiritual perſons from reſidence, or from the penalties and forfeitures in the ſaid acts contained for non-reſidence, or actually ſerving as a chaplain of the houſe of commons, or as a clerk of his majeſty's cloſet, or as a deputy

a deputy clerk thereof, or as a chaplain general of his majesty's forces, or brigade chaplain on foreign service, or chaplain on board any of his majesty's ships, or of his majesty's dock yards, or in any of his majesty's garrisons, or chaplain of his majesty's corps of artillery, or as chaplain to any British factory, or in the household of any British ambassador or public minister residing abroad, or as chancellor or vicar-general, or in his absence the principal surrogate or official in any ecclesiastical court of any diocese, or as minor canon, or vicar choral, or priest, vicar, or any such other public officer in any cathedral or collegiate church, or as deans, sub-deans, priests, or readers in his majesty's royal chapels at St. James's and Whitehall, or as reader in his majesty's private chapel at Windsor, or elsewhere, or as chaplain at the royal military asylum at Chelsea, or royal military college at High Wycombe, or teacher at the royal military academy at Woolwich, or chaplains at the royal hospitals at Greenwich and Chelsea, or as chaplains to the royal hospitals for seamen at Haslar and Plymouth, or as a preacher or reader in any of the inns of court, or at the rolls, or as bursar, dean, vice-president or public tutor or chaplain, or other such public officer, in any college or hall, in either of the universities of Oxford or Cambridge, or as public librarian or public registrar, or proctor, or public orator, or other such public officer, in either of the said universities, or as fellow of any college in either of the universities, or of Eton or Winchester college, or as warden or provost of Eton or Winchester college, or as schoolmaster or usher in the same, or as schoolmaster or usher of Westminster-school, during the period that they shall respectively be required, by reason of any such office, to perform the duties of the same, and actually shall perform the duties of the same, shall be liable to any of the pains, penalties, or forfeitures in the said first recited act or this act contained, for or on account of any non-residence on any dignity, prebend, benefice, donative, or perpetual curacy. s. 15.

It shall be lawful for any bishop to grant licences to spiritual persons within his diocese, to reside out of the proper house of residence, or out of the parish, and within such distance therefrom, as the case may appear to such bishop to require, if such bishop shall, in his discretion, think the same fit and proper, in the several cases hereinafter mentioned; (that is to say,) to any spiritual person who shall be prevented from residing in the proper house of residence, or in the parish, by actual illness of himself, or wife or child; and also to any spiritual person having any dignity, prebend, benefice, donative, perpetual curacy, or parochial chapelry, where there shall be no house of residence, or where the house of residence shall be unfit for the residence of such ecclesiastical person, such unfitness not being occasioned by such ecclesiastical person, such spiritual person keeping such house in such repair as shall be to the satisfaction of the bishop; and also to any spiritual person having any benefice, donative, perpetual curacy, or parochial chapelry, and having any mansion or messuage belonging to himself or any relative, to reside in such mansion or messuage, such spiritual person keeping the house of residence in good repair, to the satisfaction of the bishop; and also to any spiritual person having any benefice, donative, perpetual curacy, or parochial chapelry, of small value, and serving as a stipendiary curate elsewhere, with licence, and providing for the serving of such his benefice, donative, perpetual curacy, or parochial chapelry, to the satisfaction of the bishop of his diocese; and also to any master or usher of any endowed school duly licensed by the bishop, and actually employed in teaching therein, or to the master of any other school who now is or shall be, within one month after the passing of this act, duly licensed by the bishop; and also to any master or preacher of hospitals or incorporated charitable foundation, during the period for which he may be required to reside in the same, and shall actually reside and perform his duties therein; or to any person holding any endowed lectureship, chapelry, or preachership, and performing the duties thereof respectively; or to any spiritual person having any benefice, donative, perpetual curacy, or parochial chapelry of small value, and serving as preacher in any proprietary chapel in cities or towns, with the licence of the bishop in whose diocese he shall so officiate; or to the librarians of the British museum, or of Sion college; or to the trustees of lord Crewe's charity, during the times of their personal attendance on the duties of their office: provided always, that for any such licence, the party obtaining the same shall not pay more than the sum of ten shillings, exclusive of any such stamps as may be required by law: provided always, that if any spiritual person, applying to any bishop for any such licence, shall think himself aggrieved by the refusal thereof, it shall be lawful for such spiritual person to appeal to the archbishop of the province, who shall confirm such refusal, or grant a licence under this act, as shall seem just and proper. s. 19.

It shall be lawful for any bishop, in cases not enumerated, to grant licences to reside out of the proper house of residence, or out of the parish, and to assign to a curate such salary as he shall judge fit: provided, that in every such case, the reasons that have induced such bishop to grant such licence shall be transmitted to the archbishop of the province to which such bishop shall belong, who shall allow or disallow such licence, in the whole, or in part, or make any alteration therein, as to the period for which the same may have been granted, or otherwise, and likewise as to the stipend assigned to the curate, as to such archbishop shall seem fit; and no such licence shall be good unless it shall have been so allowed and approved by such archbishop: provided also, that no licence shall be made void by the death or removal of the bishop or archbishop granting the same, but the same shall be good and valid, unless the same shall be revoked by the next or any succeeding bishop or archbishop: provided also, that any spiritual person may appeal against any such revocation by the bishop alone: provided also, that the respective archbishops may, in their respective dioceses of which they are bishops, grant licences in all cases in which any licences may be granted by any bishop, either by his own authority, or with the allowance and approval of the archbishop as aforesaid: provided also, that it shall be lawful for any such archbishop to order reasonable fees and charges to be paid by any such spiritual person appealing: provided always, that in every case when any costs and charges directed by such archbishop or bishop as aforesaid, shall remain unpaid for the period of twenty-one days after demand thereof, it shall be lawful for such bishop or archbishop to cause the same to be recovered by sequestration. s. 21.

Provided always, that it shall be lawful for any bishop or archbishop to revoke any such licence: provided also, that no licence for non-residence granted under this act shall continue in force for more than two years from the granting thereof.

Every bishop or archbishop shall cause a copy of such licence or revocation to be filed in the registry of the diocese; and a list shall be made out by the register of the said diocese, and entered in a book, and kept for the inspection of all persons; and a copy of every such licence and revocation shall be transmitted to the churchwardens of the parish to which the same relates, within one month after the grant thereof.

thereof, to be by them depoſited in the pariſh cheſt; and a copy of the ſame ſhall likewiſe be read at the viſitation of the archdeacon. ſ. 22.

Provided, that during the vacancy of any ſee, the power of granting licences under this act ſhall be exerciſed by the vicar-general of the dioceſe; and that during the abſence of any prelate out of the realm, or ſuch infirmity as diſables him from exerciſing in perſon the functions of his office, it ſhall be exerciſed by ſuch perſon or perſons as is or are lawfully empowered to exerciſe his general juriſdiction in the dioceſe. ſ. 28.

And nothing in this act ſhall exempt any perſon or perſons from any canonical or eccleſiaſtical cenſures, or affect any proceedings in any eccleſiaſtical court, in relation to non-reſidence, not being duly licenſed according to the proviſions of this act, to be abſent therefrom, nor having any other lawful cauſe of abſence; provided no ſuch cenſures, by reaſon of any non-reſidence, not exceeding three months in any one year, ſhall be put in force at the ſuit or inſtance of any perſon or perſons other than the archbiſhop, biſhop, or archdeacon. ſ. 29.

In every caſe in which it ſhall appear to any biſhop or archbiſhop, that any ſpiritual perſon, not being licenſed according to this act, nor having any other lawful cauſe of abſence, does not ſufficiently reſide, it ſhall be lawful for ſuch biſhop or archbiſhop to iſſue a monition to ſuch ſpiritual perſon, to reſide thereon, and to make a return to ſuch monition within a certain number of days after the iſſuing thereof; ſo as that there ſhall be thirty days between the time of executing ſuch monition, and the time ſpecified for the return thereto; and it ſhall be lawful for the biſhop or archbiſhop to whom any ſuch return ſhall be made, to require ſuch return to be verified by the oath of ſuch ſpiritual perſon, or others; and where no ſuch return ſhall be made, or where ſuch return ſhall not be deemed ſatisfactory, it ſhall be lawful for ſuch biſhop or archbiſhop to iſſue an order to require ſuch perſon to proceed to and reſide, within thirty days after ſuch order ſhall have been delivered; and in caſe of non-compliance, to ſequeſter the profits of ſuch benefice, donative, perpetual curacy, or parochial chapelry of ſuch ſpiritual perſon, and to direct the application of ſuch profits, after deducting the neceſſary expences of ſerving the cure, to the payment of ſuch expences as ſhall have been incurred in relation to ſuch monition and ſequeſtration, and in the next place, towards the augmentation or improvement of any ſuch parſonage, vicarage, donative, or perpetual curacy, or the houſe of reſidence, or any of the buildings and appurtenances, or any of the glebe or demeſne lands; or may order and direct the ſame, or any portion thereof, to be paid to the governors of the bounty of queen Anne, to be applied as ſuch biſhop or archbiſhop ſhall in his diſcretion think fit; and it ſhall alſo be lawful for any ſuch biſhop or archbiſhop, within ſix months after ſuch order for ſequeſtration, or within ſix months after any money ſhall have been actually levied by ſuch ſequeſtration, to remit to any ſuch ſpiritual perſon any part of ſuch profits, or cauſe the ſame or any part thereof that ſhall have been paid to ſuch governors of queen Anne's bounty, to be repaid to ſuch ſpiritual perſon, in any caſe in which, by reaſon of the ſubſequent obedience of any ſuch ſpiritual perſon, ſuch biſhop or archbiſhop ſhall think the ſame proper: provided, that when any ſuch ſpiritual perſon ſhall think himſelf aggrieved by reaſon of any ſuch ſequeſtration, it ſhall be lawful for any ſuch ſpiritual perſon to appeal to the archbiſhop, who ſhall make ſuch order as ſhall be juſt and proper: provided, that the party ſo appealing ſhall give ſecurity to the biſhop for the payment of expences occaſioned by the appeal: provided alſo, that no ſuch order for any ſequeſtration ſhall be put in force during ſuch appeal. ſ. 30.

Perſons who ſhall return to reſidence on monition, ſhall pay the coſts. ſ. 31.

If any perſon, returning to reſidence on monition, ſhall before ſix months thereafter abſent himſelf, the biſhop may, without monition, ſequeſtrate the profits of the benefice. ſ. 32.

And if any clerk ſhall continue under any ſequeſtration for non-reſidence for the ſpace of three years, or ſhall incur three ſequeſtrations in the ſaid ſpace of three years, not being relieved with reſpect to any of ſuch ſequeſtrations, upon appeal, the benefice ſhall become *ipſo facto* void, and the patron or perſon entitled to preſent or nominate ſome clerk thereto, other than the clerk who ſhall have ſo continued under ſuch ſequeſtration or ſequeſtrations. ſ. 33.

Provided, that if an action be brought before the iſſuing of the monition, the biſhop or archbiſhop ſhall retain out of the profits of the benefice ſufficient to ſatisfy the penalty and coſts; but if at the time of filing the monition, no action ſhall have been commenced, none ſhall be brought afterwards. ſ. 36.

But nothing in this act contained ſhall affect his majeſty's royal prerogative in the granting of diſpenſations for non-reſidence, nor any privilege of clerks retained in his majeſty's ſervice under the ſtatute 9 Edward II. c. 8.—ſ. 40.

No archbiſhop or biſhop having any dignity, prebend, benefice, donative, or perpetual cure, ſhall, by reaſon of non-reſidence, be ſubject or liable to any penalties or forfeitures. ſ. 41.

By 54 Geo. III. c. 175. biſhops are empowered to puniſh paſt non-reſidence by monition and ſequeſtration, as well as to compel reſidence in future, and to exerciſe the ſame powers of remitting or ordering the repayment of any part of ſuch penalties as is directed or allowed in 43 Geo. III. c. 84. Perſons may appeal, as under the laſt cited act, and penalties may be remitted; nor are penalties recoverable for more than one year. This ſtatute repeals the proviſion of the former act 43 Geo. III. as to perſons neglecting to notify the cauſe of exemption from reſidence, for which it is not neceſſary to obtain a licence, and enacts that a perſon chargeable with ſuch neglect ſhall forfeit and pay for ſuch offence the ſum of 20*l.* to be levied by ſequeſtration, if not otherwiſe paid after monition, to be applied as the archbiſhop or biſhop of the dioceſe to whom the notification ought to have been made ſhall direct, who poſſeſſes the power of remitting or ordering the repayment of any part of ſuch penalties, as is allowed in the ſaid act, in caſes of non-compliance with an order for reſidence. A perſon who has no houſe of reſidence, but who ſhall have reſided nine months in the year within the limits of his benefice, donative, perpetual curacy, or parochial chapelry, ſhall not be liable to any penalties on account of non-reſidence, nor be obliged to take out any licence for it; but the ſame ſhall be deemed a legal reſidence; and in all returns made by the biſhops, perſons ſo reſiding ſhall be returned as reſident. It is enacted alſo, that houſes purchaſed by the governors of queen Anne's bounty, though not ſituated within the pariſhes for which they are purchaſed, ſhall be deemed reſidences; and in all caſes of ſinecure rectories having vicarages endowed, the reſidence of the vicar in the rectory houſe ſhall be deemed a ſufficient legal reſidence.

For leaſes of non-reſidents, ſee LEASE.

We obſerve here, that the act of 13 Eliz. c. 20, referred to under LEASE, which was at firſt temporary, but made perpetual by 3 Car I. c. 4, is repealed by 43 Geo. III. c. 84, as well as ſeveral other ſtatutes, ſo far as they relate to it. This ſtatute enacts, that ſpiritual perſons may take houſes, &c. though not in a city, &c. and ſuch as have not ſufficient glebe may, by conſent of the biſhop, take farms. They may alſo hold eſtates as property, but not any farm for cultivation, unleſs under a leaſe granted on or before Jan. 1, 1803, or by conſent of the biſhop. They may alſo buy or ſell cattle or corn for the occupation of farms. Vicars or curates may take leaſes of the impropriate parſonages of their pariſhes; but if not occupied by a ſpiritual perſon before the paſſing of this act, the licence of the biſhop is neceſſary. A licenſed clergyman, or one exempt from reſidence, may occupy, where he reſides, ſuch lands as the biſhop may allow. This ſtatute is amended, in ſeveral reſpects, by 54 Geo. III. c. 175. By one clauſe in this laſt act, ſo much of 53 Geo. III. c. 149, as enacts that incumbents, neglecting to notify the death of a curate, ſhall loſe his exemption from reſidence, or licence for non-reſidence, is repealed; and a penalty of 20*l.* is impoſed.

By 53 Geo. III. c. 149. ſ. 2, the biſhop or ordinary is empowered to appoint ſalaries to licenſed curates; the licence ſpecifying the amount of ſuch ſalary; and curates may be directed to reſide in the parſonage houſe in caſe of the non-reſidence of incumbents for four months in each year, during the ſaid non-reſidence: but the diſtance of the reſidence of ſuch curate, licenſed to reſide out of the pariſh, from any church or chapel which he ſhall be licenſed to ſerve, ſhall not exceed five ſtatute miles, except in caſes of neceſſity, to be approved by the biſhop or ordinary, and ſpecified in the licence. The biſhop may direct the curate to give up poſſeſſion of the parſonage or vicarage houſe, and in caſe of refuſal, he ſhall forfeit to the rector or vicar, all ſuch parts of his ſtipend as ſhall then be unpaid, or ſhall thereafter become due, and alſo the ſum of 50*l.* to ſuch rector or vicar, recoverable in an action of debt. The ſalaries payable to curates ſhall be in proportion to the value of the benefices; in no caſe leſs than 80*l.* *per annum*, or than the annual value of the benefice, donative, perpetual curacy, or parochial chapelry, if the ſaid value ſhall not amount to 80*l.* *per annum*; nor leſs than 100*l.* *per annum*, or the whole value as aforeſaid, if the ſaid value ſhall not amount to 100*l.* *per annum* in any pariſh or place where the population, (according to the returns then laſt made in purſuance of any act or acts of parliament,) ſhall amount to or exceed 300 perſons; and ſuch ſalary ſhall not be leſs than 120*l.* *per annum*, or the whole value as aforeſaid, if the ſaid value ſhall not amount to 120*l.* *per annum*, in any pariſh or place where the population ſhall appear as aforeſaid to amount to or exceed 500 perſons; and ſuch ſalary ſhall not be leſs than 150*l.* *per annum*, or than the whole value as aforeſaid, if the ſaid value ſhall not amount to 150*l.* *per annum*, in any pariſh or place where the population ſhall appear, as aforeſaid, to amount to or exceed 1000 perſons: provided always, that the annual value of all benefices, donatives, perpetual curacies, or parochial chapelries, of which the ſaid value, eſtimated as is herein provided, does not amount to 150*l.* *per annum*, ſhall be eſtimated from the returns made by the biſhops of the ſeveral dioceſes to the governors of queen Anne's bounty, in purſuance of an addreſs of the houſe of lords, or from any future returns which may be made by the ſaid biſhops to the ſaid governors, reſpecting pariſhes or places omitted in the ſaid returns, or reſpecting pariſhes or places in the actual income of which it ſhall be made appear to the ſaid biſhops that any conſiderable variation has taken place, either by augmentations made by the ſaid governors or otherwiſe.

However, where the curate's ſalary is of the value of the benefice, it ſhall be liable to the charges affecting it. When the curate is permitted to ſerve in an adjoining pariſh, it ſhall be lawful for the biſhop or ordinary to appoint for ſuch incumbent, or perpetual curate, ſo licenſed, a ſalary leſs by a ſum not exceeding 30*l.* *per annum*, than the ſalary which in the ſeveral caſes herein before mentioned the biſhop or ordinary is reſpectively required by this act to appoint; and in every caſe where the biſhop or ordinary ſhall find it neceſſary or expedient as aforeſaid, to licenſe one and the ſame perſon to ſerve as curate for two adjoining or other pariſhes or places, it ſhall be lawful for ſuch biſhop or ordinary to direct that during ſuch time as ſuch curate ſhall ſerve ſuch two churches or chapels, the ſalary to be received by him for ſerving each of the ſaid churches or chapels ſhall be leſs by a ſum not exceeding 30*l.* *per annum*, than the ſalary which in the ſeveral caſes herein before mentioned the biſhop or ordinary is required by this act to appoint: Provided always, that no ſuch ſalary ſhall in any caſe be leſs than 50*l.* *per annum*, or than the whole value of the ſaid benefice, donative, perpetual curacy, or parochial chapelry, which ſuch incumbent, perpetual curate, or curate, ſhall be licenſed to ſerve, if the ſaid value ſhall not amount to 50*l.* *per annum*: Provided always, that no incumbent, perpetual curate, or curate, ſhall be licenſed to ſerve as curate in any church or chapel which is diſtant more than five ſtatute miles from any church or chapel already ſerved by ſuch incumbent, perpetual curate, or curate, except in caſes of neceſſity, to be approved by the biſhop or ordinary, and ſpecified in the licence.

In certain caſes, ſmaller ſalaries are to be allowed to curates. The biſhop is to allow the rector, &c. to deduct from the curate's ſalary for repairs to a limited amount, ſo that it ſhall not in any year exceed one-fourth part of the ſalary allotted to the curate. The curate is required, in certain caſes, to pay the taxes of the parſonage houſe. Where the benefice, clear of all deductions, exceeds 400*l.* *per annum*, the biſhop may aſſign to the curate of ſuch pariſh or place, reſident within the ſame, and ſerving no other cure, a ſalary of 100*l.* *per annum*, though the population may not amount to 300 perſons; and if the population ſhould amount to 500 perſons, the biſhop may aſſign to the curate any larger ſtipend or allowance, ſo that the ſame ſhall not exceed by more than 50*l.* *per annum* the amount of the ſtipend or allowance before ſpecified, as required to be aſſigned to ſuch curate. No licence ſhall be granted to ſerve more than two churches in one day; excepting only in certain caſes, where three chapels or churches are not diſtant from each other more than four meaſured miles, the reaſons for granting ſuch licence being ſtated in it; and it is required that the reſidence of the curate be ſuch, that it ſhall not be neceſſary for him to travel more than fifteen miles to perform his whole duty. An incumbent applying for licence for non-reſidence ſhall ſtate what ſalary he propoſes to give to his curate. See CURATE.

Biſhops are not puniſhable by the ſtatute of the 21 Hen. VIII. for non-reſidence upon their biſhoprics; but although an archbiſhop or biſhop be not tied to be reſident upon his biſhopric by the ſtatutes; yet they are thereto obliged by the eccleſiaſtical law, and may be compelled to keep reſidence by eccleſiaſtical cenſures. (Watſ. c. 37.) See alſo the conſtitutions of archbiſhop Langton, of Otho, and of Othobon. By canon 42, every dean, maſter, or warden, or chief governor of any cathedral or collegiate church, ſhall be reſident in the ſame fourſcore and ten days, *conjunctim* or *diviſim*,

divisim, in every year at the least, and then shall continue there in preaching the word of God, and keeping good hospitality; except he shall be otherwise let with weighty and urgent causes, to be approved by the bishop of the diocese, or in any other lawful sort dispensed with.

By can. 44 no prebendaries nor canons in cathedral or collegiate churches, having one or more benefices with cure, (and not being residentiaries in the same cathedral or collegiate churches,) shall, under colour of their said prebends, absent themselves from their benefices with cure above the space of one month in the year, unless it be for some urgent cause, and certain time to be allowed by the bishop of the diocese. And such of the said canons and prebendaries, as by the ordinances of the cathedral or collegiate churches do stand bound to be resident in the same, shall so among themselves sort and proportion the times of the year, concerning residence to be kept in the said churches, as that some of them always shall be personally resident there; and all those who be, or shall be residentiaries in any cathedral or collegiate church, shall, after the days of their residency appointed by their local statutes or custom expired, presently repair to their benefices, or some one of them, or to some other charge where the law requireth their presence, there to discharge their duties according to the laws in that case provided. And the bishop of the diocese shall see the same to be duly performed and put in execution.

So that, besides the general laws directing the residence of other clergymen, these dignitaries have another law peculiar to themselves, namely, the local statutes of their respective foundations, the validity of which local statutes this canon supposeth and affirmeth. And, with respect to the new foundations in particular, the act of parliament of the 6 Anne, c. 21. enacteth that their local statutes shall be in force, so far as they are not contrary to the constitution of the church of England, or the laws of the land. This canon is undoubtedly a part of the constitution of the church: so that if the canon interfereth in any respect with the said local statutes, the canon is to be preferred, and the local statutes to be in force only so far forth as they are modified and regulated by the canon.

There doth not appear to be any difference, either by the ecclesiastical or temporal laws of this kingdom, between the case of a rector and of a vicar concerning residence; except only that the vicar is sworn to reside, (with a proviso, unless he shall be otherwise dispensed withal by his diocesan,) and the rector is not sworn. And the reason of this difference was this: in the council of Lateran, held under Alexander III., and in another Lateran council, held under Innocent III., there were very strict canons made against pluralities; by the first of these councils pluralities are restrained, and every person admitted *ad ecclesiam, vel ecclesiasticum ministerium*, is bound to reside there, and personally serve the cure; by the second of these councils, if any person, having one benefice with cure of souls, accepts of a second, his first is declared void *ipso jure*. These canons were received in England, and are still part of our ecclesiastical law.

At the first appearance of these canons, there was no doubt made but they obliged all *rectors*; for they, according to the language of the law, had churches *in title*, and had *beneficium ecclesiasticum*: and of such the canons spoke. But *vicars* did not then look upon themselves to be bound by these canons, for they, as the gloss upon the decretals speaks, had not *ecclesiam quoad titulum*; and the text of the law describes them, not as *having benefices*, but as bound *personis et ecclesiis deservire*, that is, as assistant to the rector in his church.

Upon this notion a practice was founded, and prevailed in England, which eluded the canons made against pluralities. A man beneficed in one church could not accept another, without avoiding the first; but a man possessed of a benefice, could accept a vicarage under the rector in another church, for that was no benefice in law, and therefore not within the letter of the canon, which forbids any man holding two benefices.

The way then of taking a second living in fraud of the canon was this: a friend was presented, who took the institution, and had the church *quoad titulum*; as soon as he was possessed, he constituted the person vicar for whose benefit he took the living, and by consent of the diocesan, allotted the whole profit of the living for the vicar's portion, except a small matter reserved to himself.

This vicar went and resided upon his first living, for the canon reached him where he had the *benefice*; but having no benefice where he had only a vicarage, he thought himself secure against the said canons requiring residence.

This piece of management gave occasion to several papal decrees, and to the following constitution of archbishop Langton; *viz.* No ordinary shall admit any one to a vicarage, who will not personally officiate there. Lind. 64.

And to another constitution of the same archbishop, by which it is injoined, that vicars who will be non-resident shall be deprived. Lind. 131.

But the abuse still continued, and therefore Otho, in his legatine constitutions, applied a stronger remedy, ordaining, That none shall be admitted to a vicarage, but who, renouncing all other benefices (if he hath any) with cure of souls, shall swear that he will make residence there, and shall constantly so reside: otherwise his institution shall be null, and the vicarage shall be given to another. Athon. 24.

And it is upon the authority of this constitution that the oath of residence is administered to vicars to this day. And this obligation of vicars to residence was further inforced by a constitution of Othobon, as followeth: If any shall detain a vicarage contrary to the aforesaid constitution of Otho, he shall not appropriate to himself the profits thereof, but shall restore the same; one moiety whereof shall be applied to the use of that church, and the other moiety shall be distributed half to the poor of the parish, and half to the archdeacon. And the archdeacon shall make diligent inquiry every year, and cause this constitution to be strictly observed. And if he shall find that any one detaineth a vicarage contrary to the premises, he shall forthwith notify to the ordinary that such vicarage is vacant, who shall do what to him belongeth in the premises; and if the ordinary shall delay to institute another into such vicarage, he shall be suspended from collation, institution, or presentation to any benefices until he shall comply. And if any one shall strive to detain a vicarage contrary to the premises, and persist in his obstinacy for a month; he shall, besides the penalties aforesaid, be *ipso facto* deprived of his other benefices (if he have any); and shall be disabled for ever to hold such vicarage, which he hath so vexatiously detained, and from obtaining any other benefice for three years. And if the archdeacon shall be remiss in the premises, he shall be deprived of the share of the aforesaid penalty assigned to him, and be suspended from the entrance of the church, until he shall perform his duty. Athon. 95.

So that, upon the whole, the doubt was not, whether rectors were obliged to residence; the only question was, whether vicars were also obliged: and to inforce the residence

dence of vicars, in like manner as of rectors, the aforesaid constitutions were ordained. Sherl. ibid. p. 20, 21, 22.

By the 43 Geo. III. c. 84. no oath shall be required of or taken by any vicar in relation to residence on his vicarage. f. 37.

Can. 47. Every beneficed man licensed by the laws of this realm, upon urgent occasions of other service, not to reside upon his benefice, shall cause his cure to be supplied by a curate that is a sufficient and licensed preacher, if the worth of the benefice will bear it. But whosoever hath two benefices, shall maintain a preacher licensed in the benefice where he doth not reside, except he preach himself at both of them usually.

And by the last article of archbishop Wake's directions it is required, that the bishop shall take care, as much as possible, that whosoever is admitted to serve any cure, do reside in the parish where he is to serve; especially in livings that are able to support a resident cure: and where that cannot be done, that they do at at least reside so near to the place, that they may conveniently perform all their duties, both in the church and parish.

By the 36 Geo. III. c. 83. the ordinary, besides appointing to curates an allowance not exceeding 75*l. per ann.* may, on livings where the rector or vicar does not personally reside four months in the year at least, grant the use of the rectory or vicarage house, and the garden and stable thereto belonging, such use to be granted to the said curate for the space of twelve calendar months by the authority of the ordinary, under his hand and seal, with power in the said ordinary to renew and grant from time to time, or a further sum, not exceeding 15*l. per ann.* in lieu of such house, garden, and stable, in case there shall be none such, or it shall appear to him not to be convenient to allot and assign the same to such curate. Provided that the said house, garden, and stable, shall be for the use of the said curate and his family only during his *actual* residence in the said rectory and vicarage house. Provided also, that the ordinary shall have power at any time under his hand and seal, to revoke the grant to the said curate of the said house, garden, and stable, or any of them, and also to insert in such grant such terms and conditions to be observed on the part of the curate as he shall think reasonable.

By the faculty of dispensation, a pluralist is required, in that benefice from which he shall happen to be most absent, to preach thirteen sermons every year; and to exercise hospitality for two months yearly, and for that time, according to the fruits and profits thereof, as much as in him lieth, to support and relieve the inhabitants of that parish, especially the poor and needy.

By the 1 W. c. 26. if any person presented or nominated by either of the universities to a popish benefice with cure, shall be absent from the same above the space of sixty days in any one year; in such case, the said benefice shall become void. Burn's Eccl. Law, art. *Residence.*

Residence, in *Chemistry*, &c. the *settling*, or what remains of a liquor, or other substance, in the vessel after the chief part of it has been poured or taken out, to change the manner of the operation on what is left.

Residence, *Country*, in *Ornamental Gardening*, a rural habitation, mansion, or other kind of place, where it, as well as the ground which surrounds it, are formed and laid out in some sort of ornamental style. There have been a great many ways of accomplishing this proposed at different times, which have given rise to the variety of styles that have prevailed at different periods; but the *avowedly formal*, and the *affectedly graceful*, are the two which have been chiefly had recourse to, according to the writer of the "Treatise on Country Residences," before that of the free, characteristic, natural one, which he has suggested the introduction of; which is confined to no particular style or mode, but which furnishes and supplies beauties and effects which are suitable to the scene and situation, whatever the age or country may be from which they are borrowed, or by whatever epithets they may be called or known.

Suppose a piece of ground containing from four to five hundred acres, of which more than three hundred are to be formed into a residence; that a brook may pass through it, partly among meadows or wastes of copse and pasture, and partly along the hedge fences; that two farm-houses, some cottages, and belts of planting may likewise appear; that the farm-house in the centre is on the highest ground, which descends in varied and gentle slopes on every side to the margin of the brook, except toward a cluster of cottages upon the banks of it, where it abruptly terminates in a wooded precipice of rocks or gravel, or something of a similar kind.

The manner of forming a residence, in such a situation, according to the ancient formal style of a century ago, would, in the first place, have been to clear away every cottage, hedge, and tree; then to level down the precipice, and all irregularities. After which to form it into square fields and avenues, planting belts of trees between them. Two small woods would have been placed on each side of the house, and a large one near the garden. The water of the brook would have been introduced through a conduit, to an oblong canal; from that to two round basins in the central garden; thence to another oblong canal answering to the first. From that, under ground, as before, to two ponds in the large wood; after which to be carried by the side of the outer strip of plantation until it rejoined the former canal. The other parts are not very material. But it may be noticed that the surrounding fields would have nothing done to them, but the removal of the cottages, and the belt of planting, which would otherwise have closed the view from the avenue. The short avenues would probably be continued through the fields in single rows of trees.

And according to the affectedly graceful, or more modern style of Brown and his followers, the same portion of land would have been laid out by means of clearing, levelling, and smoothing the irregularities of the surface in the first instance, only leaving a single small cottage properly hidden by the belt of planting. The house would be built on the highest part of the ground. The whole of the offices sunk under or below it, with the exception of the stables; and the part of the house which is seen, in the form of a cube, with a large front, visible only on the side on which is the approach. The brook elevated upon the side of the rising ground, and formed into a still river, with cascades and islands, which are capable of being seen all round from the house. The park surrounded with a belt, inclosing a ride or drive within this, the whole diversified with clumps of various sizes, but mostly similar in shape. The park fed with deer, sheep, and cattle, and the more considerable spaces in the drive, with the whole of the pleasure ground, regularly mown. Buildings would be introduced in various places in the drives as well as the park. The approach and walks formed in different turns and windings, and the pleasure ground, and kitchen garden, in a regular manner, the latter mostly in the perfectly square form. From each of the drives, the approach, walks, and the pleasure ground, the objects of view are either the ornamental buildings or the mansion, vistas being made in all places from the one to the other; the belt excludes the whole of the distant country from the lower parts of the ground, and the clumps from the

the higher, as well as from the houſe. It may be ſuppoſed that nothing would be done to the ſurrounding country, only, perhaps, that in the place of the removed cottages, a formal ſtreet, under the title of improved village, might be formed and raiſed at a ſuitable diſtance from the manſion and its approach. It is ſuggeſted that numbers of places in this country, as well as in Scotland, are laid out nearly in this manner; and that the general paſtures, the *belt*, the *clump*, the *tame* and *ſtill* river, abound in both countries, and continue to be formed in the ſame way, whatever may be the natural character of the ſituation or place.

But according to the characteriſtic or natural manner which the writer has adviſed, ſuch a ſituation ſhould be laid out ſomewhat in this way. The houſe ſhould be placed on the abrupt termination of the riſing grounds, the whole of the offices be brought more or leſs into view, each of ſuch buildings being made low, irregular, and ſuitable to the nature of the ground. The brook be rendered more characteriſtic as ſuch, by having little aits and iſlands formed in it, as well as occaſional pools, or ſtagnated ſpots of water, in the open parts, and under the ſhade of the grove where not ſeen. Near the houſe, in the hollow, it ſhould ſpread out in the manner of a lake, being varied by prominences, iſlands, and wood. The ſtable offices, kitchen garden, and farm, ſhould be placed near each other, and at no great diſtance from the main reſidence. The wood ſhould be ſeen in one extenſive irregular maſs, crowning the large eminence, and connecting it with the lower grounds in which the brook runs. Inſtead of ſurrounding the whole with a belt of planting, the borders of the park ſhould every where blend in an irregular manner with the country; in ſome places a hedge only, in others a ſunk fence, and in a few open paling ſhould ſeparate it from the corn-fields; in different places large portions of it may be united to the country by means of hurdle fences, in which way more or leſs of it may be incloſed and let out to tenantry as thought proper. In this mode, the wood does not terminate abruptly with the park; but gradually loſes itſelf in ſcattered trees, hedge-rows, and occaſional ſtrips among the corn lands of the neighbouring farms. Hence, it is ſuggeſted, ariſe the beauty of the views in walking round the outſide border of the park. An irregular village ſhould be formed by ſcattered cottages, wood, and paſture, from which the approach is led to the houſe; with a branch to the offices and the garden; the farm road is moſtly concealed, but might often be partially ſeen with advantage. Walks ſhould be formed in different parts of the grounds; thoſe for morning and evening ſhould be extenſive and open; thoſe for noon wholly under the wood. They both afford conſiderable variety, whether the beauty and wildneſs of the park, the views of the diſtant corn-fields and hedge-rows, the village, the brook, or the different picturesque compoſitions formed by the houſe and offices be regarded; without ſaying any thing concerning diſtant proſpect, which, in the other practice, is often loſt by the belt, and at all events conſtantly prevented from harmonizing with the park, by its dark diſtant boundary. The cattle may be guarded and kept off from the front of the manſion by ſome proper ſort of fence, and a certain ſpace along the border and rivulet be preſerved as pleaſure ground, in which exotic ſhrubs and flowers may be planted in diſperſed natural-like groups and thickets. The whole of the other parts of the ground may be fed with cattle, horſes, deer, and ſheep, as well as other animals. The kitchen garden, in ſuch a ſituation, need not be ſo large as in other caſes, as many culinary vegetables may be grown in other places, and the fields of the farm. Nor will an orchard be neceſſary in many caſes, as a ſufficient number of fruit-trees may be introduced in the groups, and pleaſure-ground ſcenery. There may, beſides theſe, be ſome other differences made, which need not be noticed in this place. A drive may be made through the park as thought proper, and through the ſurrounding country according to the circumſtances of it as connected with the park. The planting in the park ſhould abound with low growths and wildneſſes, in the nature of the trees and the various maſſes of wood in it.

The ſame ſpot of ground is diſplayed as formed and laid out after theſe three different methods, in the work already alluded to, which may be conſulted with much advantage by the inquirer on this head.

In comparing the leading diſtinctions between the two latter of the above methods of forming and laying out rural reſidences, or that followed by Brown, Repton, and others, and that which has been ſuggeſted by the writer; it is remarked that, in relation to the *whole*, the object of the *former* is to render a reſidence ſeparate from the country; while the *latter*, or the characteriſtic ſtyle of forming, and the improvements propoſed in reſidences already formed on bad principles, tend to harmonize it. In relation to the parts, that ſort of gardening forms and places every thing diſtinctly and alone; while this groups and connects them with each other, and with the whole.

In what regards *wood*, the vulgar practice is, it is ſaid, to ſhut out the country by a belt, and to vary the ſpace within by the clumps: while that which is propoſed tends to increaſe the expreſſion and character of the ſituation or place, whatever part of the grounds it may direct to be wooded, whether in the middle or the boundaries; and inſtead of ſhutting out the country, the wood diverges in a gradual manner into hedge-rows, ſo as to unite and harmonize it as much as poſſible with the reſidence.

In reſpect to *buildings*, the former or common way is to conceal every thing except the manſion: while this, on the contrary, ſhews every building, not as ſingle objects, but as compound parts of the ſcenery of the place.

In relation to *water*, the old or former plan is to produce quantity or extent of ſurface, and to render it as conſpicuous as poſſible: while the ſtyle here propoſed is to produce natural character.

In reſpect to *ground*, the former or modern ſyſtem is to ſmooth and form undulating ſurfaces: while that of this is to attend to natural character.

In what regards *parks*, modern landſcape gardening, it is ſaid, makes them ſmooth and deſtitute of under-growths, ferns, and other plants: while this, by introducing hollies, thorns, briars, ferns, and ſometimes furze, broom, and brambles, gives them a wild foreſt character, which is the great and main object of their formation and arrangement.

In reſpect to *pleaſure-ground*, the common mode, it is ſaid, is to form many acres of lawn, which are to be kept in preſervation at a great expence, while they produce nothing. The plan here propoſed admits of more or leſs, according to circumſtances and ſituation, but generally forms little that is not grazed by ſheep or covered by flowers, extenſive mowing being therefore never requiſite, and it commonly permits the cattle to come within a ſmall diſtance of the reſidence.

The difference of expence will, it is ſuppoſed, be very conſiderable, as muſt be evident from the general conſideration of the difference between aſſiſting what Nature has already begun, and counteracting her altogether. This will be ſo whether it relates to the manſions, buildings, planting, water, gardens, farms, or pleaſure-grounds. And there will be differences

differences of a minor nature on all these heads, as well as on many others.

The ideas respecting the latter of these methods of forming and laying out residences of this nature, have yet been but little put in practice, nor their union in the mind of any one person been such as to produce a distinct style in regard to them, except, perhaps, with the writer of the work before alluded to. They are, however, of considerable importance, and highly deserving of attention, not only as being founded on the principles of nature, but as according so well with the nature of rural scenery.

In chusing situations for residences of this description, it is advised, that attention should be particularly paid to such as are most convenient in what respects scite and position, as they relate to the adjoining country; that they should be the most striking which the grounds will afford; and that they should furnish the best views from the residences of the surrounding country which it is capable of supplying.

A perfect knowledge of what is deficient, and whether that which is wanted can be supplied by the proposed scite, or is wholly wanting, or some others deficient that cannot readily be afforded, will greatly contribute to the decision of the first point. And much assistance, in some respects, may often be derived from the neighbouring residences, especially as to climate, weather, springs, rivulets, roads, markets, and many other similar particulars; though they can mostly be ascertained with little trouble in other ways.

In regard to the next point, it is of very great importance, as the effect depends much upon it. Where the surfaces are only gently varied, some of the highest eminences may be mostly fixed upon for this purpose. But where they are varied in a high degree, and where a number of hills are within the proposed space: if such hills slope gently, some of their sides may commonly be selected for this use; or, when they are very steep, it may be upon some gentle rising or eminence near their bottom parts. Occasionally, where rivers pass through the grounds, it may be on some of their banks, where they are rendered interesting either by rocks, bends, or other similar means. Where there are lakes, the margins of them may be proper for the purpose, as producing good effects in such cases; and the rocky margins of the sea, in some instances, may be very suitable. Many other appropriate situations for this purpose might be noticed, but these may shew the nature of striking ones, and the means of selecting them.

The proper accomplishment of this object is very material, as any error in it may be highly injurious in various ways; while its being properly done saves expence, and at the same time affords a far superior effect, as is seen in a variety of instances.

In respect to the last matter, or that of the views towards the surrounding scenery being agreeable, it is supposed to be the best accomplished by the proper arrangement or disposition of the apartments of a residence. Where regularity is to prevail this cannot always be so easily done, but where the irregular is had recourse to, which should mostly be the case in this sort of residence, there can be little difficulty in effecting it, either by means of projections or recesses.

Thus, the breakfasting room should front a morning scene, and afford a prospect somewhat inviting to exercise throughout the day; the drawing room should have such a disposition as to display the effects of the setting sun, &c. In short, to every view, some object, it is supposed, should appear sufficiently striking to characterise it; as a hill, a spire, or some other thing of a similar nature; as, unless this be the case, too trifling an impression is left upon the mind. All these matters, it is supposed, are the best decided upon the particular spots where they should be marked out and left for the observations of others, with the view of their being afterwards finally settled. They should never be determined upon in the closet of the designer.

In forming residences of this nature, the style of the buildings should, in some measure, it is thought, be adapted to, or regulated by, the nature of the place, and the general growth of the trees in it; the forms of the particular trees which may be peculiar to it; the general character of the surrounding scenery; and the colour of the rocks, as well as of the ground. It is found that the more common sorts of trees, in their natural growth, whether single or in groups, deviate a little in their general form, and the delicacy of their parts, according as their situation may be. Thus, where much exposed, they are mostly broad and low, being more hardy, rough, and picturesque, than when covered with young shoots, which are comparatively soft, fresh, and beautiful. In high rocky spots and expositures, trees are much broken, or divided into parts, and distant from each other, but apparently firmly attached to the place; these are hardier than others, with much less softness and beauty. In low fertile plains, trees are mostly large and erect, throwing out their branches on all sides; the foliage is full and fresh; and the whole outline round, full, and flowing. When single in this sort of situation, the balance of the branches in the trees is better preserved, than in the contrary cases. Where vallies are confined between hills, trees grow high and upright, rarely broad, or putting forth many horizontal branches: the growth is quick; the shoots and foliage are tender and delicate; the trunk comparatively slender; and the whole trees more elegant and capable of graceful motions than in any of the former situations or aspects.

It is supposed that these different circumstances in the growth of trees may easily suggest styles of building somewhat analogous in their general magnitude, height, and finishing. On rocky exposed spots, where trees grow low and irregular; low irregular edifices in the castle style may be raised. In vallies, where they grow high and elegant, houses in the tower style, which implies much height, should commonly be had recourse to. In rich extended plains, buildings of the Grecian order, or such as are in a more massy and regular style than the others, should be formed. "This mode is," it is said, "certainly deserving of attention, were it for no other reason than that the trees might group well with the buildings; that when full grown they might neither be too large, nor too small; that they might neither diminish it into insignificance, nor leave it staring through trees, which, from want of due proportion to it, appear as copsewood." Many instances of these different evils are to be met with in different places.

And it is noticed, that this mode of fixing on the style of residences of this kind must be attended to, though trees be not growing on the situations at the time of forming and raising them. This is to be determined in such cases, by the nature of the climate and the qualities of the soil, as the growth of trees chiefly depends upon them.

With regard to the forms of trees, most places are capable of affording common ones, such as oaks, elms, beeches, and others of similar kinds. But there are many spots, where residences of this sort may be formed, that are only capable of raising certain descriptions to the state of trees. This frequently occurs in hilly and maritime situations; which therefore require the particular attention of the designer; as the kinds of trees that suit them are so very different from the ordinary sort, that if he were to be attempting to group

with oaks and beeches, he might be grievouſly diſappointed, as not any would probably grow, but ſpiry larches, dark Scotch firs, birches, and mountain aſh, or perhaps only ivy and elder. This may furniſh a variety of uſeful hints to the deſigner, as well as others.

The general character of the ſurrounding ſcenery is equally deſerving of attention as the trees, and ſhould concur in deciding on the ſtyle of the reſidence. It is a common notion that buildings ſhould form ſtrong contraſts to the works of nature, from which various ſtyles of them have been ſuggeſted under different circumſtances; but more full inquiry will ſhew that very ſudden contraſts are not found in general nature, though they may accidentally occur in ſome caſes, conſequently that they are highly improper to be uſed in this way.

With reſpect to the colour of the rocks, and the ground, it is ſaid, that, not merely the general forms of the ſurface, but the appearances of the ſoil and the rocks, ſhould deſerve attention, as contributing greatly to promote the principle of harmony. The tints of rocks, ſtones, gravel, and the ſoil, are moſtly the ſame in one part of the country. Where they agree with the colour of the reſidence, the effect muſt, it is ſuppoſed, be ſingularly happy, as ſeen in the works of painters, as well as in the ancient reſidences of the country kind. But where they diſagree, it muſt be diſguſting, as is ſeen in many caſes of white-waſhing buildings in rocky ſituations. This furniſhes hints which may be uſeful in managing that proceſs to the moſt advantage in other caſes; and others are likewiſe thrown out upon different matters, which are equally uſeful. But the deſigner is cautioned againſt carrying theſe, or any other notions, into the extreme, contrary to the common practice; as where the expreſſion of gaiety, or ſtriking beauty, is deſirable, no reaſons ſuggeſted from the colour of the rocks or ſoil are intended to hinder the production of theſe characters, if in general harmony with what ſurrounds them.

There are many other matters which relate to the ſubject, that are forcibly pointed out, and the means of executing them well explained, in the work alluded to above, ſuch as the methods of uniting reſidences of this ſort with the grounds by means of the offices and appendages of other kinds; and with the ſurrounding country or ſcenery by the former, as well as by architectural appendages principally of the ornamental deſcription. Alſo as to the modes of executing and finiſhing them.

More full information on the whole of this ſubject may be obtained from the above treatiſe, and the writings of Knight, Price, and others on the ſame head.

RESIDENT, a public miniſter, who manages the affairs of a king in the court of a prince, or petty ſtate; or the affairs of a prince, or petty ſtate, in the court of a king or prince.

Thus, the king of England has reſidents in the courts of the electors, and other princes of Germany and Italy; at the republics of Genoa and Lucca; and they, reciprocally, have reſidents in the court of Great Britain.

Reſidents are a claſs of public miniſters inferior to ambaſſadors and envoys; but, like them, they are under the protection of the law of nations.

The reſident does not repreſent the prince's perſon in his dignity, but only in his affairs. His repreſentation is in reality of the ſame nature as that of the envoy; and he is accordingly, together with the envoy, often termed a miniſter of the ſecond order; and thus the public miniſters are diſtinguiſhed only into two claſſes; ambaſſadors, who have the repreſentative character, ſo termed by way of excellence, and all the miniſters who are not inveſted with that eminent character.

RESIDENT, *Reſidens*, in our *Ancient Cuſtoms*, was a tenant who was obliged to reſide on his lord's land, and not to depart from the ſame, called alſo *homme levant* and *couchant*, and in Normandy *reſſeant du fief*.

"Quantumque de aliis teneat, ei magis obnoxius eſt; & ejus reſidens eſſe debet, cujus legius eſt." Leg. H. I.

RESIDENTIARY, RESIDENTIARIUS, a canon inſtalled to the privileges and profits of reſidence.

RESIDUAL ANALYSIS, is a branch of algebra invented by Landen, and applied to the ſolution of thoſe problems uſually ſolved by means of the differential and integral calculus, or the direct and inverſe method of fluxions; by which the ingenious author thought to be able to avoid the objections generally made to the new calculus under either of the above forms. With regard to the fluxional proceſs, he thought it more free from objection than the differential calculus; although many important ones might be diſcovered in it. However natural, ſays the author, it may be, in certain problems, to conſider ſuch magnitudes as enter therein, to be generated by motion, it ſeems very unnatural to bring motion into conſideration in the ſolution of queſtions purely algebraical. Nor does it ſeem natural in the ſolution of problems concerning the motion of bodies, to ſuperinduce imaginary motions, and thereby bring into conſideration the velocity of time, the velocity of velocity, &c.; nor yet does it appear more natural, in the reſolution of other problems, to make uſe of the fluxionary method, when (as is moſt commonly the caſe in that doctrine) the fluxions introduced into the proceſs can, only in a figurative ſenſe, be ſaid to be the velocities of increaſe of the quantities called their fluents; ſuch figurative expreſſions not being the natural language of analytics, but frequently, inſtead of conveying clear and diſtinct ideas, are confuſedly employed in treating of quantities as generated by motion, which in reality cannot be conceived to be ſo generated. That theſe are legal objections to the doctrine of fluxions we are not diſpoſed to deny; but it is now generally admitted, that the defect of the fluxionary calculus is by far leſs than that which has place in the reſidual analyſis, which M. Landen was deſirous of ſubſtituting for it. Indeed, we believe its defects were ſo obvious, that few, if any, mathematicians were induced to make it the foundation of any of their inveſtigations; and it would, therefore, be uſeleſs for us to occupy our pages in explaining the principles on which the author reſted his calculus. We ſhall, therefore, merely obſerve, that in this analyſis, a geometrical or phyſical problem is reduced to another purely algebraical; and the ſolution is then obtained without any ſuppoſition of motion, and without conſidering quantities as compoſed of infinitely ſmall particles.

Inſtead of finding the fluxion of a variable quantity, in the reſidual analyſis, the author proceeds by taking the difference of the ſame function of the variable, in two different ſtates of that quantity, and expreſſing the relation of this difference to the difference between the two ſtates of the variable quantity itſelf. This relation, being firſt expreſſed generally, is then conſidered in the caſe in which the difference of the two ſtates of the variable quantity is equal to zero.

Thus when, in the fluxionary calculus, it would be neceſſary to find the fluxion of ſuch a quantity $v^{\frac{m}{r}}$, which is $\frac{m}{r} v^{\frac{m-r}{r}} \dot{v}$, M. Landen takes the quotient of $\frac{v^{\frac{m}{r}} - w^{\frac{m}{r}}}{v - w}$, when

when $v = w$, and finds it to be $\frac{m}{r} v^{\frac{m-r}{r}}$, as above; and in the ſame manner he determines what is commonly called the fluxions of a^x, x^x, log. x, &c.

The firſt book of the reſidual analyſis was publiſhed in 1764, which contains its application to a variety of algebraical inquiries, and in determining the tangents, evolutes, ordinates, points of contrary flexure, double and triple points, &c. And in the ſecond book it was intended to ſhew its application in a variety of mechanical and phyſico-geometrical inquiries; but, for ſome reaſon not known, that book was never publiſhed.

Residual *Figure*, in *Geometry*, the figure remaining after ſubtraction of a leſſer from a greater.

Residual *Root*, is a root compoſed of two parts or members, only connected together with the ſign —.

Thus, $a - b$, or $5 - 3$, is a reſidual root; and is ſo called, becauſe its true value is no more than its reſidue, or difference between the parts a and b, or 5 and 3.

RESIDUARY Legatee. See Legatee.

RESIDUE, Residuum, the remainder or reliqua of an account, debt, or obligation.

RESIDUUM *of a Charge*, in *Electricity*, firſt diſcovered by Mr. Gralath, in Germany, in 1746, is that part of the charge that lay on the uncoated part of a Leyden phial, which doth not let go all its electricity at once; ſo that it is afterwards gradually diffuſed to the coating.

Residuum *of an Inteſtate's Effects*. See Intestate. See alſo Executor, and *Reſiduary* Legatee.

RESIGNATION, in *Ethics*, is a moral virtue, which ſuperadds to patience a ſubmiſſive diſpoſition, reſpecting the intelligent cauſe of our uneaſineſs. It acknowledges both the power and the right of a ſuperior to afflict: it is uſually connected with a confidence in his juſtice, and indulges a hope alſo in ſome future exemption, and thus it oppoſes a fretful repining temper of mind.

Resignation, *Reſignatio*, in the *Canon Law*, the ſurrender or giving up of a benefice into the hands of thoſe from whom it was received.

Reſignation is of equal import with *ſurrender*; only the former is reſtrained to ſpiritual benefices, and the latter to temporal offices or employments.

It is a maxim in the eccleſiaſtical law, that all reſignations muſt be made to ſome ſuperior (Gibſ. 822.); therefore a biſhop muſt reſign, not to the dean and chapter, but to his metropolitan, from whom he received confirmation and conſecration; but the archbiſhop can reſign to none but the king himſelf.

Reſignation muſt be made to the next immediate ſuperior, and not to the mediate; as of a church preſentative to the biſhop, and not to the metropolitan. (2 Roll. Abr. 358.) Donatives are not reſignable to the ordinary, but to the patron who hath power to admit; and if there be two patrons of a donative, and the incumbent reſign to one of them, it is good for the whole. Regularly, reſignation muſt be made in perſon, and not by proxy. It is uſually done either by perſonal appearance before the ordinary, or elſewhere before a public notary, by an inſtrument directed immediately to the ordinary, and atteſted by the ſaid notary, in order to be preſented to the ordinary by a proper perſon, who may pray his acceptance. No reſignation can be valid, till accepted by the proper ordinary; that is, no perſon appointed to a cure of ſouls can quit that cure, or diſcharge himſelf of it, but upon good motives, to be approved by the ſuperior who committed it to him; for it may be, that he would quit it for money, or to live idly, or the like. Nor is there any pretence to ſay, that the ordinary is obliged to accept; ſince the law hath appointed no known remedy if he will not accept, any more than he will not ordain. 1 Still. 334.

Lindwood makes a diſtinction in this caſe, between a cure of ſouls, and a fine-cure. The reſignation of a fine-cure, he thinks, is good immediately, without the ſuperior's conſent; becauſe none but he that reſigneth hath intereſt in that caſe: but where there is a cure of ſouls, it is otherwiſe, becauſe not he only hath intereſt, but others alſo unto whom he is bound to preach the word of God; wherefore, in this caſe, it is neceſſary that there be the ratification of the biſhop, or of ſuch other perſon as hath power by right or cuſtom to admit ſuch reſignation. (Gibſ. 823.) After acceptance of the reſignation, lapſe ſhall not run but from the time of notice given. The church, indeed, is void immediately upon acceptance, and the patron may preſent, if he pleaſe; but as to lapſe, the general rule that is here laid down is the general doctrine of all the books: inſomuch that if the biſhop, who accepted the reſignation, dies before notice given, the ſix months ſhall not commence till notice is given by the guardian of the ſpiritualities, or by the ſucceeding biſhop, with whom the act of reſignation is preſumed to remain. Gibſ. 283.

Reſignations are either *ſimple* or *conditional*.

Resignations, *Simple* or *Pure*, are thoſe by which the incumbent ſtrips himſelf of all his right, abſolutely, and without any conditions, or reſerve of penſion. Theſe are made to the biſhop, or ordinary.

By the 31 Eliz. cap. 6. § 8. if any incumbent of any benefice, with cure of ſouls, ſhall corruptly reſign the ſame, or corruptly take for, or in reſpect of reſigning the ſame directly or indirectly, any penſion, ſum of money, or other benefit whatſoever; as well the giver, as the taker, ſhall loſe double the value of the ſum given or received; half to the queen, and half to him that ſhall ſue for the ſame. Before the ſtatute, the biſhop, in caſes of reſignation, might, and did frequently, aſſign a penſion, during life, out of the benefice reſigned, to the perſon reſigning. But by the aforeſaid act, no penſions whatſoever can be reſerved. But a man may bind himſelf by bond to reſign, and it is not unlawful. For bonds of reſignation, ſee Simony.

Resignations *in Favour*, or *Conditional Reſignations*, are ſuch as are only made on condition that ſuch other perſons ſhould be inveſted with them; ſo that the reſignations are null, unleſs the conditions be punctually executed. Theſe reſignations *in favorem* are not of above two hundred and fifty years ſtanding. Strong oppoſition was at firſt made to them, they being eſteemed a kind of ſucceſſion or tranſmiſſion of benefices, as of patrimonies belonging to a family. Accordingly, theſe reſignations are not made into the hands of the ordinary, or collator, as pure reſignations are, but to the collator paramount, who in the Romiſh church is the pope; there being a ſuſpicion of ſimony or other unlawful paction therein, where admitted of in prejudice to the lay patron.

RESIGNEE, in *Law*, the party to whom a thing is reſigned.

RESINS, in *Chemiſtry* and the *Arts*, peculiar inflammable compounds, furniſhed by ſome vegetables, and in ſome caſes by animals.

Agreeably to what we have obſerved under Oils, all bodies coming under the head of the latter, although perfect liquids in their ordinary ſtate, are ſuſceptible of a ſolid form, by long expoſure to the air, and more ſpeedily by expoſure to bodies furniſhing oxygen with facility. Thoſe oils we term fat oils, ſuch as olive, ſpermaceti, rape, &c. by treating with nitric acid, become ſolid like tallow, and poſſeſs

poſſeſs ſimilar properties. The oils termed *drying*, ſuch as linſeed and nut-oil, by the preſence of oxygen, aſſume a ſolid form, unlike the greaſy ſubſtance afforded by the fat oils, and more like horn, or elaſtic gum (caoutchouc.) The volatile oils are ſuſceptible of the ſame change, from liquidity to ſolidity, by the agency of oxygen; the reſult being reſins, which differ from each other in nothing material, excepting their degrees of ſolidity, and their peculiar odour. If we are to conclude that every eſſential or volatile oil is capable of being converted into a reſin, which is highly probable, the number of reſins will be very great. Indeed the known ſpecies are vaſtly too numerous for our notice in this place: we ſhall, therefore, confine our attention to a few of the moſt particular reſins, eſpecially thoſe which are valuable in the arts, and in medicine. Dr. Thomſon gives the following liſt of reſins, with the names of the vegetables from which they are obtained.

1. Turpentine of Chio, from the piſtacia terebinthus.
2. Venice turpentine.
3. Straſburgh turpentine, from the common fir.
4. Pitch, from the pinus picea.
5. Elemi, from the amyris elemifera.
6. Maſtic, from the piſtacia lentiſcus.
7. Sandarach, from the juniper.
8. Guaiac, from the guaiacum officinale.
9. Laudanum, from the ciſtus ladaniferus.
10. Dragon's blood, from the dracæna draco.
11. Balſam of Mecca, from the amyris opobalſamum.
12. Balſam of Copahu, from the copaifera officinalis.

To theſe may be added,

13. Balſam of Canada, from the pinus balſamea.
14. Guaiacum, from the lignum vitæ.
15. Copal, from the copallinum of North America.

Some of the reſins are combined with benzoic acid, by which their properties are altered: of theſe are benzoin, balſam of Tolu, balſam of Peru, and ſtorax.

Another claſs of theſe bodies are combined with gum, and hence have been called *gum reſins*: of theſe are olibanum, galbanum, ſcammony, aſſafœtida, myrrh, ammoniac, aloes, and opium. They admit of analyſis, either by ſeparating the reſinous part by alcohol, or the gummy part by water.

Theſe latter ſubſtances are uſed in medicine. Some of the firſt claſs, or the pure reſins, are uſed as cements; and their ſolution in alcohol conſtitutes a variety of uſeful varniſhes.

Thoſe reſins which are diſtinguiſhed by the name of balſams are ſaid to be ſuch as contain benzoic acid. It appears, however, they have alſo been diſtinguſhed for their liquidity, and from their exceſs of odour; ſo that at preſent the phraſe appears to be very indefinite. See BALSAM.

The reſins are of various degrees of conſiſtence and hardneſs. The balſams of Canada and Mecca are thickiſh fluids: the former is often ſo liquid as to be ſpread with a bruſh, and is ſometimes uſed for varniſhing pictures. It gradually hardens, on expoſure to the air, and ultimately may be rubbed with the hand without ſoiling.

Others of the reſins become hard with very little expoſure to the air, and are found in hard tears, ſticking to the tree which affords it: of theſe are maſtic, ſandarach, and copal. Thoſe which do not eaſily become ſolid may be obtained in that form, by diſtilling off the thin part. Reſin and pitch are obtained in this way: the former is obtained by diſtilling turpentine, the latter by diſtilling tar. Tar is no other than turpentine contaminated with the ſoot, which is produced by the partial combuſtion employed for its extraction from the wood.

All the reſins become harder by expoſure to a moderate heat. It is upon this fact that the art of the japanner depends. If the ſurface to be japanned be covered with common tar only, and expoſed to the temperature of 300° for a length of time, the coating becomes hard and infuſible. At the ſame temperature, any other reſin applied in the ſame way, would aſſume a ſimilar hardneſs.

Some animals and minerals, as well as the vegetables, afford reſins, or bodies very analogous to them. The concrete part of the bile of animals has moſt of the properties of a reſin, and ſhell-lac is furniſhed from the inſect called *coccus lacca*.

Ear-wax is alſo found to have the properties of a reſin; and the ſubſtances well known as perfumes, caſtor, civet, and muſk, are no other than animal reſins. For the particular application of reſins to *varniſhing* and *japanning*, ſee thoſe articles.

Reſins are employed for many purpoſes. Thoſe of the cheapeſt kind are uſed for torches, and to cover the outſides of ſhips and boats. The fine tranſparent reſins compoſe varniſhes. Many of them are employed medicinally: ſuch are thoſe which enter into the compoſition of ointments and plaſters; or internally, as the reſins of ſcammony, jalap, and turpeth, which are purgative. Other reſins, the ſmell of which is agreeable, as benjamin and ſtorax, are employed as perfumes.

RESIN, *Elaſtic*. See CAOUTCHOUC.

RESIN, *Maſtic*. See MASTIC.

RESISTANCE, or RESISTING *Force*, in *Phyſics*, any power which acts in oppoſition to another, ſo as to deſtroy or diminiſh its effect.

Of reſiſtance there are various kinds, ariſing from the various natures and properties of the reſiſting bodies, and governed by various laws: as the reſiſtance of ſolids, the reſiſtance of fluids, the reſiſtance of the air, &c.

RESISTANCE *of Solids*, in *Mechanics*, is the force with which the quieſcent parts of ſolid bodies oppoſe the motion of others contiguous to them.

Of this there are two kinds. The firſt, where the reſiſting, and the reſiſted parts, *i. e.* the moving and quieſcent bodies, are only contiguous, and do not cohere; *i. e.* where they conſtitute ſeparate bodies or maſſes.

This is what M. Leibnitz calls *reſiſtance of the ſurface*; but which is now more commonly denominated friction; for the laws of which, ſee FRICTION.

The ſecond caſe of reſiſtance is where the reſiſting and reſiſted parts are not only contiguous, but cohere; *i. e.* are parts of the ſame continued body or maſs; for the phenomena and laws of which, ſee COHESION.

To which we may alſo add, the reſiſtance which takes place between ſurfaces of ſolids, when completely in contact, though not forming one and the ſame body, or the reſiſtance they offer to ſeparation, the particulars of which are treated of under the article ADHESION.

RESISTANCE *of the Fibres of ſolid Bodies, Theory of the.* To form an idea of this reſiſtance or renitency of the parts, ſuppoſe a cylindrical body ſuſpended vertically by one end. Here all its parts, being heavy, tend downwards, and endeavour to ſeparate the two contiguous planes, where the body is the weakeſt; but all the parts reſiſt this ſeparation by the force with which they cohere, or are bound together. Here then are two oppoſite powers; *viz.* the weight of the cylinder, which tends to break it; and the force of cohesion of the parts, which reſiſts the fracture.

If the baſe of the cylinder be increaſed without increaſing its length, it is evident the reſiſtance will be increaſed in the ſame ratio as the baſe; but the weight alſo increaſes in the ſame ratio: whence it is evident, that all cylinders of the

ſame matter and length, whatever their baſes may be, have an equal reſiſtance, when vertically ſuſpended.

But if the length of the cylinder be increaſed, without increaſing its baſe, its weight is increaſed, while the reſiſtance or ſtrength remains the ſame: conſequently it is weakened by its additional length, and has a greater tendency to break.

Hence, to find the greateſt length a cylinder of any matter may have, to break with its own weight; it is only neceſſary to know what weight is juſt ſufficient to break another cylinder of the ſame baſe and matter: for the length of the required cylinder muſt be ſuch, that its weight may be equal to the weight of the firſt cylinder, together with the additional weight that was employed in producing the ſeparation.

Thus let l denote the firſt length of the cylinder, c its weight, g the given weight the lengthened cylinder is to bear, and w the leaſt weight that breaks the cylinder l, alſo x the length ſought: then as $l : x :: c : \frac{cx}{l}$ = the weight of the longeſt cylinder; and this, together with the given weight g, muſt be equal to $c + w$: hence then, $\frac{cx}{l} + g = c + w$; or $x = \frac{c + w - g}{c} l$ = the length ſought. When the cylinder is juſt to break with its own weight only, then $g = 0$, and the expreſſion is ſimply $x = \frac{c + w}{c} l$.

If one end of the cylinder were fixed horizontally into a wall, and the reſt ſuſpended thence, its weight and reſiſtance would then act in a different manner; and if it be broke by the action of its weight, the rupture would be at the end fixed into the wall. A circle or plane contiguous to the wall, and parallel to the baſe, and conſequently vertical, would be detached from the contiguous circle within the plane of the wall, and would deſcend. All the motion is performed on the loweſt extremity of the diameter, which remains immoveable, while the upper extremity deſcribes a quadrant of a circle, and till the circle, which before was vertical, become horizontal; *i. e.* till the cylinder be entirely broken.

In the fracture of the cylinder it is viſible two forces have acted, and the one has overcome the other: the weight of the cylinder, which aroſe from its whole maſs, has overcome the reſiſtance which aroſe from the largeneſs of the baſe; and as the centres of gravity are points in which all the forces, ariſing from the weights of the ſeveral parts of the ſame bodies, are conceived to be united, one may conceive the weight of the whole cylinder applied in the centre of gravity of its maſs, *i. e.* in a point in the middle of its axis: and the reſiſtance of the cylinder applied in the centre of gravity of its baſe, *i. e.* in the centre of the baſe; it being the baſe which reſiſts the fracture.

When the cylinder breaks by its own weight, all the motion is on an immoveable extremity of a diameter of the baſe. This extremity, therefore, is the fixed point of a lever, whoſe two arms are the radius of the baſe, and half the axis; and, of conſequence, the two oppoſite forces do not only act of themſelves, and by their abſolute force, but alſo by the relative force they derive from their diſtance with regard to the fixed point of the lever.

Hence it evidently follows, that a cylinder, *e. gr.* of copper, which, vertically ſuſpended, will not break by its own weight, if leſs than four hundred and eighty fathom long, will break with a leſs length in an horizontal ſituation; becauſe the length, in this latter caſe, contributes two ways to the fracture; both as it makes it of ſuch a weight, and as it is an arm of a lever to which the weight is applied. Hence, alſo, the ſmaller the baſe is, the leſs length or weight will ſuffice to break it; both becauſe the reſiſtance is really leſs, and becauſe it acts by a leſs arm of a lever.

Hence, to find the length a priſm will bear, when fixed in an horizontal poſition, before it breaks, either by its own weight, or by the addition of any adventitious weight; take any length of ſuch a priſm, and load it with weights till it break; then put

l = the length of this priſm,
c = its weight,
w = the weight that breaks it,
a = the diſtance of the weight w,
g = any given weight to be borne,
d = its diſtance,
x = the length required to break it.

Then $l : x :: c : \frac{cx}{l}$, the weight of the priſm x; and $\frac{cx}{l} \times \frac{1}{2} x = \frac{cx^2}{2l}$ = its momentum; alſo dg = the momentum of the weight g; $\frac{cx^2}{2l} + dg$ = momentum of the priſm x, and its additional weight g.

In like manner we have $\frac{1}{2} cl + aw$, for the momentum of the ſhorter priſm, together with the weight w.

Conſequently we obtain the following equation:

$$\frac{cx^2}{2l} + dg = \tfrac{1}{2} cl + aw;$$

from which is found $x = \sqrt{\frac{(aw + \frac{1}{2} cl - dg)\, 2l}{c}}$, the length ſought, or that by which the cylinder will break with the weight g, at the diſtance d. If this laſt weight be nothing, or the length be required when the cylinder would juſt break with its own weight, then we ſhall have $dg = 0$, and the expreſſion becomes ſimply $x = \sqrt{\frac{(aw + \frac{1}{2} cl)\, 2l}{c}}$.

If two cylinders of the ſame matter, having their baſes and lengths in the ſame proportion, be ſuſpended horizontally; it is evident, that the greater has more weight than the leſſer, both on account of its length, and of its baſe. But it hath leſs reſiſtance on account of its length, conſidered as a longer arm of a lever, and has only more reſiſtance on account of its baſe; therefore it exceeds the leſſer in its bulk and weight more than in reſiſtance, and conſequently it muſt break more eaſily.

Hence, we ſee why, upon making models and machines in ſmall, people are apt to be miſtaken as to the reſiſtance and ſtrength of certain horizontal pieces, when they come to execute their deſigns in large, by obſerving the ſame proportion as in the ſmall. Galileo's doctrine of reſiſtance, therefore, is no idle ſpeculation, but becomes applicable in architecture, and other arts.

The weight required to break a body, placed horizontally, being always leſs than that required to break it in a vertical ſituation; and this weight being to be greater or leſs, according to the ratio of the two arms of the lever, the whole theory is always reducible to this: *viz.* to find what part of the abſolute weight the relative weight is to be, ſuppoſing the figure of the body known; which indeed is neceſſary, becauſe it is the figure that determines the two centres of gravity, or the two arms of the lever. For if the body,

e. gr.

e. gr. were a cone, its centre of gravity would not be in the middle of its axis, as in the cylinder; and, if it were a ſemi-parabolical ſolid, neither would its centre of gravity be in the middle of its length or axis, nor the centre of gravity of its baſe in the middle of the axis of its baſe. But ſtill, wherefoever theſe centres fall in the ſeveral figures, the two arms of the lever are eſtimated accordingly.

It may be here obſerved, that if the baſe, by which the body is faſtened into the wall, be not circular, but, *e. gr.* parabolical, and the vertex of the parabola be at the top, the motion of the fracture will not be on an immoveable point, but on a whole immoveable line; which may be called the *axis of equilibrium;* and it is with regard to this that the diſtances of the centres of gravity are to be determined.

Now, a body horizontally ſuſpended, being ſuppoſed ſuch as that the ſmalleſt addition of weight would break it, there is an equilibrium between its poſitive and relative weight; and of conſequence thoſe two oppoſite powers are to each other reciprocally as the arms of the lever to which they are applied. On the other hand, the reſiſtance of a body is always equal to the greateſt weight which it will ſuſtain in a vertical ſituation, without breaking, *i. e.* is equal to its abſolute weight. Therefore, ſubſtituting the abſolute weight for the reſiſtance, it appears that the abſolute weight of a body, ſuſpended horizontally, is to its relative weight as the diſtance of its centre of gravity from the axis of equilibrium is to the diſtance of the centre of gravity of its baſe from the ſame axis.

The diſcovery of this important truth, at leaſt an equivalent to it, and to which this is reducible, we owe to Galileo. From this fundamental propoſition are eaſily deduced ſeveral conſequences; as, for inſtance, that, if the diſtance of the centre of gravity of the baſe from the axis of equilibrium be half the diſtance of the centre of gravity of the body, the relative weight will only be half the abſolute weight; and that a cylinder of copper, horizontally ſuſpended, whoſe length is double the diameter, will break, provided it weigh half what a cylinder of the ſame baſe, 4801 fathoms long, weighs.

On this theory of reſiſtance, which we owe to Galileo, M. Mariotte made a very ingenious remark, which gave birth to a new ſyſtem. Galileo ſuppoſes, that, where the body breaks, all the fibres break at once; ſo that the body always reſiſts with its whole abſolute force, or with the whole force that all its fibres have in the place where it is to be broke. But M. Mariotte, finding that all bodies, even glaſs itſelf, bend before they broke, ſhews that fibres are to be conſidered as ſo many little bent ſprings, which never exert their whole force till ſtretched to a certain point, and never break till entirely unbent. Hence, thoſe neareſt the axis of equilibrium, which is an immoveable line, are ſtretched leſs than thoſe farther off; and, of conſequence, employ a leſs part of their force.

This conſideration only takes place in the horizontal ſituation of the body: in the vertical, the fibres of the baſe all break at once; ſo that the abſolute weight of the body muſt exceed the united reſiſtance of all its fibres; a greater weight is, therefore, required here than in the horizontal ſituation; that is, a greater weight is required to overcome their united reſiſtance, than to overcome their ſeveral reſiſtances one after another. The difference between the two ſituations ariſes hence, that, in the horizontal, there is an immoveable point or line, as a centre of motion, which is not in the vertical.

Varignon has improved on the ſyſtem of M. Mariotte, and ſhewn, that, to Galileo's ſyſtem, it adds the conſideration of the centre of percuſſion. The compariſon of the centres of gravity with the centres of percuſſion afford a fine view, and ſet the whole doctrine in a moſt agreeable light.

In each ſyſtem, the baſe, by which the body breaks, moves on the axis of equilibrium, which is an immoveable line in the ſame baſe; but in the ſecond, the fibres of this baſe are continually ſtretching more and more, and that in the ſame ratio as they recede farther and farther from the axis of equilibrium; and, of conſequence, are ſtill exerting a greater and greater part of their whole force.

Theſe unequal extenſions, like all other forces, muſt have ſome common centre where they all meet, and with regard to which they make equal efforts on each ſide; and as they are preciſely in the ſame proportion as the velocities which the ſeveral points of a rod moved circularly would have to one another, the centre of extenſion of the baſe, by which the body breaks, or tends to break, muſt be the ſame with its centre of percuſſion. Galileo's hypotheſis, according to which the fibres are ſuppoſed to ſtretch equally, and break all at once, correſponds to the caſe of a rod moving parallel to itſelf, where the centre of extenſion or percuſſion does not appear, as being confounded with the centre of gravity.

The baſe of fraction being a ſurface, whoſe particular nature determines its centre of percuſſion, it is neceſſary that this ſhould be firſt known, to find on what point of the vertical axis of that baſe it is placed, and how far it is from the axis of equilibrium. Indeed, we know in the general, that it always acts with ſo much the more advantage as it is farther from it; becauſe it acts by a longer arm of a lever; and of conſequence it is the unequal reſiſtance of the fibres in M. Mariotte's hypotheſis, which produces the centre of percuſſion; but this unequal reſiſtance is greater or leſs, according as the centre of percuſſion is placed more or leſs high on the vertical axis of the baſe, in the different ſurfaces of the baſe of the fracture.

To expreſs this unequal reſiſtance, accompanied with all the variation it is capable of, regard muſt be had to the ratio between the diſtance of the centre of percuſſion from the axis of equilibrium, and the length of the vertical axis of the baſe. In which ratio, the firſt term, or the numerator, is always leſs than the ſecond, or the denominator; ſo that the ratio is always a fraction leſs than unity; and the unequal reſiſtance of the fibres in M. Mariotte's hypotheſis is ſo much the greater, or, which amounts to the ſame, approaches ſo much nearer to the equal reſiſtance in Galileo's hypotheſis, as the two terms of the ratio are nearer to an equality.

Hence it follows, that the reſiſtance of bodies in M. Mariotte's ſyſtem is to that in Galileo's, as the leaſt of the terms in the ratio is to the greateſt. Hence, alſo, the reſiſtance being leſs than what Galileo imagined, the relative weight muſt alſo be leſs; ſo that the proportion already mentioned between the abſolute and relative weight cannot ſubſiſt in the new ſyſtem, without an augmentation of the relative weight, or a diminution of the abſolute weight; which diminution is had by multiplying the weight by the ratio, which is always leſs than unity. This done, we find that the abſolute weight, multiplied by the ratio, is to the relative weight, as the diſtance of the centre of gravity of the body from the axis of equilibrium, is to the diſtance of the centre of gravity of the baſe of the fracture from the ſame axis: which is preciſely the ſame thing with the general formula given by M. Varignon for the ſyſtem of M. Mariotte. In effect, after conceiving the relative weight of a body, and its reſiſtance equal to its abſolute weight, as two contrary powers applied to the two arms of a lever, in the hypotheſis of Galileo, there needs nothing to convert it into

into that of M. Mariotte, but to imagine that the resistance, or the absolute weight, is become less, every thing else remaining the same.

One of the most curious, and perhaps the most useful questions in this research, is to find what figure a body must have, that its resistance may be equal in all its parts, whether it be loaded with an additional weight, or as only sustaining its own weight.

To this end it is necessary that some part of it should be conceived to be cut off by a plane parallel to the fracture, so that the momentum of the part retrenched, be to its resistance in the same ratio as the momentum of the whole is to its resistance. These four powers act by arms of levers peculiar to themselves, and are proportional in the whole, and in each part, of a solid of equal resistance. From this proportion Varignon deduces two solids, which shall resist equally in all their parts, or be no more liable to break in one part than in another. Galileo had previously found one of these, which is that in which the sides are parabolical: the other, found by Varignon, is in the form of a trumpet, which is to be fixed into the wall by its greater end; so that its magnitude or weight is always diminished in proportion as its length, or the arm of the lever by which it acts, is increased. It is remarkable, that, however different the two systems may be, the solids of equal resistance are the same in both.

We cannot pursue the theory of resistances to a greater length in the present article; but shall confine ourselves to exhibiting a general synopsis of the most important results which have been drawn by different writers on this subject, both practical and theoretical.

1. The resistance of a beam, or bar, to a fracture, by a force acting laterally, is as the solid made by a section of the beam in the place where the force is applied, into the distance of its centre of gravity from the point or line where the breach will end.

2. In square beams, the lateral strengths are as the cubes of their breadths or depths.

3. In cylindric beams, the resistances or strengths are as the cubes of the diameters.

4. In rectangular beams, the lateral strengths are conjointly as the breadths and squares of the depths.

5. The lateral resistances of any beams, whose sections are similar figures and alike placed, are as the cubes of the like dimensions of those figures.

6. The lateral strength of a beam, with its narrower face upwards, is to its strength with the broader face upwards, as the breadth of the broader face to the breadth of the narrower.

7. The lateral strengths of prismatic beams of the same materials, are as the areas of the sections, and the distance of their centre of gravity, directly, and as their lengths and weights reciprocally.

8. When the beam is fixed at both ends, the same property has place, except that, in this case, we must consider the beam as only half the length of the former.

9. Cylinders and square prisms have their lateral strengths proportional to the cubes of their diameters, or depths, directly, and their lengths and weights inversely.

10. Similar prisms and cylinders have their strength inversely proportional to their linear dimensions.

For other propositions relative to the resistance or strength of beams of various forms and in various positions, see the article STRENGTH *and Stress of Materials*.

The following results are wholly drawn from experiments on different substances, by Emerson and other writers, by means of which the propositions stated in the preceding part of this article may be submitted to computation.

The relative Resistances or Strengths of Wood and other Bodies.

	Proportional Resistance.
Box, yew, plum-tree, oak - -	11
Elm, ash - - - - -	$8\frac{1}{2}$
Walnut, thorn - - - -	$7\frac{1}{2}$
Red fir, hollin, elder, plane crab-tree, apple-tree	7
Beech, cherry-tree, hazel - -	$6\frac{2}{3}$
Alder, asp, birch, white fir, willow -	6
Iron - - - - -	107
Brass - - - - -	50
Bone - - - - -	22
Lead - - - - -	$6\frac{1}{2}$
Fine free-stone - - -	1

A cylindric rod of good clean fir, of an inch circumference, drawn in length, will bear at its extremity 400 lbs.; and a spear of fir, of two inches diameter, will bear about seven ton weight. A rod of good iron, of an inch circumference, will bear nearly three ton weight. A good hempen rope, of an inch circumference, will bear 1000 lbs. at its extremity. Hence Emerson concludes, that if a rod of fir, or a rope, or a rod of iron, of d inches diameter, were to lift a quarter of the extreme weight that they would support, then

The fir would bear $8\frac{4}{5}\ d^2$ hundred weight.
The rope - $22\ d^2$ ditto.
The iron - $6\frac{3}{4}\ d^2$ tons.

To these results we may add, from the experiments and investigations of professor Robison, that a prism of white marble, an inch square and a foot long, bears about 500 lbs. And that, from the various authors he has collected, the cohesive force of a square inch of gold, when cast, is about 20,000 lbs.; of silver, 40,000 lbs.; cast iron from 40,000 to 60,000 lbs.; wrought iron from 60,000 to 90,000 lbs.; soft steel, 12,000 lbs.; razor steel, 15,000 lbs.; oak and beech, in the direction of their fibres, from 8000 to 17,000 lbs.; willow, 12,000 lbs.; cedar, 5000 lbs.; fir, 8000 lbs.; ivory, 16,000 lbs.; bone, 5000 lbs.; rope, 20,000 lbs. And a cylinder, an inch in diameter, loaded to one-fourth, will carry, if of iron, 135 cwt.; of rope, 22 cwt.; oak, 14 cwt.; and fir, 9 cwt.

The resistance of some metals is doubled, or tripled, by the operation of forging and wire-drawing; and the cohesive, as well as the repulsive, force of wood, is often increased by moderate compression. Oak will *suspend* much more than fir; but fir will *support* twice as much as oak; which difference is supposed to arise from the curvature of the fibres of oak; yet oak has been known to support, with safety, more than two tons for every square inch. Stone will support from 250 to 850 thousand pounds, on a foot square; brick, 300 lbs.; and sometimes they are practically made to support one-sixth as much. Stone is said to be capable of bearing a much greater weight in that position in which it is found in the quarry, than in any other position. See STRENGTH *of Materials*.

RESISTANCE *of Fluids*, in *Hydrostatics*, is the force with which bodies, moving in fluid mediums, are impeded and retarded in their motion.

A body moving in a fluid is resisted from two causes: the first, the cohesion of the parts of the fluid. For a body, in its motion, separating the parts of a liquid, must overcome the force with which those parts cohere.

The second is the inertia, or inactivity of matter, by which

which a certain force is required to move the particles from their places, in order to let the body pafs.

The retardation from the firft caufe is always the fame in the fame fpace, the body remaining the fame, whatever be the velocity, that is, the refiftance is as the fpace run through in the fame time; in which ratio the velocity alfo increafes; and therefore the refiftance from the firft caufe is as the velocity itfelf.

The refiftance from the fecond caufe, when the fame body moves through different fluids with the fame velocity, follows the proportion of the matter to be removed in the fame time, which is as the denfity of the fluid.

When the fame body moves through the fame fluid with different velocities, this refiftance increafes in proportion to the number of particles ftruck in an equal time; which number is as the fpace run through in that time, that is, as the velocity. But it alfo increafes in proportion to the force with which the body ftrikes againft every part; which force is alfo as the velocity of the body; and therefore, if the velocity be triple, the refiftance is triple, from a triple number of parts to be removed. It is alfo triple from a ftroke three times ftronger againft every particle; therefore the whole refiftance is nine-fold, that is, as the fquare of the velocity. Hence, a body moved in a fluid is refifted partly in a ratio of the velocity, and partly in a duplicate ratio of it.

Hence, therefore, if d denotes the denfity of the fluid, v the velocity of the body, and a and b conftant co-efficients; then $adv^2 + bv$ will be proportional to the whole refiftance to the fame body, moving with different velocities, in the fame direction through fluids of different denfities, but of the fame tenacity. But to take into confideration the different tenacities of fluids, let t denote the tenacity, or the cohefion of the parts of the fluid; then $adv^2 + btv$ will be as the faid whole refiftance.

The quantity of refiftance, however, arifing from the cohefion of the parts of the fluids, is very trifling with refpect to the other refiftance, except in very glutinous ones; and it alfo increafes in a much lower degree, being only as the velocity, while the other is as the fquare of the velocity. Hence then the term btv is very fmall, in refpect of the other term adv^2, and, confequently, the refiftance is nearly as the latter term, or nearly as the fquare of the velocity: which formula has been employed by moft authors, and is, indeed, very nearly the truth in flow motions; but in very rapid ones it is far from correct, not fo much from the omiffion of the fmall term btv, due to the cohefion; but from the want of the full counter preffure on the hinder part of the body, by which means a vacuum, either perfect or partial, is left behind the body in its motion; and alfo perhaps to fome compreffion or accumulation of the fluid againft the fore-part of the body. Therefore, in order to conceive the refiftance of fluids to a body moving in them, it is neceffary to diftinguifh between thofe fluids which, being compreffed by fome incumbent weight, perpetually clofe up the fpace behind the body in motion, without permitting, for an inftant, any vacuity to remain behind it; and thofe fluids which, not being fufficiently compreffed, the fpace left behind the moving body remains for fome time empty. Thefe differences, in the refifting fluids, will occafion very remarkable varieties in the laws of their refiftance, and are abfolutely neceffary to be confidered in the determination of the action of the air on fhot and fhells; for the air partakes of both thefe affections, according to the different velocities of the projected body.

In treating of thefe refiftances, the fluids may likewife be confidered as continued or difcontinued, that is, as having their particles contiguous, or as being feparated and unconnected, and alfo as either elaftic or non-elaftic.

If a fluid was fo conftituted, that all the particles compofing it were at fome diftance from each other, and there was no action between them, then the refiftance of a body moving in it would be eafily computed, from the quantity of motion communicated to thefe particles: for inftance, if a cylinder moved in fuch a fluid in the direction of its axis, it would communicate to the particles it met with a velocity equal to its own, and in its own direction, fuppofing that neither the cylinder, nor the parts of the fluid, were elaftic; whence, if the velocity and diameter of the cylinder be known, and alfo the denfity of the fluid, there would thence be determined the quantity of motion communicated to the fluid, which, action and re-action being equal, is the fame with the quantity loft by the cylinder, confequently the refiftance would be thereby afcertained.

In this kind of difcontinued fluid, the particles being detached from each other, every one of them can purfue its own motion in any direction, at leaft for fome time, independent of the neighbouring ones; wherefore, if inftead of a cylinder, moving in the direction of its axis, a body, with a furface oblique to its direction, be fuppofed to move in fuch a fluid, the motion which the parts of the fluid will hereby acquire, will not be in the direction of the refifted body, but perpendicular to its oblique furface; whence the refiftance to fuch a body will not be eftimated from the whole motion communicated to the particles of the fluid, but from that part of it only which is in the direction of the refifted body. In fluids then, where the parts are thus difcontinued from each other, the different obliquities of that furface, which goes foremoft, will occafion confiderable changes in the refiftance; although the fection of the folid, by a plane perpendicular to its direction, fhould in all cafes be the fame. And fir Ifaac Newton has particularly determined, that, in a fluid thus conftituted, the refiftance of a globe is but half the refiftance of a cylinder of the fame diameter, moving in the direction of its axis with the fame velocity.

But though the hypothefis of a fluid, thus conftituted, be of great ufe in explaining the nature of refiftances; yet, in reality, we know of no fuch fluid exifting in nature; all the fluids, with which we are converfant, are fo formed, that their particles either lie contiguous to each other, or at leaft act on each other in the fame manner as if they did; confequently, in thefe fluids, no one particle contiguous to the refifted body can be moved, without moving at the fame time a great number of others, fome of which will be diftant from it; and the motion thus communicated to a mafs of the fluid, will not be in any one determined direction, but will in each particle be different, according to the different manners in which it lies in contact with thofe from which it receives its impulfe; whence great numbers of the particles being diverted into oblique directions, the refiftance of the moving body, which will depend on the quantity of motion communicated to the fluid in its own direction, will neceffarily be different in quantity, from what it would be in the preceding fuppofition, and its eftimation becomes much more complicated and operofe.

If the fluid be compreffed by the incumbent weight of its upper parts, as all the fluids are with us, except at their very furface, and if the velocity of the moving body be much lefs than that with which the parts of the fluid would rufh into a void fpace, in confequence of their compreffion; it is evident, that in this cafe the fpace left by the moving body will be inftantaneoufly filled up by the fluid; and the parts

parts of the fluid, againſt which the foremoſt part of the body preſſes in its motion, will, inſtead of being impelled forwards in the direction of the body, circulate in ſome meaſure towards the hinder part of it, thereby to reſtore the equilibrium, which the conſtant influx of the fluid behind the body would otherwiſe deſtroy; whence the progreſſive motion of the fluid, and conſequently the reſiſtance of the body, which depends on it, would be in this inſtance much leſs than in the hypotheſis, where each particle is ſuppoſed to acquire, from the ſtroke of the reſiſting body, a velocity equal to that with which the body moved, and in the ſame direction. Sir Iſaac Newton has determined, that the reſiſtance of a cylinder, moving in the direction of its axis, in ſuch a compreſſed fluid as we have here treated of, is but one-fourth part of the reſiſtance which the ſame cylinder would undergo, if it moved with the ſame velocity, in a fluid conſtituted in the manner deſcribed in the firſt hypotheſis, each fluid being ſuppoſed to be of the ſame denſity.

But again, it is not only in the quantity of their reſiſtance that theſe fluids differ, but likewiſe in the different manner in which they act on ſolids of different forms, moving in them. In the diſcontinued fluid, firſt deſcribed, the obliquity of the foremoſt ſurface of the moving body would diminiſh the reſiſtance; but in compreſſed fluids this holds not true, at leaſt not in any conſiderable degree; for the principal reſiſtance in compreſſed fluids ariſes from the greater or leſſer facility with which the fluid, impelled by the fore-part of the body, can circulate towards its hindermoſt part; and this being little, if at all, affected by the form of the moving body, whether it be cylindrical, conical, or ſpherical, it follows, that while the tranſverſe ſection of the body, and conſequently the quantity of impelled fluid is the ſame, the change of figure in the body will ſcarcely affect the quantity of its reſiſtance.

And this caſe, that is, the reſiſtance of a compreſſed fluid to a ſolid, moving in it with a velocity much leſs than what the parts of the fluid would acquire from their compreſſion; this caſe has been very fully conſidered by ſir Iſaac Newton, who has aſcertained the quantity of ſuch a reſiſtance according to the different magnitudes of the moving body, and the denſity of the fluid. But he very expreſsly informs us, that the rules he has laid down are not generally true, but upon a ſuppoſition that the compreſſion of the fluid be increaſed in the greater velocities of the moving body: however, ſome unſkilful writers, who have followed him, overlooking this caution, have applied his determination to bodies moving with all kinds of velocities, without attending to the different compreſſions of the fluids they are reſiſted by; and by this means they have accounted the reſiſtance of the air to muſket and cannon-ſhot, to be but one-third part of what it is found to be by experience.

It is indeed evident, that the reſiſting power of the medium muſt be increaſed, when the reſiſting body moves ſo faſt that the fluid cannot inſtantaneouſly preſs in behind it, and fill the deſerted ſpace; for when this happens the body will be deprived of the preſſure of the fluid behind it; which in ſome meaſure balanced its reſiſtance, and muſt ſupport on its fore-part the whole weight of a column of the fluid, independent of the motion it gives to the parts of the fluid; and beſides, the motion in the particles driven before the body, is, in this caſe, leſs affected by the compreſſion of the fluid, and conſequently they are leſs deflected from the direction in which they are impelled by the reſiſted ſurface; whence this ſpecies of reſiſtance approaches more and more to that deſcribed in the firſt hypotheſis, where each particle of the fluid being unconnected with the neighbouring ones, it purſues its own motion, in its own direction, without being interrupted or deflected by their contiguity; and therefore, as the reſiſtance of a diſcontinued fluid to a cylinder, moving in the direction of its axis, is four times greater than the reſiſtance of a fluid ſufficiently compreſſed of the ſame denſity; it follows, that the reſiſtance of a fluid, when a vacuity is left behind the moving body, may be nearly four times greater than that of the ſame fluid, when no ſuch vacuity is formed; for when a void ſpace is thus left, the reſiſtance approaches in its nature to that of a diſcontinued fluid.

This, then, may probably be the caſe in a cylinder moving in the ſame compreſſed fluid, according to the different degrees of its velocity; ſo that if it ſet out with a great velocity, and moves in the fluid till that velocity be much diminiſhed, the reſiſting power of the medium may be nearly four times greater in the beginning of its motion than in the end.

In a globe the difference will not be ſo great, becauſe, on account of its oblique ſurface, its reſiſtance in a diſcontinued medium is but about twice as much as in one properly compreſſed; for its oblique ſurface diminiſhes its reſiſtance in one caſe, and not in the other: however, as the compreſſion of the medium, even when a vacuity is left behind the moving body, may yet confine the oblique motion of the parts of the fluid, which are driven before the body, and as in an elaſtic fluid, as the air is, there will be ſome degree of condenſation in thoſe parts; it is highly probable, that the reſiſtance of a globe moving in a compreſſed fluid may greatly exceed the proportion of the reſiſtance to ſlow motions.

And as this increaſe of the reſiſting power of the medium will take place, when the velocity of the moving body is ſo great that a perfect vacuum is left behind it, ſo ſome degree of augmentation will be ſenſible in velocities much ſhort of this; for even when, by the compreſſion of the fluid, the ſpace left behind the body is inſtantaneouſly filled up; yet, if the velocity with which the parts of the fluid ruſh in behind, is not much greater than that with which the body moves, the ſame reaſons we have urged above, in the caſe of an abſolute vacuity, will hold in a leſs degree in this inſtance; and therefore we are not to ſuppoſe, that, in the increaſed reſiſtance which we have hitherto treated of, it immediately vaniſhes, when the compreſſion of the fluid is juſt ſufficient to prevent a vacuum behind the reſiſted body; but we muſt conſider it as diminiſhing only, according as the velocity with which the parts of the fluid follow the body, exceeds that with which the body moves.

Hence, then, we may conclude, that if a globe ſets out in a reſiſting medium, with a velocity much exceeding that with which the particles of the medium would ruſh into a void ſpace, in conſequence of their compreſſion, ſo that a vacuum is neceſſarily left behind the globe in its motion: the reſiſtance of this medium to the globe will be near three times greater, in proportion to its velocity, than what we are ſure, from ſir Iſaac Newton, would take place in a ſlower motion. We may alſo farther conclude, that the reſiſting power of the medium will gradually diminiſh as the velocity of the globe decreaſes, till at laſt, when it moves with a velocity which bears but a ſmall proportion to that with which the particles of the medium follow it, the reſiſtance becomes the ſame with what is aſſigned by ſir Iſaac Newton in the caſe of a compreſſed fluid.

And from this determination we ſee how falſe that poſition is, which aſſerts the reſiſtance of any medium to be in the duplicate proportion of the velocity of the reſiſted body;

body; for it is evident by what we have ſaid, that this can only be conſidered as nearly true in ſmall variations of velocity, and can never be applied in the comparing together of the reſiſtances to all velocities whatever, without the moſt enormous errors. See New Principles of Gunnery, by Mr. Robins, chap. 2. prop. 1. See RESISTANCE *of the Air*. See alſo PROJECTILE and GUNNERY.

Reſiſtance and retardation are uſed indifferently for each other, as being both in the ſame proportion, and the ſame reſiſtance always generating the ſame retardation. But, with regard to different bodies, the ſame reſiſtance frequently generates different retardations; the reſiſtance being as the quantity of motion, and the retardation as that of the celerity. For the difference and meaſure of the two, ſee RETARDATION.

The retardations from this reſiſtance may be compared together, by comparing the reſiſtance with the gravity or quantity of matter. Thus, let v = the velocity; a = the area of the face, or end of a cylinder; n = the ſpecific gravity of the fluid; $g = 32\frac{1}{6}$ feet, the force of gravity; then the altitude due to the velocity v being $\frac{v^2}{2g}$, the whole reſiſtance, or motive force m, will be expreſſed by the following formulæ;

$$m = an \times \frac{v^2}{2g} = \frac{anv^2}{2g}; \text{ or } = \frac{anv^2s^3}{2g}:$$

the latter having place when the motion is not in a direction perpendicular to the plane or end, but is inclined to it at a given angle, whoſe ſine is s. For it is a known property, that, in this caſe, the reſiſtance varies as the cube of the ſine of the angle of inclination. If now w be made to denote the weight of the body, and f the retarding force; then, on the ſame principles, we derive

$$f = \frac{m}{w} = \frac{anv^2s^3}{2gw}.$$

If the body be a cylinder, moving in the direction of its axis, and the diameter of the baſe equal d, or radius r, and $\pi = 3.14159$, &c. then

$$f = \frac{m}{w} = \frac{\pi nd^2v^2}{8gw} = \frac{\pi nr^2v^2}{2gw}.$$

But when the cylinder moves in a direction perpendicular to its axis, then writing h for the height or length of the cylinder, we have

$$f = \frac{m}{w} = \frac{nv^2hd}{3gw} = \frac{nv^2hr}{\frac{3}{2}gw}.$$

And when it moves obliquely to its axis, then writing s for the ſine of the angle of inclination, we have

$$f = \frac{nv^2rhs^3}{2g}\left\{1 - \frac{3s^2-1}{6} + \frac{3(s^2-1)^2}{40} + \frac{(s^2+5)(s^2-1)^2}{112} + \text{\&c.}\right\} + \frac{\pi nv^2r^2}{2g}.(-s^2)^{\frac{1}{2}}$$

See Moore's Theory of Military Rockets.

If the body be a cone, then the ſame notation remaining, only writing s for the ſine of the angle of inclination of the ſide of the cone; then

$$f = \frac{m}{w} = \frac{\pi nd^2v^2s^3}{8gw} = \frac{\pi nr^2v^2s^2}{2gw}.$$

For, in this caſe, the inclination has no effect in reducing the ſection oppoſed to the reſiſtance of the fluid, this being the ſame as in the cylinder, and therefore will vary as s^2.

The ſame notation ſtill remaining, it is found, from a fluxional inveſtigation (ſee Gregory's Mechanics, vol. i.) that the reſiſtance of the body, when terminated with a hemiſpherical ſurface, is

$$f = \frac{m}{w} = \frac{\pi nd^2v^2}{16gw} = \frac{\pi nr^2v^2}{4gw}.$$

that is, half what it is when the end is a plane ſurface.

Hence the reſiſtance of a ſphere, when impelled through any fluid, is equal to half the direct reſiſtance to a great circle of it, or to a cylinder of the ſame diameter. Since $\frac{1}{6}\pi d^3$ is the magnitude of the globe, if N denotes its denſity, or ſpecific gravity, its weight $w = \frac{1}{6}\pi N d^3$; and, therefore, the retardive force becomes

$$f = \frac{m}{w} = \frac{\pi nv^2d^2}{16gw} \times \frac{6}{\pi Nd^3} = \frac{3nv^2}{8gNd} = \frac{v^2}{2gs},$$

where s is the ſpace deſcribed; for $2fgs = v^2$, by the law of accelerated or retarded motions. From which it appears, that the reſiſtance varies as the ſquare of the velocity directly, and as the diameter inverſely, all things elſe being the ſame; and hence the reaſon, why a large ball overcomes reſiſtance better than a ſmaller one.

James Bernouilli demonſtrates the following theorems, Acta Erud. Lipſ. for June 1693, p. 252, &c.

1. If an iſoſceles triangle be moved in a fluid according to the direction of a line perpendicular to its baſe; firſt, with the vertex foremoſt, and then with its baſe; the reſiſtances will be in the duplicate ratio of the baſe, and of the ſum of the legs.

2. The reſiſtance of a ſquare, moved according to the direction of its ſide, is to the reſiſtance of the ſame ſquare, moved with the ſame celerity in the direction of its diagonal, as the diagonal is to the ſide.

3. The reſiſtance of a circular ſegment, leſs than a ſemicircle, carried in a direction perpendicular to its baſis, when it goes with the baſe foremoſt, and when with its vertex foremoſt (the ſame direction and celerity continuing), is as the ſquare of the ſame diameter to the ſame, leſs one-third of the ſquare of the baſe of the ſegment. Hence, the reſiſtances of a ſemicircle, when its baſe and when its vertex go foremoſt, are to one another in a ſeſquialterate ratio.

4. A parabola moving in the direction of its axis, firſt with its baſis, and then its vertex foremoſt, has its reſiſtances as the tangent to an arc of a circle, whoſe diameter is equal to the parameter, and the tangent equal to half the baſis of the parabola.

5. The reſiſtances of an hyperbola and ellipſis, when the vertex and baſe go foremoſt, may be thus computed. Say, as the ſum (or difference) of the tranſverſe axis and latus rectum is to the tranſverſe axis, ſo is the ſquare of the latus rectum to the ſquare of the diameter of a certain circle; in which circle apply a tangent, equal to half the baſis of the hyperbola or ellipſe. Then ſay again, as the ſum (or difference) of the axis and parameter is to the parameter, ſo is the aforeſaid tangent to another right line. And farther, as the ſum (or difference) of the axis and parameter is to the axis, ſo is the circular arc correſponding to the aforeſaid tangent to another arc. This done, the reſiſtances will be as the tangent to the ſum (or difference) of the right line thus found, and the arc laſt mentioned.

6. In the general, the reſiſtances of any figure whatever, going now with its baſe foremoſt, and then with its vertex, are as the figures of the baſe to the ſum of all the cubes of the elements of the baſe, divided by the ſquares of the elements of the curve line.

All which rules may be of uſe in the conſtruction of ſhips, and in perfecting the art of navigation univerſally; as alſo for determining the figures of the balls of pendulums for clocks, &c.

Resistance *of Fluid Mediums to the Motion of Falling Bodies.*—A body freely deſcending in a fluid is accelerated by the reſpective gravity of the body, which continually acts upon it, yet not equably, as in a vacuum: the reſiſtance of the fluid occaſions a retardation, that is, a diminution of acceleration, which diminution increaſes with the velocity of the body. Now there is a certain velocity, which is the greateſt a body can acquire by falling; for if its velocity be ſuch, that the reſiſtance ariſing from it becomes equal to the reſpective weight of the body, its motion can be no longer accelerated; for the motion here continually generated by the reſpective gravity, will be deſtroyed by the reſiſtance, and the body forced to go on equably. A body continually comes nearer and nearer to this greateſt celerity, but can never attain to it.

When the denſities of a fluid body are given, the reſpective weight of the body may be known; and by knowing the diameter of the body, it may be found from what height a body falling in vacuo can acquire ſuch a velocity as that the reſiſtance in a fluid ſhall be equal to that reſpective weight, which will be that greateſt velocity above-mentioned. If the body be a ſphere, it is known, that a ſphere is equal to a cylinder of the ſame diameter, whoſe height is two-third parts of that diameter; which height is to be increaſed in the ratio in which the reſpective weight of the body exceeds the weight of the fluid, in order to have the height of a cylinder of the fluid, whoſe weight is equal to the reſpective weight of the body; but if you double this height, you will have a height from which a body falling in vacuo acquires ſuch a velocity as generates a reſiſtance equal to this reſpective weight, and which therefore is the greateſt velocity which a body can acquire, by falling in a fluid, from an infinite height. Lead is eleven times heavier than water; wherefore its reſpective weight is to the weight of water, as ten to one; therefore a leaden ball, as appears from what has been ſaid, cannot acquire a greater velocity, in falling in water, than it would acquire in falling in vacuo, from a height of $13\frac{1}{3}$ of its diameters.

A body lighter than a fluid, and aſcending in it by the action of the fluid, is moved exactly by the ſame laws as a heavier body falling in the fluid. Wherever the body is placed, it is ſuſtained by the fluid, and carried up with a force equal to the difference between the weight of a quantity of the fluid of the ſame bulk as the body, and the body itſelf; by which not only the action of gravity of the body is deſtroyed; but the body is alſo carried upwards by a motion equably accelerated, in the ſame manner as a body heavier than a fluid deſcends by its reſpective gravity: but the equability of the acceleration is deſtroyed in the ſame manner by the reſiſtance, in the aſcent of a body lighter than the fluid, as it is deſtroyed in the deſcent of a body heavier.

When a body ſpecifically heavier than a fluid is thrown in it, it is retarded upon a double account; on account of the gravity of the body, and on account of the reſiſtance of the fluid; conſequently, a body riſes to a leſs height than it would riſe to in vacuo with the ſame celerity. But the defects of the height in a fluid from the height to which a body would riſe in vacuo with the ſame celerity, have a greater proportion to each other than the heights themſelves; and in leſs heights the defects are nearly as the ſquares of the heights in vacuo.

In order to ſubmit the above principles to accurate computation, we muſt refer back to our preceding determination of the retardative force of a fluid to a body moving it, which we found to be

$$f = \frac{m}{w} = \frac{\pi n v^2 d^2}{16 g w} \times \frac{6}{\pi N d^3} = \frac{3 n v^2}{8 g N d} = \frac{v^2}{2 g s};$$

from the two latter terms of which we have $s = \frac{N}{n} \times \frac{4}{3} d$; which is the ſpace that would be deſcribed by the globe, while its whole motion is generated or deſtroyed by a conſtant force, which is equal to the forces of reſiſtance, if no other force acted on the globe to continue its motion. And if the denſity of the fluid were equal to that of the globe, the reſiſting force is ſuch as, acting conſtantly on the globe without any other force, would generate or deſtroy its motion in deſcribing the ſpace $\frac{4}{3}d$, or $\frac{4}{3}$ of its diameter, by that accelerating or retarding force.

Hence the greateſt velocity that a ball will acquire by deſcending in a fluid by means of its relative weight in that fluid, will be found by making the reſiſting force equal to that weight. For, after the velocity has arrived at ſuch a degree, that the reſiſting force is equal to the weight that urges it, it will increaſe no longer, and the globe will then continue to deſcend with an uniform velocity.

Now N and n being the ſeparate ſpecific gravities of the globe and fluid, $N - n$ will be the relative gravity of the globe in the fluid; and, therefore, $w = \frac{1}{6}\pi d^3 (N - n)$ is the weight by which it is urged, $m = \frac{\pi n v^2 d^2}{16 g}$ is the reſiſtance; conſequently $\frac{\pi n v^2 d^2}{16 g} = \frac{1}{6}\pi d^3 (N - n)$ when the velocity becomes uniform; whence we obtain

$$v = \sqrt{\left(2 g \times \tfrac{4}{3} d \times \frac{N - n}{n}\right)}$$

for the uniform or greateſt velocity of the globe.

Thus, for example, if a leaden ball one inch in diameter deſcend in water, and in air of the ſame denſity as at the earth's ſurface; the three ſpecific gravities being, lead $= 11\frac{1}{3}$, water $= 1$, and air $= \frac{3}{2500}$; then

$$v = \sqrt{(2 \times 32\tfrac{1}{6} \times \frac{4}{36} \times 10\tfrac{1}{3})} = 8.5944 \text{ feet}$$

per ſecond for the greateſt velocity in water; and

$$v = \sqrt{\left(4 \times \frac{193}{12} \times \frac{4}{36} \times \frac{34}{3} \times \frac{2500}{3}\right)} = 259.82 \text{ feet}$$

per ſecond for the greateſt velocity in air.

But as this velocity, all other things being the ſame, varies as $\sqrt{d}$; it follows that a ball of $\frac{1}{1000}$th of an inch diameter would only acquire velocities $\frac{1}{10}$th of thoſe given above. Hence it appears, how ſoon ſmall bodies come to their greateſt or uniform velocity in deſcending in fluids, and how very ſmall that velocity is; which explains the reaſon of the ſlow precipitation of mud and ſmall particles in water, as alſo why, in precipitations, the larger and groſs particles deſcend ſooneſt and loweſt.

It appears alſo, from the preceding formulæ, that where $N = n$, or the denſity of the body is equal to that of the fluid; then $N - n = 0$, and conſequently the velocity and ſpace are in this caſe both equal to zero, as they ought to be.

Again, when the body is lighter than the fluid, then $N - n$ becomes negative, and the motion and force both tend the contrary way; that is, the ball will aſcend by the ſame

ſame laws by which, in the preceding caſe, the heavier body deſcended, as ſtated in the preceding part of this article.

RESISTANCE *of the Air*, in *Pneumatics*, is the force with which the motion of bodies, particularly of projectiles, is retarded by the oppoſition of the air or atmoſphere. See GUNNERY.

The air being a fluid, the general laws of the reſiſtance of fluids obtain in it, except that the different degrees of denſity, in the different ſtages or regions of the atmoſphere, occaſion ſome irregularity.

As to the reſiſtance of the air, it has been thus determined from experiments. Mr. Robins, in his New Principles of Gunnery, chap. 2. prop. 2, &c. having taken a muſket barrel, and charging it ſucceſſively with a leaden ball of three-quarters of an inch diameter, and about half its weight of powder, and taking ſuch precaution in weighing of the powder, and placing it, as to be ſure, by many previous trials, that the velocity of the ball could not differ by 20 feet in 1″ from its medium quantity, fired it againſt a pendulum, called the balliſtic pendulum, (deſcribed under GUNNERY), placed at 25 feet, at 75 feet, and at 125 feet diſtance from the mouth of the piece reſpectively. In the firſt caſe, it impinged againſt the pendulum with a velocity of 1670 feet in 1″; in the ſecond caſe, with a velocity of 1550 feet in 1″; and in the third caſe, with a velocity of 1425 feet in 1″; ſo that in paſſing through 50 feet of air, the bullet loſt a velocity of about 120 or 125 feet in 1″; and the time of its paſſing through that ſpace being about $\frac{1}{37}$d or $\frac{1}{30}$th of 1″, the medium quantity of reſiſtance muſt, in theſe inſtances, have been about 120 times the weight of the ball; which, as the ball was nearly $\frac{1}{12}$th of a pound, amounts to about 10lbs. avoirdupois.

Now, if a computation be made, according to the method laid down for compreſſed fluids, in the 38th propoſ. of lib. ii. of ſir Iſaac Newton's Principia, ſuppoſing the weight of water to be to the weight of air as 850 to 1, it will be found that the reſiſtance of a globe of three-quarters of an inch diameter, moving with a velocity of about 1600 feet in 1″, will not, on thoſe principles, amount to any more than a force of $4\frac{1}{6}$lbs. avoirdupois; whence we may conclude, the rules in that propoſition for ſlow motions being very accurate, that the reſiſting power of the air in ſlow motions is leſs than in ſwift motions, in the ratio of $4\frac{1}{6}$ to 10, a proportion between that of 1 to 2, and 1 to 3.

Again, charging the ſame piece with equal quantities of powder, and balls of the ſame weight, and firing three times at the pendulum, placed at 25 feet diſtance from the mouth of the piece, the medium of the velocities with which the ball impinged was nearly that of 1690 feet in 1″. Then removing the piece 175 feet from the pendulum, the velocity of the ball, at a medium of five ſhots, was that of 1300 feet in 1″. Whence the ball, in paſſing through 150 feet of air, loſt a velocity of about 390 feet in 1″; and the reſiſtance, computed from theſe numbers, gives ſomething more than in the preceding inſtance, amounting to between 11 and 12 pounds avoirdupois: whence, according to theſe experiments, the reſiſting power of the air to ſwift motions is greater than in ſlow ones, in a ratio which approaches nearer to the ratio of 3 to 1, than in the preceding experiments. Next, to examine this reſiſtance in ſmaller velocities, the pendulum being placed at 25 feet diſtance, was fired at five times, with an equal charge each time, and the mean velocity with which the ball impinged, was that of 1180 feet in 1″. Then removing the pendulum to the diſtance of 250 feet, the medium velocity of five ſhot, at this diſtance, was that of 950 feet in 1″; whence the ball, in paſſing through 225 feet of air, loſt a velocity of 230 feet in 1″, and as it paſſed through that interval in about $\frac{1}{13}$ths of 1″, the reſiſtance to the middle velocity will come out to be near $33\frac{1}{2}$ times the gravity of the ball, or 2lb. 10oz. avoirdupois. Now the reſiſtance to the ſame velocity, according to the laws obſerved in ſlower motions, amounts to $\frac{7}{11}$ths of the ſame quantity; whence, in a velocity of 1065 feet in 1″ (the medium of 1180 and 950), the reſiſting power of the air is augmented in no greater proportion than that of 7 to 11; whereas, in greater degrees of velocity, as before, it amounted very nearly to the ratio of 1 to 3.

By other experiments, it appears, that the reſiſtance of the air is very ſenſibly increaſed, even in ſo ſmall a velocity as that of 400 feet in 1″.

That this reſiſting power of the air to ſwift motions is very ſenſibly increaſed beyond what ſir Iſaac's theory for ſlow motions makes it, ſeems hence to be evident. It being, as has been ſaid, in muſket, or cannon ſhot, with their full charge of powder, nearly three times the quantity aſſigned by that theory.

However, this increaſed power of reſiſtance diminiſhes as the velocity of the reſiſted body diminiſhes, till at length, when the motion is ſufficiently abated, the actual reſiſtance coincides with that ſuppoſed in the theory.

The reſiſtance of a bullet of three-quarters of an inch diameter, moving in air with the velocity of 1670 feet in 1″, amounting, as we ſaid, to 10lbs., the reſiſtance of a cannon ball of 24lbs., fired with 16lbs., or its full charge of powder, and thereby moving with a velocity of 1650 feet in 1″, (which ſcarcely differs from the other), may hence be determined. For the velocity of the cannon ball being nearly the ſame as the muſket bullet, and its ſurface above 54 times greater, it follows, that the reſiſtance on the cannon ball will amount to more than 540lbs. which is nearly 23 times its own weight.

Euler has ſhewn, that the common doctrine of reſiſtance anſwers very well when the motion is not very ſwift, but in very ſwift motions it gives the reſiſtance leſs than it ought to be, on two accounts. 1. Becauſe in very quick motions the air does not fill up the ſpace behind the body faſt enough to preſs on the hinder parts, that the reſiſtance on the fore part is increaſed. 2. The denſity of the air before the ball, being increaſed by the quick motion, will preſs more ſtrongly on the fore part, and, being heavier than in its natural ſtate, will retard its motion.

He has alſo ſhewn, that Mr. Robins has reſtrained his rule to velocities not exceeding 1670 feet in 1″; whereas, had he extended it to greater velocities, the reſult muſt have been erroneous: as he apprehends that it is not perfectly exact, when the motion is not extremely ſwift. He has inveſtigated a formula for determining the degree of this reſiſtance, and deduced concluſions differing from thoſe of Mr. Robins. See Principles of Gunnery inveſtigated, &c. 1777, p. 224, &c.

Mr. Robins having proved that, in very great changes of velocity, the reſiſtance does not accurately follow the duplicate proportion of the velocity, lays down two poſitions, which may be of conſiderable ſervice in the practice of artillery, till a more complete and accurate theory of reſiſtance, and the changes of its augmentation, may be obtained. The firſt of theſe is, that till the velocity of the projectile ſurpaſſes that of 1100 feet in a ſecond, the reſiſtance may be eſteemed to be in the duplicate proportion of the velocity: and the ſecond is, that if the velocity be greater than that of 1100 or 1200 feet in a ſecond, the abſolute quantity of the reſiſtance will be nearly three times as great as it ſhould be by a compariſon with the ſmaller velocities. Upon theſe principles, he proceeds in approximating the actual ranges of pieces with ſmall angles of elevation, viz. ſuch as do not exceed 8° or 10°, which he ſets down in a table, compared with their correſponding potential ranges. See his Mathematical Tracts, vol. i. p. 179, &c.

All which rules may be of use in the construction of ships, and in perfecting the art of navigation universally; as also for determining the figures of the balls of pendulums for clocks, &c.

RESISTANCE *of Fluid Mediums to the Motion of Falling Bodies.*—A body freely descending in a fluid is accelerated by the respective gravity of the body, which continually acts upon it, yet not equably, as in a vacuum: the resistance of the fluid occasions a retardation, that is, a diminution of acceleration, which diminution increases with the velocity of the body. Now there is a certain velocity, which is the greatest a body can acquire by falling; for if its velocity be such, that the resistance arising from it becomes equal to the respective weight of the body, its motion can be no longer accelerated; for the motion here continually generated by the respective gravity, will be destroyed by the resistance, and the body forced to go on equably. A body continually comes nearer and nearer to this greatest celerity, but can never attain to it.

When the densities of a fluid body are given, the respective weight of the body may be known; and by knowing the diameter of the body, it may be found from what height a body falling in vacuo can acquire such a velocity as that the resistance in a fluid shall be equal to that respective weight, which will be that greatest velocity above-mentioned. If the body be a sphere, it is known, that a sphere is equal to a cylinder of the same diameter, whose height is two-third parts of that diameter; which height is to be increased in the ratio in which the respective weight of the body exceeds the weight of the fluid, in order to have the height of a cylinder of the fluid, whose weight is equal to the respective weight of the body; but if you double this height, you will have a height from which a body falling in vacuo acquires such a velocity as generates a resistance equal to this respective weight, and which therefore is the greatest velocity which a body can acquire, by falling in a fluid, from an infinite height. Lead is eleven times heavier than water; wherefore its respective weight is to the weight of water, as ten to one; therefore a leaden ball, as appears from what has been said, cannot acquire a greater velocity, in falling in water, than it would acquire in falling in vacuo, from a height of $13\frac{1}{3}$ of its diameters.

A body lighter than a fluid, and ascending in it by the action of the fluid, is moved exactly by the same laws as a heavier body falling in the fluid. Wherever the body is placed, it is sustained by the fluid, and carried up with a force equal to the difference between the weight of a quantity of the fluid of the same bulk as the body, and the body itself; by which not only the action of gravity of the body is destroyed; but the body is also carried upwards by a motion equably accelerated, in the same manner as a body heavier than a fluid descends by its respective gravity: but the equability of the acceleration is destroyed in the same manner by the resistance, in the ascent of a body lighter than the fluid, as it is destroyed in the descent of a body heavier.

When a body specifically heavier than a fluid is thrown in it, it is retarded upon a double account; on account of the gravity of the body, and on account of the resistance of the fluid; consequently, a body rises to a less height than it would rise to in vacuo with the same celerity. But the defects of the height in a fluid from the height to which a body would rise in vacuo with the same celerity, have a greater proportion to each other than the heights themselves; and in less heights the defects are nearly as the squares of the heights in vacuo.

In order to submit the above principles to accurate computation, we must refer back to our preceding determination of the retardative force of a fluid to a body moving it, which we found to be

$$f = \frac{m}{w} = \frac{\pi n v^2 d^2}{16 g w} \times \frac{6}{\pi N d^3} = \frac{3 n v^2}{8 g N d} = \frac{v^2}{2 g s};$$

from the two latter terms of which we have $s = \frac{N}{n} \times \frac{4}{3} d$; which is the space that would be described by the globe, while its whole motion is generated or destroyed by a constant force, which is equal to the forces of resistance, if no other force acted on the globe to continue its motion. And if the density of the fluid were equal to that of the globe, the resisting force is such as, acting constantly on the globe without any other force, would generate or destroy its motion in describing the space $\frac{4}{3}d$, or $\frac{4}{3}$ of its diameter, by that accelerating or retarding force.

Hence the greatest velocity that a ball will acquire by descending in a fluid by means of its relative weight in that fluid, will be found by making the resisting force equal to that weight. For, after the velocity has arrived at such a degree, that the resisting force is equal to the weight that urges it, it will increase no longer, and the globe will then continue to descend with an uniform velocity.

Now N and n being the separate specific gravities of the globe and fluid, $N - n$ will be the relative gravity of the globe in the fluid; and, therefore, $w = \frac{1}{6} \pi d^3 (N - n)$ is the weight by which it is urged, $m = \frac{\pi n v^2 d^2}{16 g}$ is the resistance; consequently $\frac{\pi n v^2 d^2}{16 g} = \frac{1}{6} \pi d^3 (N - n)$ when the velocity becomes uniform; whence we obtain

$$v = \sqrt{\left(2 g \times \tfrac{4}{3} d \times \frac{N - n}{n}\right)}$$

for the uniform or greatest velocity of the globe.

Thus, for example, if a leaden ball one inch in diameter descend in water, and in air of the same density as at the earth's surface; the three specific gravities being, lead $= 11\frac{1}{3}$, water $= 1$, and air $= \frac{3}{2500}$; then

$$v = \sqrt{(2 \times 32\tfrac{1}{6} \times \frac{4}{36} \times 10\tfrac{1}{3})} = 8.5944 \text{ feet}$$

per second for the greatest velocity in water; and

$$v = \sqrt{\left(4 \times \frac{193}{12} \times \frac{4}{36} \times \frac{34}{3} \times \frac{2500}{3}\right)} = 259.82 \text{ feet}$$

per second for the greatest velocity in air.

But as this velocity, all other things being the same, varies as $\sqrt{d}$; it follows that a ball of $\frac{1}{100}$th of an inch diameter would only acquire velocities $\frac{1}{10}$th of those given above. Hence it appears, how soon small bodies come to their greatest or uniform velocity in descending in fluids, and how very small that velocity is; which explains the reason of the slow precipitation of mud and small particles in water, as also why, in precipitations, the larger and gross particles descend soonest and lowest.

It appears also, from the preceding formulæ, that where $N = n$, or the density of the body is equal to that of the fluid; then $N - n = 0$, and consequently the velocity and space are in this case both equal to zero, as they ought to be.

Again, when the body is lighter than the fluid, then $N - n$ becomes negative, and the motion and force both tend the contrary way; that is, the ball will ascend by the

ſame laws by which, in the preceding caſe, the heavier body deſcended, as ſtated in the preceding part of this article.

RESISTANCE *of the Air*, in *Pneumatics*, is the force with which the motion of bodies, particularly of projectiles, is retarded by the oppoſition of the air or atmoſphere. See GUNNERY.

The air being a fluid, the general laws of the reſiſtance of fluids obtain in it, except that the different degrees of denſity, in the different ſtages or regions of the atmoſphere, occaſion ſome irregularity.

As to the reſiſtance of the air, it has been thus determined from experiments. Mr. Robins, in his New Principles of Gunnery, chap. 2. prop. 2, &c. having taken a muſket barrel, and charging it ſucceſſively with a leaden ball of three-quarters of an inch diameter, and about half its weight of powder, and taking ſuch precaution in weighing of the powder, and placing it, as to be ſure, by many previous trials, that the velocity of the ball could not differ by 20 feet in 1″ from its medium quantity, fired it againſt a pendulum, called the balliſtic pendulum, (deſcribed under GUNNERY), placed at 25 feet, at 75 feet, and at 125 feet diſtance from the mouth of the piece reſpectively. In the firſt caſe, it impinged againſt the pendulum with a velocity of 1670 feet in 1″; in the ſecond caſe, with a velocity of 1550 feet in 1″; and in the third caſe, with a velocity of 1425 feet in 1″; ſo that in paſſing through 50 feet of air, the bullet loſt a velocity of about 120 or 125 feet in 1″; and the time of its paſſing through that ſpace being about $\frac{1}{12}$d or $\frac{1}{10}$th of 1″, the medium quantity of reſiſtance muſt, in theſe inſtances, have been about 120 times the weight of the ball; which, as the ball was nearly $\frac{1}{12}$th of a pound, amounts to about 10lbs. avoirdupois.

Now, if a computation be made, according to the method laid down for compreſſed fluids, in the 38th propoſ. of lib. ii. of ſir Iſaac Newton's Principia, ſuppoſing the weight of water to be to the weight of air as 850 to 1, it will be found that the reſiſtance of a globe of three-quarters of an inch diameter, moving with a velocity of about 1600 feet in 1″, will not, on thoſe principles, amount to any more than a force of $4\frac{1}{6}$lbs. avoirdupois; whence we may conclude, the rules in that propoſition for ſlow motions being very accurate, that the reſiſting power of the air in ſlow motions is leſs than in ſwift motions, in the ratio of $4\frac{1}{6}$ to 10, a proportion between that of 1 to 2, and 1 to 3.

Again, charging the ſame piece with equal quantities of powder, and balls of the ſame weight, and firing three times at the pendulum, placed at 25 feet diſtance from the mouth of the piece, the medium of the velocities with which the ball impinged was nearly that of 1690 feet in 1″. Then removing the piece 175 feet from the pendulum, the velocity of the ball, at a medium of five ſhots, was that of 1300 feet in 1″. Whence the ball, in paſſing through 150 feet of air, loſt a velocity of about 390 feet in 1″; and the reſiſtance, computed from theſe numbers, gives ſomething more than in the preceding inſtance, amounting to between 11 and 12 pounds avoirdupois: whence, according to theſe experiments, the reſiſting power of the air to ſwift motions is greater than in ſlow ones, in a ratio which approaches nearer to the ratio of 3 to 1, than in the preceding experiments. Next, to examine this reſiſtance in ſmaller velocities, the pendulum being placed at 25 feet diſtance, was fired at five times, with an equal charge each time, and the mean velocity with which the ball impinged, was that of 1180 feet in 1″. Then removing the pendulum to the diſtance of 250 feet, the medium velocity of five ſhot, at this diſtance, was that of 950 feet in 1″; whence the ball, in paſſing through 225 feet of air, loſt a velocity of 230 feet in 1″, and as it paſſed through that interval in about $\frac{3}{14}$ths of 1″, the reſiſtance to the middle velocity will come out to be near $33\frac{1}{2}$ times the gravity of the ball, or 2lb. 10oz. avoirdupois. Now the reſiſtance to the ſame velocity, according to the laws obſerved in ſlower motions, amounts to $\frac{7}{11}$ths of the ſame quantity; whence, in a velocity of 1065 feet in 1″ (the medium of 1180 and 950), the reſiſting power of the air is augmented in no greater proportion than that of 7 to 11; whereas, in greater degrees of velocity, as before, it amounted very nearly to the ratio of 1 to 3.

By other experiments, it appears, that the reſiſtance of the air is very ſenſibly increaſed, even in ſo ſmall a velocity as that of 400 feet in 1″.

That this reſiſting power of the air to ſwift motions is very ſenſibly increaſed beyond what ſir Iſaac's theory for ſlow motions makes it, ſeems hence to be evident. It being, as has been ſaid, in muſket, or cannon ſhot, with their full charge of powder, nearly three times the quantity aſſigned by that theory.

However, this increaſed power of reſiſtance diminiſhes as the velocity of the reſiſted body diminiſhes, till at length, when the motion is ſufficiently abated, the actual reſiſtance coincides with that ſuppoſed in the theory.

The reſiſtance of a bullet of three-quarters of an inch diameter, moving in air with the velocity of 1670 feet in 1″, amounting, as we ſaid, to 10lbs., the reſiſtance of a cannon ball of 24lbs., fired with 16lbs., or its full charge of powder, and thereby moving with a velocity of 1650 feet in 1″, (which ſcarcely differs from the other), may hence be determined. For the velocity of the cannon ball being nearly the ſame as the muſket bullet, and its ſurface above 54 times greater, it follows, that the reſiſtance on the cannon ball will amount to more than 540lbs. which is nearly 23 times its own weight.

Euler has ſhewn, that the common doctrine of reſiſtance anſwers very well when the motion is not very ſwift, but in very ſwift motions it gives the reſiſtance leſs than it ought to be, on two accounts. 1. Becauſe in very quick motions the air does not fill up the ſpace behind the body faſt enough to preſs on the hinder parts, that the reſiſtance on the fore part is increaſed. 2. The denſity of the air before the ball, being increaſed by the quick motion, will preſs more ſtrongly on the fore part, and, being heavier than in its natural ſtate, will retard its motion.

He has alſo ſhewn, that Mr. Robins has reſtrained his rule to velocities not exceeding 1670 feet in 1″; whereas, had he extended it to greater velocities, the reſult muſt have been erroneous: as he apprehends that it is not perfectly exact, when the motion is not extremely ſwift. He has inveſtigated a formula for determining the degree of this reſiſtance, and deduced concluſions differing from thoſe of Mr. Robins. See Principles of Gunnery inveſtigated, &c. 1777, p. 224, &c.

Mr. Robins having proved that, in very great changes of velocity, the reſiſtance does not accurately follow the duplicate proportion of the velocity, lays down two poſitions, which may be of conſiderable ſervice in the practice of artillery, till a more complete and accurate theory of reſiſtance, and the changes of its augmentation, may be obtained. The firſt of theſe is, that till the velocity of the projectile ſurpaſſes that of 1100 feet in a ſecond, the reſiſtance may be eſteemed to be in the duplicate proportion of the velocity: and the ſecond is, that if the velocity be greater than that of 1100 or 1200 feet in a ſecond, the abſolute quantity of the reſiſtance will be nearly three times as great as it ſhould be by a compariſon with the ſmaller velocities. Upon theſe principles, he proceeds in approximating the actual ranges of pieces with ſmall angles of elevation, *viz.* ſuch as do not exceed 8° or 10°, which he ſets down in a table, compared with their correſponding potential ranges. See his Mathematical Tracts, vol. i. p. 179, &c.

Since the above experiments of Mr. Robins, Dr. Hutton has profecuted the fubject to a much greater length. His experiments were made not only with the whirling machine invented by the former, but with cannon balls of different weights, from 1lb. to 6lbs.; as alfo with figures of various fhapes, and with planes fet at a variety of angles of inclinations to the path of motion. From thefe experiments the author has afcertained the refiftance of bodies to all velocities, from 1 to 2000 feet *per* fecond; the bodies being different, and their faces at different angles of elevation. Some of his general tables, and conclufions from thofe experiments, are as follows.

TABLE I. Of Refiftances of different Bodies.

Velocity per Second.	Small Hemifphere, flat Side.	Large Hemifphere.		Cone.		Cylinder.	Whole Globe.	Refiftance as the Power of the Velocity.
		Flat Side.	Convex Part.	Vertex.	Bafe.			
feet.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.
3	.028	.051	.020	.028	.064	.050	.027	
4	.048	.096	.039	.048	.109	.090	.047	
5	.072	.148	.063	.071	.161	.143	.068	
6	.103	.211	.092	.098	.225	.205	.094	
7	.141	.284	.123	.129	.289	.278	.125	
8	.184	.368	.160	.168	.382	.360	.162	
9	.233	.464	.199	.211	.478	.456	.225	
10	.487	.573	.242	.260	.587	.566	.255	
11	.349	.698	.292	.315	.712	.688	.310	2.052
12	.418	.836	.347	.376	.850	.826	.370	2.042
13	.492	.988	.409	.440	1.000	.978	.435	2.936
14	.573	1.154	.478	.512	1.166	1.143	.305	2.031
15	.661	1.336	.552	.589	1.346	1.327	.581	2.036
16	.754	1.538	.634	.673	1.546	1.526	.663	2.033
17	.853	1.757	.722	.762	1.763	1.745	.752	2.038
18	.959	1.998	.818	.858	2.002	1.986	.848	2.044
19	1.073	2.258	.922	.959	2.260	2.246	.949	2.047
20	1.196	2.542	1.069	1.069	2.540	2.528	1.057	2.051
Mean proportional numbers.	140	288	119	126	291	285	124	2.040
1	2	3	4	5	6	7	8	9

In this table are contained the refiftances of feveral forms of bodies, when moved with feveral degrees of velocity, from 3 feet *per* fecond to 20 feet *per* fecond. The names of the bodies are at the tops of the columns, as alfo which end went foremoft through the air; the different velocities are in the firft column, and the refiftance, on the fame line in their feveral columns in avoirdupois ounces and decimal parts. Thus, on the firft line are contained the refiftances when the bodies move with a velocity of three feet in a fecond; *viz.* in the fecond column, for the fmall hemifphere of $4\frac{3}{4}$ inches diameter, its refiftance .028 ounces, when the flat fide went foremoft; in the third and fourth columns, the refiftances to a large hemifphere, firft with the flat fide, and next with the convex part foremoft; the diameter of this, as well as all the following figures, being $6\frac{5}{8}$ inches, and therefore the area of the great circle = 32 fquare inches, or $\frac{2}{9}$ of a fquare foot; then in the fifth and fixth columns are the refiftances of a cone, firft, with its vertex, and then with its bafe foremoft; the altitude of the cone being $6\frac{5}{8}$ inches, the fame as the diameter of its bafe; in the feventh column, the refiftance to the end of the cylinder; and in the eighth, that againft the whole globe or fphere. All the numbers fhew the real weights which are equal to the refiftances; and at the bottoms of the columns are placed proportional numbers, which fhew the mean proportions of the refiftances of all the figures to each other with any velocity. Laftly, in the ninth column are placed the exponents of the power of the velocity which the refiftances in the eighth column bear to each other, *viz.* which that of the 10 feet velocity bears to each of the following ones; the medium of all them being as the 2.04 power of the velocity; that is, very little above the fquare, or fecond power, fo far as the velocities in this table extends.

From this table the following inferences are readily deduced.

1. That the refiftance is nearly in the fame proportion as the furfaces; a fmall increafe only taking place in the greateft furfaces, and for the greater velocities: thus, by comparing together the numbers in the fecond and third columns for the bafes of the two hemifpheres, the areas of which bafes are in the proportion of $17\frac{3}{4}$ to 32, or 5 to 9 very nearly, it appears that the numbers in thefe two columns, expreffing the refiftances, are nearly as 1 to 2, or 5 to 10, as far as the velocity of 12 feet: but after that, the refiftances on the greater furface increafe gradually more and more above that proportion.

2. The refiftance to the fame furface, with different velocities, is, in thefe flow motions, nearly as the fquare of the velocity; but gradually increafes more and more above that proportion, as the velocity increafes. This is manifeft from all the columns; and from the index of the power of the velocity fet down in the ninth column for the refiftances in the eighth, the medium of which being 2.04, fhews that the refiftance to the fame body is, in thefe flow motions, as the 2.04 power of the velocity, or nearly as the fquare of it.

3. The round ends, and the fharp ends, of folids, fuffer

lefs

leſs reſiſtance than the flat or plane ends of the ſame diameter; but the ſharper end has not always the leaſt reſiſtance. Thus, the cylinder, and the flat ends of the hemiſphere, and cone, have more reſiſtance than the round or ſharp ends of the ſame, but the round ſide of the hemiſphere has leſs reſiſtance than the ſharp end of the cone.

4. The reſiſtance on the baſe of the hemiſphere is to that of its convex part, as $2\frac{1}{3}$ to 1, inſtead of 2 to 1, as given by theory. The experimented reſiſtances alſo exceed the theoretical by nearly $\frac{1}{4}$th.

5. The reſiſtance on the baſe of the cone is to that on its vertex, nearly as $2\frac{3}{10}$ to 1, which is the ſame as the ratio of the ſine of the angle of inclination of the ſide of the cone to its axis; ſo that, in this inſtance, the reſiſtance is as the ſine of the angle of incidence.

6. When the hinder parts of different bodies are of different forms, the reſiſtances are different, although the fore parts be exactly the ſame; owing probably to the different preſſures of the air on the hinder parts.

Thus the reſiſtance to the fore-part of the cylinder is leſs than on the equal flat ſurface of the cone, or of the hemiſphere; and the reſiſtance on the baſe of the hemiſphere leſs than that of the cone; and the round ſide of the hemiſphere leſs than the whole ſphere.

TABLE II. Reſiſtance, both by Experiment and Theory, to a Globe of 1.965 Diameter.

Velocity per Second in Feet.	Reſiſtance by Experiment in Ounces.	Reſiſtance by Theory in Ounces.	Ratio of Experiment to Theory.	Reſiſtance as the Power of the Velocity.
5	0.006	0.005	1.20	
10	0.024½	0.020	1.23	
15	0.055	0.044	1.25	
20	0.100	0.079	1.27	
25	0.157	0.123	1.28	2.022
30	0.23	0.177	1.30	2.052
40	0.42	0.314	1.33	2.068
50	0.67	0.491	1.36	2.075
100	2.72	1.964	1.38	2.059
200	11	7.9	1.40	2.041
300	25	18.7	1.41	2.039
400	45	31.4	1.43	2.039
500	72	49	1.47	2.044
600	107	71	1.51	2.051
700	151	96	1.57	2.059
800	205	126	1.63	2.067
900	271	159	1.70	2.077
1000	350	196	1.78	2.086
1100	442	238	1.86	2.095
1200	546	283	1.90	2.102
1300	661	332	1.99	2.107
1400	785	385	2.04	2.111
1500	916	442	2.07	2.113
1600	1051	503	2.09	2.113
1700	1186	568	2.08	2.111
1800	1319	636	2.07	2.108
1900	1447	709	2.04	2.104
2000	1569	786	2.00	2.098

In the firſt column of this table are contained the ſeveral velocities, gradually, from 5 feet *per* ſecond to the greateſt velocity of 2000 feet *per* ſecond, with which a globe or ball is moved. In the ſecond column are the experimented reſiſtances in avoirdupois ounces. In the third, the correſponding reſiſtances as deduced from theory. In the fourth column the ratio of theſe two reſiſtances, or the quotients of the former divided by the latter; and the fifth, or laſt, the indices of the power of the velocity which is proportional to the experimented reſiſtances, and which are found by comparing the reſiſtance of 20 feet velocity with each of the following ones.

The following tables are of a ſimilar kind, but the experiments are repeated on balls of different ſizes.

TABLE III.—Reſiſtances to a ball of 1.965 inch diameter, and 16 oz. 13 dr. weight.

Velocity.	Reſiſtances.		1ſt Dif.	2d Dif.
feet.	lbs.	oz.		
100	0.17	2¾	8¼	
200	0.69	11	14	5¾
300	1.56	25	20	6
400	2.81	45	27	7
500	4.50	72	35	8
600	6.69	107	44	9
700	9.44	151	54	10
800	12.81	205	66	12
900	16.94	271	79	13
1000	21.88	350	92	13
1100	27.63	442	104	12
1200	34.13	546	115	11
1300	41.31	661	124	9
1400	49.06	785	131	7
1500	57.25	916	135	4
1600	65.69	1051	135	0
1700	74.13	1186	133	−2
1800	82.44	1319	128	−5
1900	90.44	1447	122	−6
2000	98.06	1569		

TABLE IV.—Reſiſtances to a ball 2.78 inc. diameter, and 3lb. weight.

Velocity.	Ref.	Diff.
feet.	lbs.	
900	35	6
950	41	6
1000	47	6
1050	53	7
1100	60	7
1150	67	7
1200	74	8
1250	82	9
1300	91	10
1350	101	11
1400	112	10½
1450	122½	10
1500	132½	9
1550	141½	8½
1600	150	8
1650	158	7
1700	165	6
1750	171	5
1800	176	

TABLE V.— Reſiſtances to a ball 3.55 inc. diameter, and 6lb. 1 oz. 8dr. weight.

Velocity.	Ref.	Diff.
feet.	lbs.	
1200	125	9
1250	124	9
1300	133	9
1350	142	10
1400	152	10
1450	162	10½
1500	172½	11½
1550	184	13
1600	197	14
1650	211	15
1700	226	16
1750	242	17
1800	259	

The

The analogy among the numbers in all these tables is very remarkable and uniform, the same general law obtaining in them all, by means of which, together with our preceding remarks, we may answer many interesting questions relating to this subject, as connected with artillery practice. For example, suppose it were required to determine what would be the resistance of the air against a 24lb. ball, discharged with a velocity of 2000 feet *per* second. By Table III. the ball of 1.965 inch diameter, when moving with 2000 feet velocity, suffered a resistance of 98lbs.; then since the resistances, with the same velocity, are as the surfaces, and the surfaces as the squares of the diameters; also the diameter of a 24-pound ball being 5.6 inches, we have as $(1.965)^2 : (5.6)^2$, or as $3.86 : 31.36 :: 98$lbs. : 796lbs., the resistance which a 24lb. ball experiences when discharged with the above velocity. And generally, if the diameter of any proposed ball be d inches, and r the tabular resistance corresponding to any velocity v; then we shall generally have as $(1.965)^2 : d^2 :: r : \frac{r\,d^2}{(1.965)^2} = \frac{r\,d^2}{3.8}$, or very nearly $\frac{1}{4} r\,d^2$.

These resistances relating to certain and determinate velocities, a principal object of investigation has been, amongst experimentalists, to determine some rule or formula by which the resistance may be found for any velocity whatever, and the result of Dr. Hutton's investigations on this subject is as follows, *viz.*

Resistance $= r = .00002576\,v^2 - .00388\,v$, in avoirdupois pounds, the velocity being v.

This rule $.00002576\,v^2 - .00388\,v = r$ denotes the resistance for a ball whose diameter is 1.965 inch, the square of which is 3.9 or 4 nearly. Hence to adapt it to any other ball, whose diameter in inches is d, we shall have, by the same proportion as above, $\frac{d^2}{3.8}\,(.00002576\,v^2 - .00388\,v) = (.00000667\,v^2 - .0010)\,d^2 = (.00000\frac{2}{3}\,v^2 - .001\,v)\,d^2$, for the resistance of any ball whose diameter is d, and velocity v.

In smaller velocities the same author finds the theorem $.00001725\,v^2 = r$ sufficiently correct, and this is adapted to a ball whose diameter is d in exactly the same manner, giving the result $.00000447\,d^2\,v^2 = r$ for the resistance when the velocities are small.

For the application of these theorems to the solution of certain problems connected with the doctrine of *projectiles*, see that article: and for various other formulæ and results equally curious and interesting, see Dr. Hutton's Tracts, as also vol. iii. of his Course of Mathematics; Robins' Gunnery; Moore's Theory of Rockets; Gregory's Mechanics; and Prony's Architecture Hydraulique.

Resistance, *Different, of the same Medium to Bodies of different Figures.*—Sir Isaac Newton shews, that if a globe and a cylinder, of equal diameters, be moved with equal velocity in a thin medium, consisting of equal particles, disposed at equal distances, according to the direction of the axis of the cylinder; the resistance of the globe will be less by half than that of the cylinder.

Resistance, *Solid of the least.*—From the last proposition the same author deduces the figure of a solid which shall have the least resistance of any containing the same quantity of matter and surface.

The figure is this. Suppose D N F G (*Plate* XXXVI. *Mechanics, fig.* 15.) to be such a curve, as that if from any point N be let fall a perpendicular N M to the axis A B; and from a given point G be drawn a right line G R parallel to a tangent to the figure in N, and cut the axis, when continued, in R; M N be to G R as G R *cub.* to $4\,B\,R \times G\,B\,q$; a solid described by the revolution of this figure about its axis A B, moving in a medium from A towards B, is less resisted than any other circular solid of the same area, &c.

This theorem, which sir Isaac Newton has given without a demonstration, has been demonstrated by several mathematicians, as Fatio, Craig, M. d'Hospital, Bernouilli, &c. (See Dr. Horsley's edition of Newton, vol. ii. p. 390, and Maclaurin's Fluxions, sect. 606 and 607.) For a more particular investigation of this solid, see prob. 6. under the article Isoperimetry.

Resistance *of a Globe* perfectly hard, and in a medium whose particles are so too, is to the force with which the whole motion may either be destroyed, or generated, which it has at the time when it has described four-thirds of its diameter, as the density of the medium to the density of the globe. Hence, also, sir Isaac Newton infers, that the resistance of a globe is, *cæteris paribus*, in a duplicate ratio of its velocity. Or its resistance is, *cæteris paribus*, in a duplicate ratio of its diameter; or, *cæteris paribus*, as the density of the medium. Lastly, that the actual resistance of a globe is in a ratio compounded of the duplicate ratio of the velocity, and of the duplicate ratio of the diameter, and of the ratio of the density of the medium.

In these articles the medium is supposed to be discontinuous, as air probably is: if the medium be continuous, as water, mercury, &c. where the globe does not strike immediately on all the particles of the fluid generating the resistance, but only on those next it, and those again on others, &c. the resistance will be less by half: and a globe in such a medium undergoes a resistance which is to the force with which the whole motion it has after describing eight-thirds of its diameter, might be generated, or taken away, as the density of the medium to the density of the globe.

Resistance *of a Cylinder*, moving in the direction of its axis, is not altered by any augmentation or diminution of its length; and therefore is the same with that of a circle of the same diameter, moving with the same velocity in a right line perpendicular to its plane.

The resistance of a cylinder, moving in an infinite non-elastic fluid, arising from the magnitude of a transverse section, is to the force with which its whole motion, while it describes four times its length, may be taken away, or generated, as the density of the medium to that of the cylinder, very nearly.

Hence, the resistance of cylinders moving lengthwise, in infinitely continued mediums, are in a ratio compounded of the duplicate ratio of their diameters, the duplicate ratio of their velocities, and ratio of the density of mediums.

The resistance of a globe, in an infinite non-elastic medium, is to the force by which its whole motion, while it describes eight-thirds of its diameter, might be either generated or taken away, as the density of the fluid to the density of the globe, *quam proximè*.

Resistance *of Matter.* (See Matter.) The meaning of this expression is not, that matter makes any *opposition* to a change of its state, or exerts a force to maintain itself in the state it is, as some have very improperly expressed themselves. This would imply that activity which is inconsistent with its nature; and if it were true, a part of the force of every impulse would be spent merely in overcoming this opposition, without producing any other effect; and, therefore, the sum of the motions the same way would always be greater before than after collision, which is impossible. The *largest* body will be moved by any the *slightest*

ſlighteſt impulſe of the *ſmalleſt;* but then it can be moved only in proportion to the force of the impulſe, and this is what is chiefly meant by the *reſiſtance* of matter: *e. gr.* a body at reſt will *reſiſt* another which is moving towards it; that is, it will be an *obſtruction* to the motion of this other; the latter will be retarded by the former, and will loſe juſt as much motion as it communicates. In other words; the reſiſtance of matter is that in its nature which makes it require an *adequate foreign* cauſe of every change of ſtate, or from whence it is *wholly paſſive*, and incapable of receiving any motion from impulſe, that is not in a certain fixed proportion to the *relative momentum* of the impelling body, and ſtrictly equal to the change of ſtate it ſuffers in conſequence of the impulſe. In this proportion matter is always moved *without difficulty;* but beyond this there is not only a *difficulty*, but an *impoſſibility* of moving it; and whatever motion it can be ſuppoſed to receive from any impulſe that is greater than that which the impelling body loſes, it muſt derive from nothing at all. The activity which is denied to matter, is a power of changing its own ſtate, not that of acting upon other matter by *impulſe*. This ſort of activity, or power, follows from, and is neceſſarily implied in its perfect paſſiveneſs or inertia. See Price's Diſſertations, p. 35, note.

Non-Resistance, in *Politics*. See Passive *Obedience*.

RESITU, in *Geography*, a town of Naples, in the province of Capitanata; 16 miles N.N.W. of Vieſte.

RESLEU, a river which riſes in Bavaria, and runs into the Egra, in Bohemia.

RESOLIF, a town of Scotland, in the county of Cromarty; 7 miles W. of Cromarty.

RESOLVENTS, Resolventia, in the *Materia Medica*, remedies proper to reſolve and diſſipate tumours and gatherings; to ſoften indurations, and, by their tenuity and warmth, evacuate redundant or peccant humours through the pores.

Under this claſs come various unguents, emplaſters, &c.

RESOLUTION, Resolutio, or *Solutio*, in *Phyſics*, the reduction of a body into its original or natural ſtate, by a diſſolution or the ſeparation of its aggregated parts.

Thus ſnow and ice are ſaid to be reſolved into water; and a compound is reſolved into its ingredients, &c.: water reſolves into vapour by heat; and vapour is again reſolved into water by cold.

Some of the moderm philoſophers, particularly Mr. Boyle, M. Mariotte, Boerhaave, &c. maintain that the natural ſtate of water is to be congealed, or in ice; inaſmuch as a certain degree of heat, which is a foreign and violent agent, is required to make it fluid: ſo that near the pole, where this foreign force is wanting, it conſtantly retains its fixed or icy ſtate. On this principle, the reſolution of ice into water muſt be allowed an improper expreſſion.

Resolution, in *Chemiſtry*, is the reduction of a maſs, or mixed body, into its component parts, or firſt principles, by proper analyſis.

The reſolution of bodies is performed variouſly; by diſtillation, ſublimation, diſſolution, fermentation, &c. See each operation under its proper article. See alſo Dissolution and Solution.

Resolution, in *Ethics*, is that paſſion which encounters difficulties and dangers; but when it has to do more peculiarly with dangers, it is called boldneſs. Deſire, joy, and ſorrow, enter into its conſtitution; but joy is much the principal ingredient. When reſolution degenerates into a concern to maintain our miſtakes, humours, or vices, it is more properly denominated obſtinacy. See Passions.

Resolution, in *Logic*, is a branch of *method*, called alſo *analyſis*.

The buſineſs of reſolution is to inveſtigate or examine the truth or falſehood of a propoſition, by aſcending from ſome particular known truth, as a principle, by a chain of conſequences, to another more general one in queſtion. Reſolution, or the analytic method, ſtands in direct oppoſition to *compoſition*, or the ſynthetic method; in which laſt we deſcend from ſome general known truths to a particular one in queſtion.

For an inſtance of the method of reſolution; ſuppoſe the queſtion this: Whether, on the ſuppoſition of man's exiſtence, we can prove that God exiſts?

To reſolve this, our method is thus: Mankind did not always exiſt. It is evident, from a thouſand conſiderations, the ſpecies had a beginning; and that, according to all hiſtory, not ſix thouſand years ago; but if it had a beginning, there muſt be ſome cauſe of its beginning; ſomething to induce it to exiſt then more than it did before; in effect, there muſt be a cauſe or author of its exiſtence; for from nothing, nothing ariſes: this cauſe, whatever it is, muſt, at leaſt, have all the faculties we find in ourſelves; for none can give more than he has: nay, he muſt have others, which we have not, ſince he could do what we cannot do, *i. e.* create, make man exiſt, &c. Now, this cauſe either exiſts ſtill, or has ceaſed to do ſo: if the former, he did not exiſt from eternity; for what is from eternity is neceſſary, and can neither by itſelf, nor any other cauſe, be reduced to nothing: if the latter, it muſt have been produced from ſome other; and then the ſame queſtion will return upon the producer. There is then ſome firſt cauſe, and this cauſe has all the properties and faculties we have; nay more, has exiſted from eternity, &c. Therefore, from the ſuppoſition of man's exiſtence, it follows that there is a God.

Resolution, or *Solution*, in *Mathematics*, is an orderly enumeration of ſeveral things to be done, to obtain what is required in a problem.

Wolfius makes a problem to conſiſt of three parts. The *propoſition* (which is what we properly call the *problem*), the *reſolution*, and the *demonſtration*.

The general tenor of all problems is, thoſe things being done which are injoined by the reſolution, the thing is done which was to be done.

As ſoon as a problem is demonſtrated, it is converted into a theorem; of which the reſolution is the hypotheſis; and the propoſition the theſis.

The proceſs of a mathematical reſolution, ſee in the following article.

Resolution, in *Algebra*, or *algebraical*, is of two kinds; the one practiſed in numerical problems, the other in geometrical ones.

Resolution *of Equations*, is the determination of the values of the unknown letters or quantities of which it is compoſed; in order to which it is neceſſary, firſt, to exterminate or eliminate all the unknown quantities but one out of the equation, and then the value of the remaining quantity is to be found by the proper rules for this purpoſe, *viz.* by the rules given for *ſimple*, *quadratic*, *cubic*, or *biquadratic equations*, according to which of theſe it may belong; or, by the general method of *approximation*, for which ſee the reſpective articles. But as all theſe caſes have reference only to one unknown quantity, it will not be amiſs, in this place, to explain ſome of thoſe methods which are moſt commonly employed for reducing equations to one unknown.

Firſt, it may be obſerved, that in any determinate problem there are always as many equations independent of each other, as there are unknown quantities; if there are not ſo many, the queſtion is *indeterminate*, and if there be more, it is *impoſſible*.

We

We cannot, in a limited article like the prefent, give all the methods that may be employed for exterminating the unknown letters; thefe being extremely various, and depending much upon the practice and proficiency of the analyft himfelf, and the manner in which thofe quantities are involved; but the moft applicable and general methods are the three following, *viz.*

1. Find the value of one and the fame unknown quantity in each equation, and put all thefe values equal to each other, which will eliminate one of the quantities, and reduce the number of equations to one lefs. Then do the fame in thefe new equations; and again in the laft; and fo on, till there be but one equation and one unknown quantity, the value of which muft be found by the proper rules, as above referred to.

2. Find the value of one of the unknown quantities in one of the equations, in terms of the other quantities; then fubftitute this value for that quantity in all the other equations; again, find the value of one of the remaining quantities, and fubftitute its value as before; and fo on, till there remains but one equation and one unknown quantity, whofe value is to be found as before.

3. Multiply each of the equations by fuch numbers as will render the co-efficients of one of the letters the fame in all; then, by adding or fubtracting thefe equations according as the equal co-efficients have unlike or like figns, the quantity whofe co-efficients were equal will difappear; which being repeated again upon the remaining quantities, there will ultimately be found only one equation and one unknown quantity. And it may be proper to obferve, that in all thefe cafes, if any of the unknown quantities have fractional co-efficients, the whole equation in which they are found fhould be multiplied by fuch a number as will convert thefe fractions into integers.

Thus, in the equations

$$\tfrac{3}{5}x + \tfrac{2}{15}y = 10$$
$$\tfrac{1}{3}x + 3y = 95$$

multiply the firft by 15, and the latter by 2, gives

$$9x + 2y = 150$$
$$x + 6y = 190$$

the folution of which, by each of the preceding rules, will be as follows.

Or, putting letters inftead of the above numerical co-efficients, in order to render the folution more general, let there be given

$$\left.\begin{aligned} ax + by &= c \\ dx + ey &= f \end{aligned}\right\} \text{ to find } x \text{ and } y.$$

1ft method. $\left.\begin{aligned} ax &= c - by \\ dx &= f - ey \end{aligned}\right\}$ by tranfpofition.

$$x = \frac{c - by}{a} = \frac{f - ey}{d} \text{ by divifion.}$$

$$dc - dby = af - aey, \text{ by multiplication.}$$
$$(ae - db)y = af - dc$$
$$y = \frac{af - dc}{ae - db}$$

And in the fame manner we find,

$$x = \frac{ec - bf}{ae - db}$$

2d method. $\left.\begin{aligned} ax + by &= c \\ dx + ey &= f \end{aligned}\right\}$ to find x and y.

$$x = \frac{c - by}{x} \text{ as above.}$$

$$\frac{dc - dby}{a} + ey = f, \text{ by fubftit.}$$

$$dc - dby + aey = af, \text{ by multiplication.}$$
$$(ae - db)\,y = af - de$$
$$y = \frac{af - dc}{ae - db} \text{ as before.}$$
$$x = \frac{ec - bf}{ae - db}$$

3d method. $\left.\begin{aligned} ax + by &= c \\ dx + cy &= f \end{aligned}\right\}$ to find x and y.

$$dax + dby = dc, \text{ mult. by } d.$$
$$adx + acy = af, \text{ mult. by } a.$$
$$(db - ac)\,y = dc - af$$
$$\left.\begin{aligned} y &= \frac{dc - af}{db - ae} = \frac{af - dc}{ae - db} \\ x &= \frac{bf - ec}{db - ae} = \frac{ec - bf}{ae - db} \end{aligned}\right\} \text{ as before.}$$

This will, in fome meafure, illuftrate the preceding rules, which we fhall not infift upon any further; but, in the following examples, fhall avail ourfelves of any advantages that the equations prefent, in order to arrive at the folution in the eafieft manner poffible.

Examples.

1. Given $\left.\begin{aligned} x^2 + y^2 &= a \\ xy &= b \end{aligned}\right\}$ to find x and y.

$$x^2 + y^2 = a$$
$$2xy = 2b, \text{ doubling the 2d.}$$
$$x^2 + 2xy + y^2 = a + 2b, \text{ by addition.}$$
$$x^2 - 2xy + y^2 = a - 2b, \text{ by fubftit.}$$
$$\left.\begin{aligned} x + y &= \sqrt{(a + 2b)} \\ x - y &= \sqrt{(a - 2b)} \end{aligned}\right\} \text{ by extraction.}$$
$$x = \frac{\sqrt{(a + 2b)} + \sqrt{(a - 2b)}}{2}$$
$$y = \frac{\sqrt{(a + 2b)} - (a - 2b)}{2}$$

2. Given $\left.\begin{aligned} x + y &= a \\ xy &= b \end{aligned}\right\}$ to find x and y.

$$x^2 + 2xy + y^2 = a^2, \text{ by fquaring.}$$
$$4xy = 4b, \text{ mult. by 4.}$$
$$x^2 - 2xy + y^2 = a^2 - 4b, \text{ by fubftit.}$$
$$x - y = \sqrt{(a^2 - 4b)}, \text{ by extract.}$$
$$x + y = a, \text{ 1ft equat.}$$
$$x = \frac{a + \sqrt{(a^2 - 4b)}}{2}$$
$$y = \frac{a - \sqrt{(a^2 - ab)}}{2}$$

3. Given $\left.\begin{aligned} x - y &= a \\ xy &= b \end{aligned}\right\}$ to find x and y.

$$x^2 - 2xy + y^2 = a^2, \text{ fquaring.}$$
$$4xy = 4b, \text{ mult. by 4.}$$
$$x^2 + 2xy + y^2 = a^2 + 4b, \text{ by adding.}$$
$$x + y = \sqrt{(a^2 + 4b)}, \text{ by extract.}$$
$$x - y = a$$
$$x = \frac{a + \sqrt{(a^2 + 4b)}}{2}$$
$$y = \frac{a - \sqrt{(a^2 + 4b)}}{2}$$

4. Given

4. Given $\left.\begin{array}{l} x - y = a \\ x^2 + y^2 = b \end{array}\right\}$ to find x and y.

$$x^2 - 2xy + y^2 = a^2, \text{ squaring.}$$
$$2x^2 \quad + 2y^2 = 2b, \text{ doubling.}$$
$$x^2 + 2xy + y^2 = 2b - a^2, \text{ subtr.}$$
$$x + y = \sqrt{(2b - a^2)}$$
$$x - y = a$$
$$x = \frac{a + \sqrt{(2b - a^2)}}{2}$$
$$y = \frac{a - \sqrt{(2b - a^2)}}{2}$$

This method of resolution will apply in many problems, and sometimes saves considerable labour.

5. Given $\left.\begin{array}{l} x^2 + xy = a \\ y^2 + xy = b \end{array}\right\}$ to find x and y.

$$x^2 + 2xy + y^2 = a + b, \text{ by adding.}$$
$$x + y = \sqrt{(a + b)}, \text{ by extract.}$$
$$(x + y)\,x = x\sqrt{(a + b)} = a$$
$$(x + y)\,y = y\sqrt{(a + b)} = b$$
$$x = \frac{a}{\sqrt{(a + b)}}, \text{ and } y = \frac{b}{\sqrt{(a + b)}}.$$

6. Find three numbers in arithmetical progression, whose sum is a, and sum of their squares b.

Let $x - y$, x and $x + y$, be the numbers required.

Then $x - y + x + x + y = 3x = a$

$$(x - y)^2 + x^2 + (x + y)^2 = 3x^2 + 2y^2 = b$$
$$x^2 = \frac{a^2}{9} = \frac{b - 2y^2}{3}$$

Whence $a^2 = 3b - 6y^2$

and $\quad y = \sqrt{\dfrac{3b - a^2}{6}}$, and $x = \dfrac{a}{3}$.

And a similar substitution, *viz.* one which answers one of the conditions of the question, may frequently be employed to great advantage.

7. Sometimes it will be convenient to substitute for the sums and differences of numbers, as in the following example.

Given $\left.\begin{array}{l} x + y = a \\ x^4 + y^4 = b \end{array}\right\}$ to find x and y.

Let $\left.\begin{array}{l} x + y = 2m \\ x - y = 2n \end{array}\right\}$ then $\left\{\begin{array}{l} x = m + n \\ y = m - n \end{array}\right.$

and

$$(m + n)^4 + (m - n)^4 = b,$$
$$\text{or } 2m^4 + 12m^2n^2 + 2n^4 = b;$$

but $2m = a$, or $m = \dfrac{a}{2}$; therefore m is known, and the above becomes

$$2n^4 + 12m^2n^2 = b - 2m^4$$
$$n^4 + 6m^2n^2 = \tfrac{1}{2}b - m^4$$
$$n^2 = -3m^2 \pm \sqrt{(\tfrac{1}{2}b + 8m^4)}$$
$$\text{and } n = [3m^2 \pm \sqrt{(\tfrac{1}{2}b + 8m^4)}]^{\frac{1}{2}}.$$

Whence m and n being known, x and y are also known; for $x = m + n$, and $y = m - n$.

8. Sometimes it is advantageous to consider one of the quantities as an unknown multiple of the other; thus:

Given $xy = x^2 - y^2 = x^3 + y^3$, to find x and y.

Make $y = zx$, then these become

$$\left.\begin{array}{l} zx^2 = x^2 - z^2x^2 \\ zx^3 = x^3 + z^3x^3 \end{array}\right\}$$
$$z = 1 - z^2, \text{ from the first,}$$
$$z^2 + z = 1, \text{ or } z = -\tfrac{1}{2} + \tfrac{1}{2}\sqrt{5};$$

whence z is a known quantity. Now,

$$z = x + z^3x, \text{ from the second,}$$

$$x = \left\{\begin{array}{l} \dfrac{z}{1 + z^2} = \dfrac{-\frac{1}{2} + \frac{1}{2}\sqrt{5}}{1 - (\frac{1}{2} - \frac{1}{2}\sqrt{5})^2} \\ \dfrac{-\frac{1}{2} + \frac{1}{2}\sqrt{5}}{-1 + \sqrt{5}} = \tfrac{1}{2} \end{array}\right.$$

$$y = zx = -\tfrac{1}{4} + \tfrac{1}{4}\sqrt{5}, \text{ as required.}$$

Sometimes it saves considerable labour, to find the sum, product, or difference, of the two quantities, instead of the quantities themselves; thus:

9. Given $x^2 + y^2 - x - y = a$
$\quad\quad xy + x + y = b$;

by addition $\quad x^2 + xy + y^2 = a + b$

$$x^2 + 2xy + y^2 = a + b + xy$$
$$x + y = \sqrt{(a + b + xy)};$$

but $\quad x + y = b - xy$;

therefore $\quad b^2 - 2bxy + x^2y^2 = a + b + xy$

$$x^2y^2 - (2b + 1)\,xy = a + b - b^2:$$

whence $xy = \dfrac{2b + 1}{2} \pm \sqrt{\left(\dfrac{2b + 1}{2}\right)^2 + a + b - b^2}$.

Now make $xy = p$ a known quantity, and we have, from the second equation,

$$p + x + y = b,$$
$$\text{or } x + y = b - p$$
$$xy = p$$

whence $\quad x^2 - 2xy + y^2 = (b - p)^2 - 4p$

$$x - y = \sqrt{[(b - p)^2 - 4p]}$$
$$x + y = b - p$$

therefore $x = \dfrac{b - p + \sqrt{[(b - p)^2 - 4p]}}{2}$

$$y = \frac{b - p - \sqrt{[(b - p)^2 - 4p]}}{2}.$$

These, and a variety of other artifices peculiar to certain equations, will occur to the practical analyst; of which, numerous examples may be seen in Bland's Algebraical Problems, as also in Bonnycastle's and Euler's Algebra.

Resolution *of a geometrical Problem algebraically.* The process in the former article is to be observed throughout; but as it rarely happens we come at an equation in geometrical problems by the same means as in numerical ones, there are some farther things to be noted: 1st, then, suppose the thing done, which was proposed to be done. 2. Examine the relations of all the lines in the diagram, without any regard to known or unknown, in order to find which depends on which; and from which being had, what others are had, whether by similar triangles, or rectangles, &c. 3. To obtain the similar triangles or rectangles, the lines are to be frequently produced, till they become either directly or indirectly equal to given ones, or intersect others, &c. Parallels and perpendiculars to be frequently drawn; points to be frequently connected; and angles to be made equal to others. If thus you do not arrive at a neat equation, examine the relation of the lines in another manner.

Sometimes it is not enough to ſeek the thing directly, but another thing muſt be ſought, whence the firſt may be found.

The equation being reduced, the geometrical conſtruction is to be deduced from it, which is done in various manners, in the various kinds of equations. See Application *of Algebra to Geometry*.

Resolution, *Problematical*. See Problematical.

Resolution, in *Medicine*, the termination of an inflammation, without any change in the texture of the part inflamed, in contradiſtinction to the termination in ſuppuration or gangrene. The great object of medicine, in all inflammatory diſeaſes, in the commencement, is to obtain the reſolution of the inflammation, ſo that the ſtructure and functions of the part affected may not be injured by the diſeaſe: and the means of obtaining a reſolution, when the inflammation is ſeated in an internal part, are evacuations of blood by the lancet, cupping, or leeches; and of ſerum, by purging the bowels, applying bliſters in the vicinity, &c.; and when the inflammation is external, by local evacuations by ſimilar means, and by the application of cold ſubſtances. See Inflammation.

Resolution, in *Muſic*, is when a canon or perpetual fugue is not written all on the ſame line, or in one part; but all the voices that are to follow the guida, or firſt voice, are written ſeparately, either in ſcore, *i. e.* in ſeparate lines, or ſeparate parts, with the pauſes each is to obſerve, in the beginning, and in the tone proper to each.

The reſolution of diſcords, in muſic, is generally by their deſcent upon concords; except the *tritonus*, or ſharp 4th, and the *note ſenſible*, or ſharp 7th of a key, which aſcend, while the baſe deſcends or remains ſtationary.

Resolution, in *Surgery*, the moſt favourable manner in which the proceſs of inflammation can terminate, conſiſting of a gradual abatement of the pain, redneſs, ſwelling, throbbing, and heat of the part, without any formation of matter, and without any ſloughing. Alſo, the diſperſion of ſwellings and indurations, through the medium of abſorption.

Resolution *of Motion*, in *Mechanics*. See Motion.

Resolution *Bay*, in *Geography*, a name given by captain Cook to the port of Madre de Dios, ſituated near the middle of the W. ſide of St. Chriſtina, one of the Marqueſas iſlands, in the South Pacific ocean, and under the higheſt land in the iſland, in S. lat. 9° 55′ 30″, W. long. 139° 8′ 40″, and N. 15° W. from the W. end of La Dominica. The ſouth point of the bay is a ſteep rock of conſiderable height, terminating at the top in a peaked hill, above which may be ſeen a path-way leading up a narrow ridge to the ſummit of the hills. The north point is not ſo high, and riſes with a more gentle ſlope. They are a mile from each other in the direction of N. by E., and S. by W. In the bay, which is near three quarters of a mile deep, and has from 34 to 12 fathoms water, with a clean ſandy bottom, are two ſandy coves, divided from each other by a rocky point. In each is a rivulet of excellent water. The northern cove is the moſt commodious for wooding and watering. Here is the little water-fall mentioned by Quiros, Mendana's pilot; but the town, or village, is in the other cove. There are ſeveral other coves or bays on this ſide of the iſland; and ſome of them, eſpecially to the northward, may be miſtaken for this: therefore the beſt direction is the bearing of the weſt end of La Dominica. Cook's Voyage, vol. i. p. 307.

Resolution *Iſland*, one of the newly-diſcovered Society iſlands, in the South Pacific ocean. S. lat. 17° 24′. W. long. 141° 15′.—Alſo, an iſland in the North Atlantic ocean, 60 miles in circumference, ſituated on the N. ſide of the entrance into Hudſon's ſtraits. N. lat. 61° 40′. W. long. 65°.

Resolution *Port*, a bay or harbour of the iſland of Tanna, in the South Pacific ocean. S. lat. 19° 32′. E. long. 169° 40′.

RESONANCE, in *Muſic*, is ſounding again, repeating or continuing the ſound. The reſonance of a ſtring, a bell, or other ſonorous body, ceaſes with the vibration.

It expreſſes the ſound returned by the air incloſed in the bodies of ſtringed muſical inſtruments, as lutes, &c.; or even in the bodies of wind inſtruments, as flutes, &c.

Elliptic and parabolic vaults reſound ſtrongly, *i. e.* they ſtrongly reflect or return the ſound. See Echo.

The mouth, and the parts thereof, as the palate, tongue, teeth, noſe, and lips, Monſ. Dodart obſerves, contribute nothing to the tone of the voice; but their effect is very great as to the reſonance.

Of this we have a very ſenſible inſtance in that vulgar inſtrument called *Jews-harp*, or *trompe de Bearn*: for if you hold it in your hand, and ſtrike the tongue or ſpring thereof, which yields all the ſound of the inſtrument, it ſcarcely makes any noiſe at all; but, holding the body of the inſtrument between the teeth, and ſtriking the ſpring as before, it makes a muſical buzz, which is heard to a good diſtance, and eſpecially in the lower notes.

So alſo in the hautboys, the tone of the reed is always the ſame; being a ſort of drone: the chief variety is in the tone of the reſonance, produced in the mouth by the greater or leſs aperture, and the divers motions of the lips.

RESORT. See Ressort.

RESOUZE, in *Geography*, a river of France, which runs into the Saone, near Pont de Vaux, in the department of the Ain.

RESP, a diſeaſe in ſheep, the ſame as red-water. See Red-*Water*.

RESPECT, in *Ethics*, denotes that favourable impreſſion which the goodneſs of a character has made upon the perſon contemplating it, united with a ſhare of good ſenſe. An union of both theſe qualities is neceſſary to create reſpect. Goodneſs alone is not ſufficient to produce it; for if it be ſeated in a mind that indicates extreme imbecility, it cannot be deemed reſpectable. On the other hand, ſuperior ſenſe in a mind deſtitute of goodneſs, will not inſpire reſpect: it will either waſte itſelf in idle ſpeculations, which renders it indifferent to us; or it may degenerate into low cunning, which renders it hateful. Should it be connected with power in a wicked and perverſe mind, it will excite horror and diſmay, which are very remote from reſpect.

RESPECTU *computi vicecomitis habendo*, in *Law*, a writ for the reſpiting of a ſheriff's accompt, upon juſt occaſion, directed to the treaſurer and barons of the exchequer.

RESPECTUANDO Homagio. See Homagio.

RESPIRATION, in *Phyſiology*, that function of animal bodies, in which the air, either in its elaſtic ſtate, as it conſtitutes the atmoſphere, or held in ſolution in water, is brought into contact with ſome organ or organs, undergoing alterations in its own conſtitution, and producing changes in the nature of the animal fluids, which are eſſential to the continuance of life. In the mammalia, birds, and reptiles, the reſpiratory organs conſiſt of lungs, that is, of membranous cavities, differently conſtructed in the three claſſes, but agreeing in the circumſtance of alternately receiving and emitting a portion of atmoſpherical air. This alternate ingreſs and egreſs of air conſtitutes properly what is called in common language *breathing*, to which the philoſophical term *reſpiration* is ſynonimous. We extend the term to animals of the lower claſſes, which have no lungs, and ſome of

of which do not even *breathe*, that is, do not receive and emit air at all. In consequence of the medium in which fishes are immersed, they cannot take in the atmospheric air in its elastic state, and they consequently have an apparatus, altogether different from that which exists in the three classes already named, for the purpose of producing analogous effects in their economy. They are furnished with a passage communicating with the fauces or œsophagus, and terminating in the external surface of the body, through which a part of the water received into the mouth is forcibly propelled. In this passage, the branchiæ or gills are situated; and the blood, which circulates in their fringed extremities, is thus exposed to the action of a quantity of air, which the water always holds in solution. Crustaceous animals, and many of the mollusca, have organs more or less similar in structure and functions to the gills of fishes. Insects, both in their larva and perfect states, possess numerous ramified tubes, distributed over their whole body, and provided with open mouths, which admit the passage to and fro of the external air. Although the structure of the organs in fishes and insects is so different from that which we find in mammalia, birds, and reptiles, they perform an analogous office, answer the same general purposes in the animal economy, and are considered equally in the light of organs of *respiration;* this term being employed now to denote the general effect produced by these various organizations, without any reference to the means through which it is produced; although it was originally applied to the passage of the air to and from the lungs, when the results of that process were unknown.

Is respiration, considered in its most extensive sense, a function necessary to the existence of all animals? The results of all the investigations hitherto made, induce us to answer this question in the affirmative; but the point is not yet demonstrated in all cases.

In Cuvier's class of zoophytes, excepting the echinodermata, no respiratory apparatus has been found; nor has any been yet discovered in the intestinal worms, or in some of the external worms, as the leech, earth-worm, and others. It may be doubted, since the analogy on which we ground our opinion of the necessity of air to animal existence is so very strong, whether the apparent exception afforded by the animals just enumerated may not arise from our imperfect knowledge of their organization, and whether more accurate inquiries may not either disclose to us in these cases some particular organ of respiration, or shew us that the function is performed by the external surface of the body in general. We know, in fact, by direct experiment, that some of these animals produce changes in the air, and cannot live when debarred from its access.

The differences which animals exhibit in their mode of breathing, or in the manner of effecting the changes which their nutritive fluid undergoes from the action of the atmosphere, depend on other circumstances in their organization. Vegetables, and animals which have no circulation, *respire* by their whole surface, or by means of vessels, which convey air to all points of their interior. Those only which have a true circulation breathe by a particular organ. The heart being in them a common point of departure and return for the blood, the vessels containing that fluid could easily be so arranged as to convey it to the lungs, after it had circulated through the body: this was obviously impracticable in instances, when the nutritive fluid is every where uniformly expanded, without being contained in vessels. Hence respiration by lungs or gills is a function dependent on that of circulation, and may be regarded as a remote consequence of those faculties which characterise animals.

Respiration presents to our observation two very different kinds of phenomena: 1st, the motions of the lungs, gills, or other instruments of breathing, or of parts connected with them, by which the former are alternately dilated and contracted for the admission and expulsion of air, and the latter are exposed to a current of water; and 2dly, the changes produced in the blood or other animal fluids, and in the air or water, in consequence of their mutual exposure in these organs. The first may be termed the *mechanical*, and the second the *chemical* phenomena of respiration. The former, including all the modifications which breathing undergoes in laughing, crying, and sighing, in coughing, sneezing, hiccoughing, in straining or holding the breath, &c. have been fully considered under the article LUNG; in which the anatomy of the organs of respiration in man is also fully detailed. In the articles MAMMALIA, BIRDS, FISHES, REPTILES, INSECTS, and VERMES, the breathing organs, and their mechanical phenomena in animals, are considered. The chemical phenomena are the object of the present article.

The functions of the respiratory organs are closely connected with the other great processes of the animal economy. The heart, brain, and lungs, more particularly influence each other, and present, in their mutual relations, numerous and highly interesting considerations for the physiologist. On these points we refer to HEART, LUNGS, and NERVOUS *System*.

In the following article we shall speak, 1st, of the quantity of air received into the chest; 2dly, of the changes which this undergoes in breathing, as they have been made out by researches on the respiration of man and the mammalia; 3dly, of the changes produced in the blood; 4thly, of the various explanations of the mode in which these changes are produced; 5thly, of the respiration of the different gases; 6thly, of the chemical phenomena of respiration in other animals, and 7thly, of animal heat.

I. *Number of Respirations, and Quantity of Air respired.*— "It appears," says Dr. Thomson (System of Chemistry, v. 5. p. 732.), "that the number of respirations made in a given time differs considerably in different men. Dr. Hales reckons them at 20 in a minute. A man, on whom Dr. Menzies made experiments, breathed only 14 times in a minute. Mr. Davy informs us that he breathes between 26 and 27 times in a minute. I myself make about 19 respirations at an average. The average of all is 20. Now 20 in a minute make 28,800 in 24 hours."

In his "Inquiry," p. 102, et seq. Mr. Ellis has brought together, from the most authentic sources, a statement of the facts hitherto collected concerning the quantity of air ordinarily inspired. To ascertain this point, many modes of experiment have been adopted, and the conclusions which have been drawn from them very widely differ. Borelli estimated the bulk of air taken in at a single inspiration at 15 cubic inches (de Mot. Animal.); Mr. Kite from 12 to 17 (Essay on Apparent Death, p. 24.); Dr. Goodwyn at 14 (Connection of Life with Respiration, p. 28, et seq.); Mr. Davy from 13 to 17 (Researches, p. 410 and 433.); and Drs. Jurine, Hales, Haller, and Sauvages, at 40 cubic inches. With the conclusion of these latter authors the experiments of Dr. Menzies nearly coincide, and as the methods which he adopted seem less liable to objection than those of any other author, it may not be improper shortly to give the detail of them. He procured an allantoid, and fixed to it a machine consisting of two pretty large tubes, joined at right angles, nearly in the form of a common brass cock. One end of the horizontal tube was connected with the allantoid, and the other received into the mouth, while the upright tube, which rose from its centre, communicated

 with

with the atmosphere. The tubes were large, and valves, made out of an allantoid, were affixed to the end of the upright tube, and to that attached to the allantoid, so that the air, when expelled from the lungs, should not escape into the atmosphere, nor return from the allantoid, after having once entered it. Precautions were taken also, by covering the mouth and nostrils, to prevent any air from passing in or out of the lungs, except by the tubes above mentioned. Things being thus prepared, he began to respire, and did not remove his mouth from the tube till he had filled the allantoid, taking care to stop his nostrils during expiration. The allantoid was filled, in repeated trials, by about 56 expirations, as natural as possible; and as its capacity was 2400 cubic inches, the average bulk of air thrown out of the lungs by each expiration, was 42.8 cubic inches. He then fixed another allantoid, whose capacity had been previously ascertained, to the end of the upright tube; and having filled it with atmospheric air, he inspired the air from one allantoid and expired it into the other, and the quantities were found to be nearly the same. Several persons of the middle size repeated this experiment with nearly the same result; the difference being scarcely ever more than one or two cubic inches. By another mode of experiment, first proposed by Boerhaave, of plunging a man into a tub of water up to his chin, and judging of the dilatation of the lungs from the ascent and descent of the water, he obtained, by several trials, nearly the same results; and when these same men were made to breathe from and into the allantoids, in the manner above described, the correspondence by the two methods was almost complete. (Menzies on Respiration, p. 21, et seq.) As there seems no obvious source of inaccuracy in the processes here employed, and their results so remarkably coincide; and as they present the average bulk deduced from 56 respirations, we may conclude, says Dr. Bostock, that 40 cubic inches is the quantity of air employed in an ordinary act of respiration. Essay on Respiration, p. 34. Inquiry into the Changes, &c. § 85.

Messrs. Allen and Pepys endeavoured to determine the quantity of air received into the lungs in an ordinary inspiration: 3460 cubic inches of atmospheric air were passed through the lungs in 11 minutes, by 58 respirations. As, on ordinary occasions, the person breathed 19 times in a minute, it is inferred that, by multiplying the time consumed in the experiment by the number of natural respirations in a minute, and dividing the whole bulk of air by the product, we obtain the true bulk of air received into the lungs at each natural inspiration; thus $11 \times 19 = 209$; and $\frac{3460}{209} = 16.5$ cubic inches, the quantity of a single natural inspiration. (Phil. Trans. 1808, p. 256.) Mr. Ellis justly observes, that not only do the efforts of the mind, and the operations of the apparatus, interfere greatly with the natural actions of the respiratory organs, but the gross quantity of air received in 58 preternatural inspirations can never with justice be assumed as a true measure of the quantity breathed in 209 natural respirations. The experiments of Dr. Menzies therefore still seem the most unexceptionable on this subject.

The difficulty in arriving, by experiment, at certain conclusions respecting the volume of air taken into the lungs in each inspiration, may arise from a difference in the state or capacity of those organs in different individuals; from the relative vigour or debility of the muscular powers carrying on the respiratory function; from the circumstances in which the animal is placed; the composition of the air itself; or the manner in which it is breathed. In many modes of experiment also, the friction between the air and apparatus employed, or the resistance which this latter may create to the ordinary process, will greatly vary the result: and considerable errors must likewise have arisen from the variation in bulk, occasioned by the change of temperature, which the air, during its respiration, suffers; from the difficulty of breathing in a natural manner when the mind is directing that process; and from the embarrassments opposed to the natural action of the respiratory organs by the contrivances adapted to them.

It will not be denied, that the size and capacity of the chest must, in a certain degree, regulate the quantity of air which is taken into, or expelled from it; and since respiration is neither wholly a voluntary nor an involuntary act, but, within certain limits, partakes of the nature of both, and is carried on by the exertion of muscular powers, the bulk of respired air must vary also, either from an alteration in the action of these powers, or from a change in the will of the agent who exerts them. This may be illustrated by considering the different quantities of air taken into the lungs in different states of natural and forced respiration. Dr. Goodwyn, supposing a person at death to make a *complete* expiration, endeavoured to ascertain the bulk of air then remaining in the lungs, which he estimated at 109 cubic inches. (Connection of Life with Respiration, p. 27.) This estimate he formed by measuring the capacity of the chest, in subjects who had died a natural death by disease, previous to which the expiratory powers must have been much weakened, and unable, in consequence, to expel so much air as when in a state of health and vigour; and in such cases, therefore, expiration might be final without being complete. Mr. Cruickshank observes, accordingly, that the lungs in the dead body, (though expiration is the last action of life,) always retain more air than is given out at several expirations. (On Insensible Perspiration, p. 97.) By a very different mode of experiment, we find Mr. Davy to conclude that his lungs, after a forced expiration, contain only 32 cubic inches of air, when it is reduced to the temperature of 55°, but which, by the heat of the lungs, and saturation with moisture, are increased to 41 cubic inches; and, after a natural expiration, they contained 118 cubic inches (Researches, p. 409, 410.); so that the difference between the two states of natural and forced expiration is 77, which is somewhat more than Dr. Menzies allows, who remarked that many men, after an ordinary expiration, could still expel from their lungs 70 cubic inches of air. (Diss. on Respiration, p. 31.) Mr. Davy adds, that his estimate of 118 cubic inches, as the capacity of the lungs after natural expiration, agrees very well with that of Dr. Goodwyn, who makes it about 109; and, on the supposition that the general debility which precedes the ordinary extinction of life, so weakens the expiratory muscles, as to disable them from making so complete an expulsion of the air, as they can effect when in health and vigour, the agreement is very striking; for nearly the same quantity of air would, in that case, remain in the lungs at the period of natural death, as after that of ordinary expiration.

Messrs. Allen and Pepys found that the healthy lungs of a stout man, five feet ten inches high, contained 108 cubic inches of air after death. Phil. Trans. 1809, p. 410, et seq.

Dr. Bostock conceives, that Dr. Goodwyn's estimate of 109 cubic inches of air remaining in the lungs after complete expiration, is not very remote from the truth; and he objects to Mr. Davy's mode of ascertaining the residual air of the lungs after a forced expiration, from a supposition that the hydrogen gas which he inspired for that purpose was not, in consequence of its low specific gravity, uniformly

formly diffused through all the cavities of the lungs; and therefore, that the proportions of the gas discharged could furnish no accurate estimate of those which were retained. (Essay, p. 17—25.) But Mr. Dalton has shewn, that hydrogen gas and atmospheric air intermix, when the former is kept in a phial above the latter, and communicating only by the small tube of a tobacco-pipe; and both in a state of rest. (Manchester Memoirs, vol. i. new series.) How much more readily then may this be expected to take place, where the gases are exposed to so large a surface, such great agitation, and increased temperature, as they must have been in the experiments of Mr. Davy. Neither is the small quantity of air, which Mr. Davy assigns, so incompatible, as Dr. Bostock supposes, with the anatomical structure of the thorax; for if we call to mind the space which the heart and the lungs occupy, and recollect, that, under a violent exertion, the chest is made to contract in every direction, and more especially by the ascent of the diaphragm nearly to the fourth or fifth rib, there is no difficulty in imagining the quantity of air in the lungs, in such circumstances, to be nearly that which Mr. Davy's experiments assign.

From a review, therefore, of all the facts and experiments above stated, we venture to draw the following conclusions, as approaching nearest to the truth. First, then, according to Mr. Davy, the lungs contain, after a forced expiration, a bulk of air equal to about 41 cubic inches; and according to the same author and Dr. Goodwyn, they contain, after a natural expiration, from 109 to 118 cubic inches; therefore the state of forced is to that of natural expiration, as 41 to 118. Secondly, according to Dr. Menzies, 40 cubic inches of air are received into the lungs at each ordinary inspiration; therefore the state of natural expiration to that of natural inspiration will be as 118 to 158. Mr. Davy found likewise, that by a forced expiration after a forced inspiration, he could expel from his lungs 190 cubic inches of air, and Dr. Menzies often found it to amount to 200 inches; therefore the state of greatest exhaustion of the lungs is to that of greatest repletion, as 41 to 231. But the 41 cubic inches of air, when inspired at temperature 55°, occupied a bulk equal only to 32; and therefore, by the same rule of proportion, 190 cubic inches, inspired at the same temperature, will be increased to 241.5; consequently, the greatest diminution of the capacity of the chest to its greatest expansion will be as 41 to 241, in the case of Mr. Davy. But these numbers must be considered as indicating proportions only, the absolute quantities being different in different persons. These facts decidedly shew how much the volume of air in the lungs will, at all times, depend on the relative capacity of those organs, on the more or less vigorous state of the expiratory powers, and on the degree of voluntary exertion with which the function may be performed.

The circumstances in which the animal may happen to be placed, will render this variation still more striking. Thus, from the experiments of Mr. Kite (On Apparent Death, p. 27. 29.) and Mr. Coleman (On Suspended Respiration, p. 7, et seq.), we learn, that in the act of drowning, animals are able to expel almost all the air which their lungs contain, by which those organs are brought into a state of collapse. Dr. Goodwyn, on the other hand, found, that in three executed persons, the lungs were expanded almost to their utmost extent, containing 250, 262, and 272 cubic inches of air (Essay, p. 25.); and Mr. Coleman observes, that when, previous to their suspension, he secured the trachea of animals by a ligature at the instant an inspiration was made, in less than four minutes they ceased to struggle, though the whole of the air was confined within the lungs, and no obstruction to the passage of the blood existed from their collapse (p. 111—138). Dr. Baillie also has often observed the lungs filling the chest, and distended with air and mucus, in persons who have died asthmatic; so that to die and to expire are by no means synonimous terms,—an observation long since made by Mayow, who remarked, that if air be drawn into the lungs, and the mouth and nostrils afterwards closed, "quamvis inflati maneant pulmones, mori tamen necesse erit, quia non licet expirare." (Tractat. Quinque, p. 300.) If indeed we reflect, that during submersion in water no fresh air can enter into the lungs, but that all which they contain may freely escape; and if we consider, that before suspension by the neck in the human subject, a deep inspiration, under the influence of fear, as Dr. Goodwyn observes, is made, and that no air can afterwards pass out, if the cord completely close up the trachea; it is reasonable to expect, that this variation in the bulk of air contained in the lungs should obtain, under the very different circumstances in which respiration is brought to a stand.

How much the composition of the air itself, and the manner in which it is breathed, will vary the bulk of residual air in the lungs, we may collect from the experiments of various authors. Dr. Hales moistened a bladder, and fixed to it a fosset, both of which would contain 74 cubic inches of air. Having blown up the bladder, he put the small end of the fosset into his mouth, and, at the same time, pinched his nostrils close, that no air might escape through them, and he then breathed to and fro the air contained in the bladder. In less than half a minute, he found a considerable difficulty of breathing, and was forced after that to draw his breath very fast; and at the end of the experiment, the suffocating uneasiness was so great as to oblige him to take away the bladder from his mouth. Towards the end of the minute, the bladder was become so flaccid that he could not blow it above half full, with the greatest expiration that he could make. (Statical Essays, vol. i. p. 238.) When also Mr. Davy respired atmospheric air in a natural manner, he took in, he says, only 13 cubic inches and expelled 12.7, so that only about $\frac{1}{13}$d part of the original bulk was retained; when he made one respiration of 100 cubic inches of air, the diminution was to 99, or $\frac{1}{100}$; when, after a complete exhaustion of his lungs, he respired 141 cubic inches of air, once only for one-fourth of a minute, they were reduced to 139, or $\frac{1}{70}$th nearly; and when 161 cubic inches were breathed for about a minute, their bulk was diminished to 152, or $\frac{1}{15}$th (Researches, p. 432—435.);—in every case, the diminution augmenting with the repetition of the respiration, and consequent impurity of the air, and distress of the respiratory organs. So likewise, when Dr. Henderson breathed from and into the gasometer 600 cubic inches of air for four minutes, they were reduced to 570, or lost $\frac{1}{10}$th of their bulk; and he adds, that he held on respiring until the sense of oppression about the chest obliged him to desist. (Nicholson's Journal, May 1804.) These distressing symptoms, brought on by the repeated breathing of the same quantity of air, were felt in a still greater degree by Mr. Kite; for on respiring 591 cubic inches of atmospheric air from and into a bladder, he experienced, in one minute, great anxiety at the breast, which in half a minute more became intolerable; his face swelled, became black, and felt excessively hot, and sparks of fire danced before him; loss of sight, giddiness and confusion of the senses succeeded, and at the end of little more than two minutes, he fell back into a chair. He was relieved by fresh air, but remained confused and giddy (Essay on Apparent Death, p. 25.) The amount of the diminution

of

of reſpired air, ſays profeſſor Pfaff, depends not only on the *time* during which a given volume of air is reſpired, but principally on the magnitude of the volume of air itſelf; it muſt be proportionally leſs the greater the quantity inſpired. He breathed 144 cubic inches of air once only in the time of ten or twelve ſeconds, and the diminution was four cubic inches, or $\frac{1}{36}$th of the primitive volume; when he reſpired the ſame volume of air twice, during twenty ſeconds, it loſt eight cubic inches, or $\frac{1}{18}$th; and when it was thrice reſpired, during thirty ſeconds, the diminution amounted to twelve cubic inches, or $\frac{1}{12}$th of the primitive volume. (Nicholſon's Journal, December 1805.) Now, in all theſe caſes, the volume of air reſpired was preciſely the ſame, and could not, therefore, affect the ratio of diminution: but as the times were doubled and tripled, ſo nearly were the degrees of diminution. But the more frequently the ſame air is breathed, the more unfit does it become for reſpiration; and to this change of compoſition, more than to the time, or the magnitude of the volume of air, is the increaſed degree of diminution to be aſcribed.

This will perhaps appear more ſtriking, if we attend to what happens in reſpiring nitrous oxyd, which is compoſed of the ſame elements as atmoſpheric air, but contains a much larger proportion of oxygen. After exhauſting his lungs, Mr. Davy inſpired 108 cubic inches of this gas, which, when expired, were reduced to 99, or had loſt $\frac{1}{12}$th of their bulk. When he made two reſpirations of the ſame quantity of the oxyd, the diminution was to 95, or about $\frac{1}{8}$th; and when he reſpired 102 cubic inches of nitrous oxyd, mixed with $\frac{1}{30}$th of common air, for half a minute, the volume of air, after the ſeventh expiration, was reduced to 62, or had ſuffered a loſs equal to $\frac{1}{2,55}$. (Reſearches, pp. 394. 416.) Hence it appears, that in the natural reſpiration of atmoſpheric air, only a ſmall diminution of its bulk takes place: that this diminution increaſes as the air becomes vitiated by repeated reſpirations, or is breathed in a preternatural manner: and that when a gas of the ſame elementary materials, but combined in very different proportions, is ſubſtituted into the place of pure atmoſpheric air, the diminution increaſes in a tenfold degree. Now, the repeated breathing of the ſame atmoſpheric air, has been ſhewn to bring on the moſt diſtreſsful ſymptoms, and at length an utter inability to continue reſpiration; and Mr. Davy tells us, that after a voluntary exhauſtion of his lungs, he could reſpire the nitrous oxyd with accuracy, when ſtooping, for about half a minute, but, even then, ſtrong ſenſations were produced, with fulneſs about the head rather alarming: that if the reſpiration extended to three-fourths of a minute, he could not rely on the accuracy of any experiment; and that the determination of blood to the head became, in leſs than a minute, ſo great as often to deprive him of voluntary power over the muſcles of his mouth. (Reſearches, p. 392.) But reſpiration is a function carried on by the exertion of muſcular powers, in a great degree obedient to the will; and the quantity of reſidual air in the lungs in preternatural reſpiration will at all times be much influenced by the manner in which the will exerts itſelf, and the degree in which the muſcles are able to act. When, therefore, the power of the will over the muſcles is in any degree diminiſhed, or is wholly loſt, or the muſcles themſelves are much weakened, a proportional derangement will take place in the reſpiratory function; and as, in the natural condition of the body, expiration is ſubſequent to inſpiration, the ability to inſpire will laſt longer than the ability to expire: conſequently the ceſſation of the proceſs is brought about by a failure in the expiratory powers. But if the expiratory powers are unable to expel the air from the lungs, it muſt remain in thoſe organs; and hence we ſee in all the foregoing examples, that the diminution in the volume of expired air was greater in proportion as the reſpiratory organs ſuffered diſtreſs or oppreſſion, and amounted even to more than one-third of the air inſpired, when all voluntary powers ceaſed. Inquiry, &c. § 86—92.

From the above data it may be eſtimated, that by each ordinary expiration one-ſeventh part of the whole contents of the lungs is diſcharged, and that by the moſt violent expiration ſomewhat more than four-ſevenths of the air contained in them is evacuated. Suppoſing that each reſpiration occupies about three ſeconds, a bulk of air nearly equal to three times the whole contents of the lungs will be expelled in a minute, or about 4114 times their bulk in 24 hours. The quantity of air reſpired during the diurnal period will be 1,152,000 cubic inches, or $666\frac{1}{2}$ cubic feet.

II. *Changes produced in the Air.*—Although the ancients were not unacquainted with the general fact, that reſpiration produces a change in the air received into the lungs, the firſt accurate notions reſpecting this change, were furniſhed by the experiments of Boyle. He not only proved, by means of the air-pump, the abſolute neceſſity of air to the ſupport of animal life, but he farther diſcovered, that the action of the lungs is quickly ſuſpended, unleſs they are furniſhed with a regular ſupply of freſh air. (Works, v. 1. p. 99, et ſeq.) "Animals, whoſe hearts have two ventricles, and no foramen ovale," ſays Mr. Derham, "as birds, dogs, cats, and mice, die under the action of the air-pump in leſs than half a minute, counting from the very firſt exſuction, particularly in a ſmall receiver." (Phyſico-Theology, p. 8.) The ſame poſition is corroborated by an experiment, exhibited before the Royal Society by Dr. Hooke. He cut away the ribs, diaphragm, and pericardium of a dog, whereby the lungs and heart were brought into view; and then dividing the windpipe, he introduced into it the nozzle of a pair of double bellows, and made, at the ſame time, ſeveral ſmall punctures through the outer coat of the lungs. By blowing in a ſtream of freſh air, which continued to eſcape through the ſmall apertures made in the lungs, he was enabled to keep thoſe organs fully diſtended. As long as he ſupplied the lungs with air, the actions of life continued, and the heart beat very regularly; but, on intermitting the ſupply, the dog would immediately fall into dying convulſive fits; and revive again as ſoon as the lungs were filled with a ſtream of freſh air. The circulation through the lungs continued both during their diſtended and collapſed ſtate, and as well when they were kept at reſt, as during their ſtate of motion; whence he concluded, that neither the motion of the lungs, nor the ceſſation of their motion, nor the ſtopping of the circulation of the blood through them, was the immediate cauſe of death; but the want of a ſufficient ſupply of freſh air. Lowthorp's Abridg. Phil. Tranſ. v. 3. p. 66.

From theſe facts it was naturally concluded, that the air had undergone ſome important change during its continuance in the pulmonary veſicles, and a variety of hypotheſes and conjectures were formed to account for this alteration. The knowledge which was then obtained reſpecting the air was, however, almoſt entirely confined to its mechanical properties, ſo that the theories of reſpiration, formed during this period, were neceſſarily crude and imperfect. Boyle perceived that the air, in paſſing through the lungs, became loaded with a quantity of aqueous vapour, and he farther ſuppoſed, that it acquired, what he calls, recrementitious ſteams (Works, v. 3. p. 371, et ſeq.); but reſpecting

ſpecting the nature of theſe ſteams he forms no conjecture. He obſerved alſo, that the air in which an animal had reſpired for ſome time, was conſiderably diminiſhed in volume, an effect which he attributed to the loſs of part of its elaſticity or ſpring. The contemporaries of Boyle, for the moſt part, coincided with him in his ideas reſpecting reſpiration; there were, however, ſome philoſophers, who ſuppoſed, that beſides the addition of theſe vapours, the air, during its continuance in the lungs, imparted ſomething to the blood. Among theſe, the firſt in point of genius and originality was Mayow of Oxford. He inveſtigated the properties of the air, and the effects produced upon it by reſpiration, with great acuteneſs, and concluded, that a peculiar volatile ſpirit, which was one of the conſtituents of the atmoſphere, was abſorbed by the blood during its paſſage through the lungs. Borelli, Lower, Willis, and others, adopted opinions in many reſpects ſimilar to that of Mayow; they imagined, that either a portion of the whole maſs of air, or ſome particular conſtituent of it, was abſorbed by the blood, and by this means converted this fluid from the venous to the arterial ſtate. But ſo little real knowledge was at this time poſſeſſed reſpecting the compoſition of the atmoſphere, that they entirely failed in their attempts to aſcertain the nature of the matter abſorbed, and their hypotheſes appeared ſo extravagant, and ſo little founded upon truth, that their doctrines fell into diſcredit, became neglected, and at length were totally forgotten. De Motu Anim. p. 2*a*. prop. 113. De Corde, p. 159—165. Willis, Pharm. Rat. p. ii. p. 34.

Dr. Hales devoted much of his attention to this ſubject, and performed many experiments with a view to illuſtrate the manner in which the air is affected by the lungs; he concludes nearly as Boyle had done, that it acquires a noxious vapour, and that its elaſticity is diminiſhed. (Statical Eſſays.) The learned Boerhaave confeſſes his inability to explain the changes which the air experiences by reſpiration. (Prælect. t. 5. p. 169, et ſeq.) The opinion of Haller was not materially different from that of Boyle and Hales; he had collected all the different theories which have been advanced upon this ſubject, and after reviewing them with his accuſtomed candour and perſpicuity, he concludes, that the air, when it is emitted from the pulmonary veſicles, is combined with a quantity of water, and a peculiar noxious vapour, and has its elaſticity diminiſhed. (Notæ ad Boerhaav. Prælect. t. 5. p. 170. Element. Phyſiol.) Such was the imperfect ſtate of our knowledge, when Haller wrote his Elements of Phyſiology! This noble monument of induſtry and genius was ſcarcely publiſhed, when Dr. Black commenced his experiments upon fixed air, and among other intereſting diſcoveries, ſatisfactorily proved, that this peculiar gaſeous ſubſtance is generated in the lungs during reſpiration.

"So early as the year 1757," ſays this diſtinguiſhed philoſopher, "I convinced myſelf, that the change produced in wholeſome air by breathing it, conſiſts chiefly, if not ſolely, in the converſion of part of it into fixed air; for I found, that by blowing through a pipe into lime-water, or a ſolution of cauſtic alkali, the lime was precipitated, and the alkali rendered mild." (Black's Lectures, by Robiſon, v. 2. p. 87.) At a later period, Mr. Bewley detected the formation of carbonic acid in reſpiration by a method ſomewhat ſimilar: he found, that on breathing through an infuſion of litmus, the ſame change to a red colour was produced in it, as when it was expoſed to the action of fixed air; and when, by adding a few drops of the water of potaſſa, the blue colour was reſtored to the infuſion, it could again be made to diſappear by ſuperſaturating it with the acid expired from the lungs. Prieſtley on Air, v. 5. p. 383.

The particular ſubſtance which conſtituted the wholeſome part of atmoſpheric air, was not, however, known to Dr. Black at the time his experiments were made: and long before the compound nature of the atmoſphere was aſcertained, it had been ſuppoſed by many philoſophers, that, to uſe the language of biſhop Berkeley, "there was no ſuch thing as a pure ſimple element of air. There is," he adds, "ſome one quality or ingredient in the air on which life more immediately and principally depends. What that is, though men are not agreed, yet it is agreed it muſt be the ſame thing that ſupports the vital and the common flame; it being found that when air, by often breathing in it, is become unfit for the one, it will no longer ſerve for the other. This quality of the air is neceſſary both to vegetables and animals, whether terreſtrial or aquatic; neither beaſts, inſects, birds, nor fiſhes, being able to ſubſiſt without air: and when air is deprived of this ingredient, it becometh unfit to maintain either life or flame, even though it ſhould retain its elaſticity." (Siris, § 143, et ſeq. 2d edition.) Dr. Hooke aſſerted, that this ingredient or ſubſtance, inherent in, and mixed with the air, is like, if not the very ſame, with that which is fixed in ſaltpetre, by which, during combuſtion, inflammable bodies are diſſolved. (Micrographia, p. 103.) The ſame opinion was afterwards held by Willis, Lower, and Mayow, all of whom likewiſe conſidered the nitrous quality of the air to act an important part in reſpiration. The laſt author, in particular, made experiments preciſely ſimilar to thoſe which have lately been brought forward to prove, that both by the burning of a candle, and other combuſtible bodies, and by the reſpiration of animals, the nitro-aërial particles of the air were exhauſted, whereby the volume of air was diminiſhed, and the reſidual air was unable afterwards to ſupport either life or flame. (Tractat. Quinque, p. 98, et ſeq.) The exhibition, however, of this peculiar, or nitro-aërial, part of the air in a diſtinct and ſeparate form, we owe to the genius of Scheele and Dr. Prieſtley, who diſcovered, independently of each other, in the year 1774, pure or dephlogiſticated air or oxygen gas. The atmoſphere, which, until this period, had been regarded as a homogeneous elementary body, was diſcovered by theſe celebrated experimenters, to be compounded of two aëriform fluids, poſſeſſing diſtinct properties, and having totally different purpoſes in the economy of nature. Theſe ſubſtances, which have ſince obtained the names of oxygenous and azotic gaſes, were found to exiſt in the atmoſphere, in the conſtant proportion of about 22 to 78. This great diſcovery, and the uſe which he made of it, enabled Dr. Prieſtley to propoſe the firſt conſiſtent explanation of the phenomena of reſpiration that had ever been offered to the public; and, although the theoretical opinions on which that explanation was partly founded, no longer exiſt, yet it ſhould never be forgotten that his experiments and diſcoveries firſt pointed out the true path of inveſtigation; and have contributed, in a pre-eminent degree, to advance our knowledge of this moſt important function. The cauſe of the unfitneſs of air, beyond a certain extent, to ſupport life and flame, he proved to ariſe from the deſtruction of its pure part, or what has ſince been called its oxygen gas; and he concluded, that, in reſpiration, combuſtion, and calcination, which, in conſequence of his peculiar theory, he ſtiles phlogiſtic proceſſes, it underwent preciſely the ſame changes. Philoſ. Tranſ. 1776. Obſ. on Air, v. 3. p. 9.

About a year after the publication of Dr. Prieſtley's experiments, the celebrated and unfortunate Lavoiſier pre-

ſented a memoir on reſpiration to the French Academy of Sciences. (Mem. de l'Acad. des Sciences, 1777.) After paying a tribute of reſpect to the genius of Dr. Prieſtley, he proceeds to an accurate examination of his experiments, and the concluſions which were deduced from them. He agrees with the doctor in ſuppoſing, that the proportion of oxygen is diminiſhed in air which has been reſpired, but upon a careful analyſis of the reſidue, he finds it to differ from the air left after the calcination of metals, which is merely azotic gas, in containing a quantity of carbonic acid. He alſo obſerved, that the bulk of the air was ſomewhat diminiſhed, and we learn in general from theſe experiments, that the changes produced in air by reſpiration, conſiſt in the removal of part of the oxygen, in the addition of a quantity of carbonic acid gas, and in the diminution of its volume. He ſuppoſes that the azote is not affected by the proceſs, and that it ſerves merely to dilute the oxygenous part of the atmoſphere.

In this paper, M. Lavoiſier does not mention the aqueous vapour which is ſo evidently diſcharged from the lungs by reſpiration; it is impoſſible that it could have been overlooked by ſo accurate an obſerver; we may therefore conjecture, that he omitted to mention it, becauſe at this period he conſidered it as only diffuſed through the air expired from the lungs, by the proceſs of evaporation, and not formed in conſequence of the operation of any chemical affinities.

The concluſions of this philoſopher reſpecting the changes produced by reſpiration upon the air taken into the lungs, are for the moſt part acquieſced in by modern phyſiologiſts, and the reſearches which have been ſince made upon this ſubject are principally directed, either to aſcertain with more preciſion the proportion of the reſpective ingredients in the air of expiration, or to frame hypotheſes to account for the operation of the lungs in effecting theſe changes.

Among the inveſtigations, however, of a date ſubſequent to this memoir of Lavoiſier, thoſe of Meſſrs. Allen and Pepys, publiſhed in the Philoſophical Tranſactions, 1808 and 1809, deſerve peculiar mention, on account of their great accuracy, and the ſatisfactory manner in which they have conſequently enabled us to determine ſome doubtful points.

Quantity of Oxygen conſumed.—"A difficult and intereſting queſtion," ſays Dr. Boſtock, "reſpecting the conſumption of oxygen, is the abſolute quantity of this gas conſumed by reſpiration in a given time. The firſt calculations which were made upon this ſubject, in conſequence of the imperfect nature of the apparatus employed, and of the want of a ſufficient dexterity in the management of pneumatic experiments, were unavoidably vague and inaccurate. The difficulty was much increaſed by a circumſtance firſt noticed by Dr. Crawford, and afterwards more fully inveſtigated by M. Jurine of Geneva, and M. Lavoiſier, that the reſpiration of the ſame animal in different ſtates of the ſyſtem, and under the operation of different external circumſtances, affects the air in very different degrees. This curious fact, which affords an inſight into ſome of the moſt important operations of the animal economy, muſt unavoidably produce great differences in the reſults of the beſt conducted experiments, and will render it impoſſible for us to arrive at more than an approximation to the truth. The circumſtances which have been diſcovered to influence the chemical effects of the reſpiration are, the temperature of the air reſpired, the degree of muſcular exertion, the ſtate of the digeſtive organs, and the condition of the ſyſtem as affected by fever; it is highly probable that other circumſtances will be diſcovered, by multiplying and varying our experiments upon the living body."

An experiment performed by Lavoiſier, upon a guinea pig, ſeems to have been the firſt in which a perfect apparatus, and the neceſſary degree of accuracy, were employed. (Mem. de l'Acad. des Sciences, 1780, p. 401—8.) The animal was confined over mercury, in a jar containing 248 cubic inches of gas, conſiſting principally of oxygen. In an hour and a quarter, the animal breathed with much difficulty, and being removed from the apparatus, the ſtate of the air was examined. Its bulk was found to be diminiſhed by eight cubic inches, and of the remaining 240 inches, 40 were abſorbed by cauſtic potaſh, and conſequently conſiſted of carbonic acid gas. Taking 100 parts of this air, theſe numbers will be as follows; the air was diminiſhed to 96.5, or by 3.5 cubic inches, and of the remainder, 16.5 were converted into carbonic acid gas, and abſorbed by potaſh, which reduces the quantity of air to 80 cubic inches. Towards the concluſion of the experiment, the air would be neceſſarily much leſs fit for performing the functions of the lungs than the air of the atmoſphere, in conſequence of the carbonic acid gas which it contained; but as the air employed was originally much purer than the atmoſphere, the author ſuppoſes, that the quantity of oxygen deſtroyed, was probably about the ſame which would have been conſumed under the ordinary circumſtances of reſpiration.

The ſame philoſopher performed a ſecond experiment upon the ſame ſpecies of animal, with ſtill more accuracy, in which pure oxygen was employed. (Ann. de Chimie, t. 5. p. 261, et ſeq.) This experiment continued during an hour and a half, and the animal being then removed from the jar, the air was analyſed as in the former caſe: 1728 cubic inches of air were found to be reduced to 1673, *i. e.* had ſuffered a diminution of 55 inches, cauſtic potaſh abſorbed about 229.5 inches, leaving a reſidue of pure oxygen. Theſe numbers, eſtimated as in the former caſe, will be nearly as follows; 100 inches were reduced to 96.82, or by 3.18 inches, the potaſh abſorbed about 19 inches, reducing the whole quantity of air to 77.82 parts. The quantity of carbonic acid was here ſomewhat greater than in the former experiment, which may be attributed to the air employed being pure oxygen, and to the proceſs having been continued for a ſomewhat longer ſpace of time than in the former inſtance. Upon the whole, the reſults correſpond as nearly as can be expected, from the very delicate nature of the experiments.

Dr. Menzies firſt attempted to aſcertain the quantity of oxygen conſumed by a man, in the courſe of a day. He found by experiment, that one-twentieth part of air, which had been once reſpired, is converted into carbonic acid gas: this he concludes muſt have been oxygen, as that part of the air alone is affected by reſpiration. He conceives that 720 cubic inches of air are reſpired in a minute, of which conſequently 36 will be conſumed. From theſe data he eſtimates, that in the ſpace of 24 hours, 51,840 cubic inches, or 17625.6 grains of oxygen, are conſumed and converted into carbonic acid gas. In this calculation ſeveral important particulars appear to have been overlooked, and accordingly it will be found to differ from the reſults of the more accurate experiments, which have been ſince performed by M. Lavoiſier, and Mr. Davy.

The experiments which were made by M. Lavoiſier, in conjunction with his friend M. Seguin, were conducted with every poſſible attention to accuracy, and with an apparatus more complete than any which has ever been employed in phyſiological reſearches. An account of them is detailed in two papers in the memoirs of the Academy of

Sciences

Sciences for the years 1789 and 1790; but notwithſtanding the peculiar advantages under which they were performed, their reſults will not be found in all inſtances to coincide. M. Seguin was himſelf the ſubject of the experiments. The authors begin by pointing out the different effects which are produced by reſpiration, under the different circumſtances in which the body is placed; and they farther remark, that individuals may probably differ in the abſolute quantity of oxygen which they conſume in the ſame circumſtances. Making a due allowance for theſe variations, they conclude, that the mean conſumption of oxygen by a man, during 24 hours, is ſomewhat more than 22 French cubic feet, or 46037.38 Engliſh cubic inches; a quantity of gas which will weigh 15661.66 grains troy.

Lavoiſier was ſtill continuing to purſue his experiments on this ſubject, and had conſtructed a very expenſive apparatus, for aſcertaining with ſtill more preciſion the amount of the ſeveral changes produced by reſpiration, when he fell a ſacrifice to the fury of Robeſpierre, and received ſentence of death. He had already performed a number of experiments with his new apparatus, and earneſtly requeſted a reſpite of a few days, in order to prepare them for publication; but his requeſt was not granted. M. de la Place, who pronounced his eulogy, has fortunately given us the moſt important reſults: they will be found to differ in ſome particulars from the former experiments, though, with reſpect to the quantity of oxygen conſumed, they nearly coincide. It is ſtated that a man in 24 hours conſumes 15592.5 grains.

There are ſome experiments on this ſubject by Mr. Davy, which appear to have been executed with great accuracy. From a number of trials made upon his own reſpiration, he found, that 100 cubic inches of atmoſpheric air, after having once paſſed through the lungs, had loſt between four and five parts of oxygen: hence he calculates, that 31.6 cubic inches of oxygen are conſumed in a minute; this will give 45,504 inches in 24 hours, a quantity which will weigh 15471.36 grains. This eſtimate coincides nearly with that of M. Lavoiſier, though it was obtained by a different proceſs, and by the uſe of a different apparatus. We may, therefore, conclude, that between 45 and 46,000 cubic inches, or about 15,500 grains = 2 lbs. 8 oz. troy, is the average quantity of oxygen conſumed by a man in 24 hours. Davy's Reſearches, p. 431—434. Eſſay on Reſpiration, p. 78—84.

In the ſeries of experiments lately performed by Meſſrs. Allen and Pepys, an apparatus was employed, in which the volume of the air reſpired could be meaſured with great accuracy, and in which a large quantity (3 or 4000 cubic inches) could be reſpired; ſo that the ſource of error, to which experiments on a ſmaller ſcale are liable, from the influence of the reſidual air in the lungs, is much diminiſhed. They cauſed a perſon to inſpire, from a gaſometer, 3460 cubic inches of atmoſpheric air, which were afterwards expired into another gaſometer; and to both gaſometers graduated ſcales were affixed, by which the quantities of air received and expelled could be accurately meaſured. The time occupied in the experiment was 11 minutes: about 58 reſpirations were made; and the deficiency in the whole volume of air, at the cloſe of the experiment, amounted only to 23 cubic inches. One hundred parts of the expired air afforded, on analyſis, 8.5 carbonic acid, 12.5 oxygen, and 79 nitrogen gas. (Phil. Tranſ. 1808, p. 254.) In an experiment on the reſpiration of another ſubject, the changes produced in the air were the ſame, but the quantity conſumed was very different. The thermometer (Fahr.) being at 56°, and the barometer at 30°.3, 3300 cubic inches of atmoſpheric air were inſpired, and 3311 expired in $5\frac{1}{2}$ minutes. One hundred parts of the expired air conſiſted of 8.5 carbonic acid, 12.5 oxygen, and 79 azote. When, therefore, twice the quantity of air was paſſed through the lungs in a given time, as great a proportion of its oxygen was conſumed, and as much carbonic acid formed, as in a ſubject in whom only half the quantity was breathed. The experiment was repeated ſeveral times; and in one inſtance, 9890 cubic inches of air were breathed for $24\frac{1}{2}$ minutes, with the loſs of only 18 cubic inches; and 100 parts of the expired air then afforded, on analyſis, 8 carbonic acid, 13 oxygen, and 79 nitrogen. (Ibid. 257.) Now the air employed in theſe experiments contained, in 100 parts, 21 oxygen and 79 nitrogen; and in the numerous analyſes, which were made of this air after its reſpiration, the portion of oxygen that diſappeared was exactly replaced by that of carbonic acid produced; ſo that, in every inſtance, theſe two gaſes formed together $\frac{21}{100}$ths of the reſpired air, the remaining 79 parts being pure nitrogen gas. It is, therefore, concluded, that the quantity of carbonic acid gas emitted is exactly equal, bulk for bulk, to the oxygen conſumed. Ibid. p. 279.

In ſubſequent experiments on the reſpiration of a guinea pig, theſe chemiſts found, that when 310 cubic inches of atmoſpheric air were breathed for 25 minutes by this animal, its volume experienced no variation whatever; and the portion of its oxygen, which diſappeared, was replaced by an equal bulk of carbonic acid. (Phil. Tranſ. 1809, p. 414.) Three experiments were made on the reſpiration of the guinea pig, in two of which the time occupied was 25 minutes, and in the third one hour. The animal was confined in a certain volume of air, which was changed ſucceſſively, ſo that the ſame air may have been breathed more than once; while in the experiments of theſe gentlemen on human reſpiration, juſt detailed, the air was only once breathed. In all the three experiments with the guinea pig, 100 parts of the air breathed contained the ſame conſtituent elements, *viz.* 5 carbonic acid, 16 oxygen, 79 azote. (Phil. Tranſ. 1809, p. 413, et ſeq.) Wherefore, they juſtly conclude, that when atmoſpheric air alone is reſpired, even by an animal ſubſiſting wholly on vegetables, no other change takes place in it than the ſubſtitution of a certain portion of carbonic acid gas for an equal volume of oxygen. Ibid. p. 427.

In reſpiration as nearly natural as poſſible, theſe gentlemen eſtimate the quantity of oxygen conſumed on an average at 26.6 cubic inches, at the temperature of 50°, and barometrical preſſure of 30°.4.

The changes occurring in reſpiration are influenced by various cauſes, which modify the actions of the capillary veſſels. Crawford eſtabliſhed by experiment, that leſs oxygen is conſumed at a high than at a low temperature (Experiments on Animal Heat, p. 307.); and this was confirmed in the experiments of Lavoiſier and Seguin (Mem. de l'Acad. des Sciences, 1789, p. 575.); a man conſuming, at the temperature of 54°, 1344 cubic inches of oxygen in an hour, while, in an atmoſphere at the temperature of 79°, he conſumed only 1210 cubic inches. Crawford obſerved alſo, that in an animal placed in a warm medium, the venous blood approached to the arterial in colour. Hence it appears, that the high temperature counteracts thoſe chemical changes which the blood undergoes in the extreme veſſels; and that the diminution in the conſumption of oxygen by reſpiration is owing to this cauſe, and not, as has been ſuppoſed, to the rarity of the air at the high temperature. If the conſumption of oxygen were diminiſhed from the latter cauſe, the blood ought to be even more completely venous than

than usual. The fact formerly known, that the consumption of oxygen is influenced by the food and the state of digestion, was confirmed and more accurately demonstrated by Lavoisier and Seguin. They found, that during digestion the consumption of oxygen was increased to 1800 or 1900 cubic inches in an hour. Exercise, too, increased the proportion consumed. It is stated that Seguin, in continuing the exercise of raising a weight of 15 pounds to a height of 613 feet during a quarter of an hour, consumed 800 cubic inches, which is at the rate of 3200 in an hour; and the same exercise, made during digestion, occasioned a consumption equal to 4600.

Notwithstanding, however, says Mr. Ellis, the necessity of oxygen gas to the continuance of respiration, and the great quantity of it that is thus daily consumed, many facts tend to prove, that, by the very constitution of that function, a necessary limit is placed to its consumption: and that this limit is determined, not by the purity of the air employed, but by some circumstances inherent in the animal system. It has been found, that the growth of vegetables is retarded by a great superabundance of oxygen (Ellis's Inquiry, § 14–40.); and that, although insects will live a considerable time in this gas, yet their breathing becomes oppressive, and they die (ibid. § 53.) long before the whole of it is consumed. There can be little doubt but that the other classes of inferior animals would, under the same circumstances, suffer in the same manner. In the experiment also made by Lavoisier on the guinea pig, already described, the animal is said to have breathed with much difficulty, although not more than one-fifth of the oxygen gas was consumed: but some experiments of the same author, at a later period, seem in opposition to this fact. In comparing together the phenomena of combustion and respiration, he observes, that much more combustible matter is consumed in a given time in vital air, than in that of the atmosphere, but that the same circumstance does not hold in respiration: for whether animals respire oxygen gas in its pure state, or mixed with a proportion, more or less considerable, of nitrogen gas, the quantity of oxygen which they consume is always the same. If a guinea pig, he adds, be kept for several days in oxygen gas, or in a mixture composed of fifteen parts nitrogen and one of oxygen, preserving constantly these proportions, the animal in both cases continues in his natural state: his respiration and circulation do not sensibly appear to be either accelerated or retarded: his temperature remains the same, and he has only, when the proportion of nitrogen gas is too great, a slight disposition to drowsiness. Mem. de l'Acad. 1789.

The results of Mr. Davy's experience, however, do not correspond with these conclusions of Lavoisier. He introduced a mouse into a jar containing an atmosphere composed of 10.5 cubic inches of oxygen, and three inches of nitrogen gas. In half an hour the animal appeared to suffer much, and, in about an hour, lay down on his side, as if dying: in an hour and a quarter he was withdrawn from the jar alive, but motionless. The residual air, on being analysed, was found to have lost only 2.1 cubic inches of its oxygen gas, and consequently 8.4 inches of that gas still remained. Another mouse, which was put at the same time into a jar containing 15.5 cubic inches of atmospheric air, was taken out through the mercury alive, but unable to stand, in 50 minutes: and on analysing the residual air, 2.7 cubic inches of its oxygen were consumed. Hence it appears, that the mouse in atmospheric air consumed nearly one-third more of oxygen in 50 minutes, than the other mouse did in an hour and a quarter, when placed in a jar containing so large a portion of oxygen. (Researches, p. 443.) The results of these experiments on mice are corroborated by those made by Mr. Davy on his own respiration; for he found, that he consumed much less oxygen gas when he respired it pure, than when, for the same length of time, he breathed atmospheric air; and the quantity of carbonic acid formed in the first case, was but little more than half that obtained by the respiration, for the same time, of atmospheric air. (Ibid. 442.) Messrs. Allen and Pepys state, on the contrary, that when pure oxygen gas is breathed, more of it is consumed in a given time, and more carbonic acid formed, than in breathing atmospheric air. The experiments of Davy differ greatly therefore from those of Lavoisier as to the effects produced by the respiration of oxygen on the animal system; for, while the latter philosopher informs us, that this gas may be respired for many days without inconvenience, Mr. Davy has shewn that the animal dies long before the whole of it is consumed. Trusting, therefore, to the accuracy of Mr. Davy's experiments, as in all respects supported by analogy, we infer, that an excess of oxygen gas in the air that is breathed, is not suited to the due maintenance of the respiratory function: and, on the other hand, the oppressive symptoms which the respiration of impure air occasions, as well as the results of Lavoisier's experiments, in which nitrogen superabounded, equally instruct us, that a deficiency of this gas is alike unsuited to it. Consequently, we may conclude, that the atmosphere, as it is naturally composed, is best adapted to the economy of the animal system; but that this system is, at the same time, so constituted, as to be able to bear great variations in the composition of the air without immediate injury to the powers of animal life.

When, however, this variation proceeds to a certain extent, the air is no longer capable of supporting vital action; but different animals, when confined in given volumes of air, possess the power of prolonging this action in very different degrees. Thus insects, worms, fishes, and the amphibia, live until all the oxygen gas of the air is nearly or entirely consumed (Ellis's Inquiry, § 53, et seq.); while birds die in a given quantity of air before they have consumed two-thirds of its oxygen (ibid. § 84.), and a mouse and guinea pig expire when about three-fourths of this gas have disappeared. Dr. Priestley observed, that if a mouse can stand the first shock of being put into impure air, or has been habituated to it by degrees, he will live a considerable time in air in which other mice will instantaneously die. (Experiments on Air, p. 257.) When, however, death does happen to animals in a given volume of air, it must arise either from the noxious operation of the nitrogen gas that is always present, or from that of the carbonic acid, which is formed; or it must proceed from the deficiency, or total absence, of oxygen gas. Now, although nitrogen gas do not of itself support life, yet we have no evidence that it exerts any injurious effects on the animal system. In vegetation, and in the respiration of the inferior animals, it has been shewn to be wholly inactive; and when, in the experiment of Lavoisier, it constituted $\frac{15}{16}$ths of the air employed, a degree of drowsiness only seems to have been induced by it. That it is entirely passive, is still farther confirmed by an experiment of Lavoisier, who found that hydrogen gas, mixed in due proportion with oxygen, would serve the purposes of respiration as well as the air of the atmosphere. We have no proof that nitrogen is able to enter the vessels so as to produce any direct operation on the blood,—an effect which is still farther forbidden by its incapacity of uniting with that fluid. We may therefore conclude, that nitrogen gas, when respired, neither suffers any change itself, nor produces any direct operation on the animal system.

The

The only other gas to which the death of animals, in these circumstances, can be ascribed, is carbonic acid, which, however, when formed by respiration, does not seem destructive to animal life. Dr. Goodwyn observes, that when the same air is breathed several times, so as to increase the quantity of carbonic acid, its noxious operation is to be attributed not to the presence of this acid, but to the deficiency or absence of oxygen gas (Connection of Life, &c. p. 66.); and when Spallanzani, by means of an alkaline substance, abstracted this acid as soon as formed by the respiration of birds and quadrupeds, he did not find that they lived longer in a given bulk of air than when it was suffered to remain. (Memoirs on Respiration, p. 318.) Dr. Higgins observes, that debility, convulsions, and death, follow the successive diminution of the oxygen gas of the air in respiration, long before the whole of that gas is consumed, although the carbonic acid that is generated be, in the mean time, carefully withdrawn. (Minutes of a Society, p. 160.) Indeed, we might in this, as in former examples, be led to suppose, that neither the carbonic acid formed in respiration, nor the nitrogen gas employed in that process, would exert any positively destructive operation on the animal powers, since both of them must, at all times, necessarily be present in the system; and seeing, moreover, that the abstraction of oxygen gas alone is sufficient to account for the fatal effects which ensue, it must be deemed unnecessary to resort to the supposed agency of any subordinate cause. Inquiry, &c. § 127—130.

Quantity of Carbonic Acid produced.—Having ascertained the proportion of oxygen which is consumed in respiration, it next remains for us to determine the quantity of carbonic acid gas which is produced. It appears that Dr. Black first demonstrated its existence in air emitted from the lungs, and that Lavoisier afterwards examined it with more accuracy, and found that the air, in which an animal had expired, contained about one-sixth of its bulk of carbonic acid gas. (Acad. des Sciences, 1777.) In the experiment which this philosopher performed with a more perfect apparatus, upon a guinea pig confined in oxygen, the carbonic acid amounted to nearly one-fifth of the bulk of the whole air employed, when the animal had been detained in the apparatus until the air was reduced into a state no longer fit for respiration. (Annales de Chimie, t. 5. p. 261, et seq.) These experiments, however, only prove what proportion of carbonic acid gas will render air incapable of supporting life, without acquainting us with the quantity of this gas produced under the ordinary circumstances of respiration.

M. Jurine of Geneva, appears to have been the first who attempted to calculate the absolute quantity of carbonic acid formed by the respiration of man; he imagined that it constituted about one-tenth part of the air emitted from the lungs. (Encycl. Method. Médécine, v. 1. p. 494.) Dr. Menzies instituted a set of experiments to discover the absolute quantity generated in a given time; he infers from them, that $\frac{1}{10}$th part of air which has been once respired, is carbonic acid, and estimates, that a man, in 24 hours, sends out from the lungs 51,840 cubic inches, or nearly 4lbs. troy; but this estimate is probably over-rated. Essay, p. 50.

The circumstances which have been already pointed out, as influencing the consumption of oxygen, have at least as powerful an effect upon the production of carbonic acid gas. Accordingly we shall find the calculations of the most accurate experimenters upon this subject so widely different from each other, that it seems scarcely possible to arrive at any tolerable degree of certainty.

M. M. Lavoisier and Seguin, in their first memoir of 1789, estimate the average quantity of carbonic acid gas, formed by a man in 24 hours, at 17720.89 grains troy; in their subsequent memoir, published in the following year, this quantity is diminished to 8450.24 grains; and in the eulogy of Lavoisier by La Place, it is stated, that Lavoisier, in his last experiments, reduced it still lower, to 7550.40 grains. Mr. Davy, on the contrary, whose experiments seem to have been performed with great exactness, though with a less complicated apparatus than that employed by the French chemists, supposes the carbonic acid formed in 24 hours to amount to 17811.38 grains (Researches, p. 434.), a quantity which is not very different from that first announced by Lavoisier.

Mr. Murray found that he expired 265 cubic inches of air in 30 seconds, and he discovered in this 16.57 cubic inches of carbonic acid. Making a deduction for the small quantity of this acid contained in the inspired air, he assumes 16 cubic inches as the quantity formed by respiration in 30 seconds. He calculated the quantity of oxygen consumed at 19 cubic inches: the ratio, therefore, between the calculated quantity of oxygen consumed, and the actual quantity of carbonic acid formed, was as 100 to 84.5. Syst. of Chemistry, v. 4. p. 494.

Messrs. Allen and Pepys conclude from their experiments, that the atmospheric air expelled from the lungs usually contains from 8 to 8.5 *per cent.* of carbonic acid, and that the proportion of acid in no case exceeds 10 *per cent.* They estimate the quantity of acid thrown off in 11 minutes at 302 cubic inches, which is about 27.45 *per* minute; and supposing the production uniform for 24 hours, the total quantity in that period would be 39,534 cubic inches, weighing 18,683 grains, or rather more than 11 oz. troy. Phil. Trans. 1808.

If a larger quantity of air be passed through the lungs in a given time, more carbonic acid is formed, but it still preserves the same ratio to the other component parts of the expired mass. Thus, 3300 cubic inches of air were inspired by one person in $5\frac{1}{2}$ minutes, and as each 100 parts contained 8.5 of carbonic acid, the whole acid formed in this time was 281.42 cubic inches. The first and last portions of a single expiration differ considerably in their proportions of carbonic acid, because the former consists principally of air contained in the fauces, trachea, and its larger branches, while the latter comes from the air-cells themselves. In small quantities of the first portions, given off by natural and easy expirations, the carbonic acid formed from three to five *per cent.* When an expiration was made as complete as possible, the utmost efforts being employed to press the air out of the lungs, 204 cubic inches were expelled, and the proportion of carbonic acid was 9.5. Now as the first portions contain only from three to five *per cent.*, the last must have contained more than the average, or 9.5. When 300 inches of atmospheric air were repeatedly breathed, until the laborious state of respiration compelled the operator to desist, 100 parts of the expired air contained 9.5 carbonic acid, 5.5 oxygen, and 85 azote. When a similar trial was repeated until the operator became insensible, 100 parts of the air contained 10 carbonic acid, 4 oxygen, and 86 azote. (Phil. Trans. 1808.) When 3260 cubic inches of gas, consisting of 97.5 oxygen, and 2.5 azote in 100 parts, were respired for 9 minutes and 20 seconds, the expired air measured 3193 inches, and contained, in 100 parts, 11 carbonic acid, 83 oxygen, 6 azote. Here, therefore, 37.64 cubic inches of carbonic acid were emitted from the lungs in one minute by the same individual, who produced 27.45 *per* minute, when he breathed common air. In another instance, 3420 cubic inches of similar air were breathed for 7′ 25″:

the expired air meafured 3362. The firft 250 cubic inches confifted, in 100 parts, of 9 carbonic acid, 25 azote, 66 oxygen; the laft, of 12.5 carbonic acid, 5.5 azote, 82 oxygen: 100 parts of the whole expired air confifted of 12 carbonic acid, 6.5 azote, 81.5 oxygen. The whole quantity of carbonic acid gas emitted in this experiment was 396.78 cubic inches. Ibid.

The refult, which fhews a greater evolution of carbonic acid when oxygen is refpired, is totally adverfe to thofe obtained by Mr. Davy, and already mentioned. We do not therefore feel authorifed in determining whether, in general, an increafe in the quantity of oxygen employed augments the carbonic acid evolved, or whether the proportion of the latter depends on the condition of the refpiratory organs, or variations in the exercife of their functions.

If it fhould be allowed, as the greateft number of inveftigations on the fubject tends to prove, that the carbonic acid formed in refpiration be lefs in bulk than the oxygen gas, which difappears, yet the weight of the compound is increafed by the addition of carbon, derived from the animal fyftem. Lavoifier and Seguin eftimated the weight of oxygen gas confumed by a man in 24 hours, at 15661.66 grains; and that of carbonic acid produced in the fame fpace of time, at 17720.89 grains; the carbon conftituting $\frac{1}{8.16}$th of the weight of the acid formed. In the experiments of Mr. Davy, the volume of oxygen gas that difappeared every minute was 31.6 cubic inches, and that of carbonic acid produced 26.6 inches. But one cubic inch of oxygen gas weighs 0.3474 of a grain, and therefore 31.6 cubic inches will weigh 10.97784 grains: again, one cubic inch of carbonic acid weighs 0.476 of a grain, and therefore 26.6 cubic inches will weigh 12.4222 grains. From thefe facts it would feem, that the proportion of carbon in the carbonic acid of refpiration is much lefs than that which forms the fame acid in combuftion. For 100 parts of carbonic acid, formed by burning the diamond, contain, according to the very accurate refearches of Allen and Pepys (Phil. Tranf. 1807) 20.72 or 28.81 of carbon: and the proportion of carbon in 100 parts of acid is 28.77, when it is formed from charcoal and oxygen. (Murray's Chemiftry, ed. 3. v. 2. p. 487.) But there are fome points of the fubject requiring the elucidation of further refearches.

Alteration in the Bulk of the refpired Air.—On no point of the refpiratory procefs are the recorded refults of different inquiries more at variance with each other, than about the queftion of the change in volume of the air, and the amount of that change. At firft, it was generally believed, that the refpired air undergoes fome lofs; and this opinion maintained its ground until very lately, although experiments were publifhed, in which no fuch lofs was obferved. The moft accurate modern refearches are much in favour of the opinion, that the bulk of the atmofphere is not affected by breathing; and this view of the fubject is the moft generally entertained in the prefent day. Some think, that, although the volume of the refpired air is not affected in ordinary natural breathing, it may be altered under particular circumftances. The determination of the queftion concerning the volume of the air, is clofely connected with another refpecting its abforption by the blood. We fhall detail the facts and arguments on both fides, and point out that which has the moft numerous and ftrong proofs in its favour.

The diminution of bulk was early noticed by Boyle, who eftimated it at about $\frac{1}{30}$th of the air employed. Mayow, whofe genius enabled him to anticipate fo many important difcoveries of modern chemiftry, confined an animal in a glafs veffel inverted over water, and, by the aid of a fyphon, brought the water on the infide of the veffel to a level with that on the outfide. Having then marked the height of the water by pieces of paper affixed to the fide of the veffel, he obferved its gradual rife as the animal continued to breathe; and then, comparing the fpace occupied by the air at the commencement of the experiment, with that which it poffeffed when the animal ceafed to breathe, he found that it was reduced about $\frac{1}{14}$th part of its bulk. (Tractat. Quinque, p. 104.) In the experiments of Dr. Hales, the degree of diminution varied from $\frac{1}{15}$th to $\frac{1}{30}$th of the air employed. Statical Effays, v. 1. p. 230. v. 2. p. 320.

Lavoifier, in the firft memoir which he publifhed upon refpiration, afcertained the degree of diminution with more accuracy, and ftated, that air, when rendered unfit to fupport life, was reduced $\frac{1}{6}$th in bulk. (Mem. de l'Acad. 1777.) The experiments of Dr. Goodwyn afforded the fame refult.

The volume of air, taken into the lungs at a fingle infpiration, contained,

Phlogifticated air	80
Dephlogifticated air	18
Fixed air	2
	100

The volume of air, expelled from the lungs at the next fucceeding expiration, contained,

Phlogifticated air	80
Dephlogifticated air	5
Fixed air	13
	98

Connection of Life, &c. p. 51.

In the account which Lavoifier gives of the firft experiment upon the guinea pig, he found the diminution to amount to $\frac{1}{31}$ of the bulk of the air employed (Mem. de l'Acad. 1780, p. 401.); and in the fecond fet of experiments, the diminution was found to be $\frac{1}{32}$d part (Annales de Chimie, tom. v. p. 261.); the greater abforption, in thefe cafes, probably depending upon the greater purity of the air employed. In the experiments performed by Lavoifier, in conjunction with Seguin, upon the refpiration of man, though in other refpects fo remarkable for their accuracy, there is no mention made of this circumftance, nor is it noticed by La Place, in his account of the experiments in which Lavoifier was engaged, immediately previous to his execution. In thefe inftances we cannot determine whether Lavoifier conceived that no diminution actually took place, or whether he only neglected to notice it.

The general fact of the diminution of bulk in refpired air, has been fince confirmed by Mr. Davy, though the exact degree of abforption varied fo much in his different experiments, that it is difficult from them to fix upon a quantity which may indicate the ordinary amount of this diminution. In the confideration of this queftion, as in the preceding one refpecting the confumption of oxygen, and the production of carbonic acid, there are two diftinct objects of inquiry. We may examine the degree of diminution produced in a given quantity of air, in which an animal has been confined, until it is no longer fit for fupporting refpiration; and in the fecond place, we have to afcertain the amount of the diminution which takes place in air, that has only once paffed through the lungs, as is the cafe in the procefs of ordinary refpiration. The firft of thefe points only was examined by Lavoifier. Mr. Davy has made experiments upon both. In air which had only once paffed through the lungs, he found the diminution in different trials

trials to vary from $\frac{1}{70}$th to $\frac{1}{100}$th: when he received the ſame air repeatedly into the lungs, it was found to be diminiſhed as much as $\frac{1}{18}$th of its original bulk. (Reſearches, p. 431—435.) The former experiments, however, alone indicate the effects of natural reſpiration, and taking an average of their reſults, the amount of the diminution will be about $\frac{1}{80}$th part of the whole air received into the lungs.

Mr. Murray of Edinburgh made ſome experiments on the alterations produced in the air by natural reſpiration, from which he *calculates* (for the quantity of air inſpired was not *meaſured*) that there is a loſs of 6 cubic inches in 265. Syſtem of Chemiſtry, vol. iv. p. 493, 494.

Meſſrs. Allen and Pepys, whoſe experiments we ſhall preſently allude to, as affording the ſtrongeſt arguments againſt a change of volume in the reſpired air, in natural breathing, met with a different reſult, when the circumſtances of the experiment were changed. In their fourteenth experiment, 300 cubic inches of atmoſpheric air were, in the ſpace of three minutes, paſſed eight or ten times through the lungs, until reſpiration became extremely laborious, and the operator was compelled to deſiſt. On analyſing the reſpired air, it was found to contain, in 100 parts, only 5.5 oxygen, 9.5 carbonic acid, and 85 parts of nitrogen gas. In the fifteenth experiment, which occupied alſo about three minutes, until the operator became quite inſenſible, the ſame quantity of air was employed, and afforded, by analyſis, nearly the ſame reſults; for it contained, in 100 parts, 4 of oxygen, 10 of carbonic acid, and 86 of nitrogen. In the former experiment we obſerve, therefore, an increaſe of 6 parts of nitrogen, and a loſs of 6 parts of oxygen; and in the latter, the oxygen had loſt 7 from 21, and the nitrogen had gained 7 upon 29. (Phil. Tranſ. 1808, p. 260.) Hence it is inferred, that when, as in theſe experiments, reſpiration is attended with diſtreſſing circumſtances, there is reaſon to conclude that a portion of oxygen is abſorbed. Ibid. p. 280.

In ſome experiments on the reſpiration of rabbits and of guinea pigs, Mr. Berthollet found that the bulk of acid gas produced did not quite equal that of the oxygen which diſappeared; ſo that the loſs of oxygen appeared to vary from 1.07 to 4.09 *per cent.*

We proceed to ſtate the reſult of thoſe inquiries, in which the volume of the air has been found not to undergo diminution in the act of breathing. Among the earlieſt experiments of Dr. Prieſtley on reſpiration is one, in which he confined a mouſe in a jar containing a given quantity of air, which was inverted over mercury. The animal was ſuffered to remain two or three days after he had died, in which time there was no ſenſible diminution of the air; but on paſſing lime-water into the jar, the air was diminiſhed $\frac{1}{78}$th part of its bulk; and when, in a ſubſequent experiment, the reſidual air was agitated in water, it was reduced between one-fifth and one-ſixth of the whole. Obſ. on Air, vol. v. p. 112, et ſeq.

Dr. Crawford found, alſo, that when the experiment was made over mercury, the diminution was not ſenſible; but that, if water of potaſſa was added to the reſidual air, it became mild, and the air was diminiſhed in the ſame degree as if the experiment had been made over water, or nearly one-fifth of its bulk. (On Animal Heat, p. 146.) The variations in theſe reſults, compared with thoſe before enumerated, ariſe, no doubt, from the more or leſs complete attraction of the carbonic acid by the fluids, over which the experiments were made; and, from the whole of them, we may collect, that when mercury is employed, which has no attraction for carbonic acid, the diminution is hardly ſenſible; but that, when this acid is completely abſtracted by an alkaline fluid, the loſs of bulk amounts nearly to one-fifth of the whole air employed. This inference correſponds very exactly with what occurs in vegetation, and in the reſpiration of the inferior animals.

In the year 1806, Mr. Dalton's attention was directed to this ſubject, and he ſatisfied himſelf, by numerous experiments, that the bulk of carbonic acid, formed in reſpiration, was exactly equal to that of the oxygen gas conſumed. On repeating theſe experiments, Dr. Thomſon obtained, in ſome caſes, nearly the ſame reſults; but, upon the whole, the bulk of oxygen that diſappeared was ſomewhat greater than that of the carbonic acid formed. The difference, however, varied conſiderably, and kept pace with the diminution in the whole bulk of air; whence he conſiders it to ariſe from the abſtraction of a part of the air by ſome other way than by reſpiration: and if this be allowed for, he believes the bulk of acid produced to be preciſely equal to that of oxygen gas loſt. Hence, ſays he, this oxygen muſt be changed into carbonic acid in the lungs; for oxygen gas, when changed into carbonic acid, does not ſenſibly alter its bulk. Syſtem of Chemiſtry, 3d edition. vol. v. p. 736, and 774.

Theſe concluſions have been completely confirmed by the very accurate experiments, already noticed, of Allen and Pepys. There was a loſs of 23 cubic inches only in 3460 breathed once, at 58 reſpirations, which occupied 11 minutes. In another experiment, 9890 cubic inches, of which the breathing occupied $24\frac{1}{2}$ minutes, loſt only 18. In ſubſequent experiments on the reſpiration of a guinea pig, theſe chemiſts found, that when 310 cubic inches of atmoſpheric air were breathed for 25 minutes by this animal, its volume experienced no variation whatever; and the portion of its oxygen, which diſappeared, was replaced by an equal bulk of carbonic acid. Theſe reſults were particularly ſatisfactory in their tendency to eſtabliſh the point, that the air undergoes no diminution; becauſe the time which they occupied was more conſiderable, and the chance of error, therefore, diminiſhed. The third trial with the guinea pig occupied one hour: the bulk of the atmoſpheric air, before the experiment, was 1060 cubic inches; after the experiment, 1061; the carbonic acid formed 53 cubic inches; the carbonic acid *per* minute, .88 of a cubic inch. (Phil. Tranſ. 1809, p. 414.) Wherefore they juſtly conclude, that when atmoſpheric air alone is reſpired, no other change is produced in it than the ſubſtitution of a certain portion of carbonic acid gas for an equal volume of oxygen.

The reſults of all the trials made by theſe gentlemen were not uniform, and the deficiency was ſometimes greater than what has been ſtated. The deficiency varied from 4 to 62 cubic inches in ten experiments; in each of which, between 3 and 4000 cubic inches of air were breathed once, the time employed being 10 or 11 minutes in each experiment. They conſider that the deficiency principally ariſes from the laſt expiration being made into a gaſometer, and conſequently meeting with more reſiſtance; ſo that the lungs are leſs completely evacuated than in the expiration into the open air, with which the experiment commenced.

The difficulty, which theſe gentlemen allude to, of bringing the lungs to the ſame ſtate exactly at the end as they were in at the beginning of the experiment, is evinced by the reſult of their thirteenth trial, which alſo affords a ſtrong argument againſt the diminution of bulk, which has hitherto been almoſt generally aſſumed as a reſult of the reſpiratory proceſs. In $5\frac{1}{2}$ minutes, 3300 cubic inches were inſpired, and 3311 expired; thus exhibiting an increaſe of 11.

Amid this conflict of authorities, we have no difficulty

in declaring it, as our decided opinion, that the experiments leaſt liable to error, moſt carefully performed, and therefore deſerving our greateſt confidence, are thoſe which contradict the notion of an abſorption of oxygen.

"In caſes," ſays Mr. Ellis, "where ſo many cauſes concur to render the apparent bulk of acid leſs than it ought to be, and leſs than that of the oxygen loſt, it is ſurely more reaſonable to give greater credit to thoſe reſults, which indicate an equality of volume between theſe gaſes, than to thoſe which declare a difference; ſince the former not only go with the latter to the fulleſt extent; but, purſuing the ſame track, have actually gone beyond them, and thereby reached a point, which the others have been unable to gain. In fact, to prefer thoſe experiments, which indicate a difference, to thoſe which prove an equality of volume, would be not only to halt in our progreſs, but to make a retrograde movement, and thus to ſuffer a negative inference to outweigh a poſitive proof." Further Inquiry, p. 279.

By the experiments of Meſſrs. Allen and Pepys, we have ſeen it proved, that when a guinea pig breathes a given quantity of air in a natural manner, no variation whatever was obſerved in the bulk of that air; and that in man, in whom many cauſes, not affecting the lower animals, contribute to produce error, when the reſpiration was nearly natural, the general average of the deficiency, in the total amount of common air inſpired, was only about ſix parts in 1000, and in one inſtance conſiderably leſs than two. The ſmallneſs of this deficiency, ſay theſe chemiſts, ſurpriſed us very much; and it probably ariſes from the difficulty, or, as they elſewhere term it, the impoſſibility of always bringing the lungs to the ſame ſtate after forcible expiration.

Under other circumſtances, as in the experiment recited above, of reſpiration continued until the operator became inſenſible, theſe gentlemen conceive that oxygen is abſorbed. To this inference, ſays Mr. Ellis, as far as it regards what is here called an abſorption of oxygen, we muſt beg leave to object. That the united volumes of oxygen and carbonic acid expired were leſs than the total volume of oxygen inſpired, we readily grant; but we deny that this fact affords any adequate proof of an abſorption of this latter gas. To the chemiſt, indeed, the mere fact of the diſappearance of a portion of oxygen may ſupply ſufficient evidence of its abſorption, in the ſenſe in which he may chooſe to employ that term; but the phyſiologiſt farther requires to know, by what organs or veſſels it is removed, in what courſe it is conveyed, and what uſes it is deſtined to ſerve. On none of theſe points, however, does he gain any information; and all the anatomical knowledge which he poſſeſſes of the ſtructure of the lungs, and of the properties of the living abſorbent ſyſtem, is adverſe to ſuch a doctrine. Should he apply to the chemiſt for a ſolution of his difficulties, he is told that oxygen does not chemically combine with other bodies, unleſs it be brought into actual contact with them; and he knows, that, in the preſent caſe, this contact is impoſſible, becauſe the membranes, both of the air-cells and blood-veſſels, are interpoſed between the air and the blood in the lungs. Even if, contrary to all experience and analogy, he were to concede to the chemiſt the exiſtence of pores or other paſſages in the cells and blood-veſſels, through which this oxygen might be attracted and combine with the blood, he is equally embarraſſed to diſcover the reaſon or mode in which it is again ſo ſpeedily expelled, or what uſeful purpoſe it can ſerve, ſince no portion of it is permanently retained. The ſcience of chemiſtry furniſhes no example of ſimilar operations,—of fluids which attract gaſes and combine them, ſo as to reduce their elaſticity, and then, without any apparent change of condition or circumſtances, almoſt inſtantly diſcharge them in a new and elaſtic form.

If, farther, we compare the reſults of the two ſeries of experiments made by Meſſrs. Allen and Pepys, the difficulties, in a phyſiological point of view, greatly accumulate upon us. For, if an *abſorption* of oxygen really take place in the lungs, how does it happen, that, in the firſt thirteen experiments, made with ſeveral thouſand cubic inches of air, and which occupied from ten to twenty-four minutes of time, a very ſmall loſs in the whole bulk of air, and not the ſmalleſt in its proportion of oxygen, occurred; while, in two other experiments, made with only 300 inches of air, and continued only for three minutes of time, a great deficiency in the whole bulk of air, and a loſs of one-third of its oxygen, took place. In all theſe experiments, except the twelfth, in which, inſtead of loſs, there was actually an increaſe of eleven cubic inches upon the bulk of air reſpired (Phil. Tranſ. 1808, p. 256.), the ſame perſon appears to have breathed, and the air was of ſimilar compoſition. Conſequently, the cauſe of variation in the reſult is to be ſought, not in any difference in the animal organs, or in the original compoſition of the air, but, probably, in ſome circumſtances of diſſimilarity, which accompanied the progreſs of the experiment.

Now the bare ſtatement of facts points out a great diſſimilarity, not only in the chemical reſults, but in the circumſtances accompanying the experiments, and in the effects which they produced in the ſyſtem. For in the firſt thirteen experiments, which occupied from ten to twenty-four minutes, and in which no loſs of oxygen occurred, the air was only *once* paſſed through the lungs, the breathing was nearly natural, the operator ſcarcely fatigued, and his pulſe not raiſed more than about one beat in a minute. (Ibid. 253.) But in the two experiments in which oxygen is ſaid to be abſorbed, the ſame air was paſſed *eight or ten times* through the lungs; and, in leſs than a minute, the operator found himſelf obliged to take deeper and deeper inſpirations. At laſt, the efforts to take in air became very ſtrong and ſudden, with a great ſenſe of oppreſſion and ſuffocation in the cheſt, indiſtinct viſion, buzz in the ears, loſs of recollection, and, at the end of three minutes, perfect inſenſibility. (Ibid. 260—262.) This difference in the effects produced in the ſyſtem, we do not heſitate to aſcribe to a difference in the *compoſition* of the air, which, in the firſt experiments, was reſpired in a natural ſtate, but, in the two laſt, by repeated breathing, was rendered more and more unfit to carry on reſpiration, until, at length, its power of ſupporting that function altogether ceaſed.

But becauſe under circumſtances, in which the mental and animal powers were in complete abeyance, the reſpiratory organs were not able to make ſo complete an expulſion of the inſpired air as they effect in their natural ſtate of health and vigour, are we, therefore, entitled at once to conclude, that all the air which was not expelled was really *abſorbed*? Setting aſide the anatomical difficulties in the caſe, let us, for a moment, look only to the chemical conſequences, to which ſuch a concluſion would conduct us. If the mere diſappearance of any gas, received into the lungs, be ſufficient evidence of its abſorption, then every gas, which is not returned, muſt be held to be abſorbed. Are we then prepared to admit that hydrogen and nitrogen gaſes are abſorbed by the blood? for, when their reſpiration is carried to its full exteut, they, too, equally diſappear. This ſuppoſed abſorption, however, cannot proceed from the operation of chemical attraction, for little or no affinity ſubſiſts between theſe gaſes and the blood. Neither can it ariſe from the operation of the living ſyſtem; for it occurs only

when

when the living powers are about to ceafe. To us there appears but one way of efcaping from thefe manifold difficulties, which is fimply to conclude, that the infpired air, which is not returned, is retained in the cells of the lungs. Such a fuppofition diffipates at once all anatomical and chemical difficulties, and explains why no air difappears in natural refpiration, when the expiratory powers are in full vigour and able to expel it, and why its difappearance increafes in proportion as the actions of thefe powers decline and ceafe.

It is, however, worthy of remark, that, in thefe laft experiments, not only was there a diminution in the whole bulk of air, but its relative proportions likewife varied; for, in 100 parts, the oxygen and carbonic acid amounted together only to about two-thirds of the ufual quantity of oxygen, and the deficiency was fupplied by a fuperabundance of nitrogen gas. We are not prepared to fay why, in this very embarrafled ftate of the refpiratory function, the relative proportions of the expired air fhould thus vary; but the fact proves only the retention of oxygen in the lungs, but not its abforption by the blood. Should it even be maintained that oxygen was abforbed, becaufe, in thefe two experiments, a portion of it difappeared, then, by the fame mode of reafoning, we muft alfo contend, that, in the thirteen preceding experiments, no abforption of oxygen took place, becaufe no part of it was retained; and as thefe laft experiments alone come near to the natural exercife of this function, they authorife us to conclude, that fuch fuppofed abforption of oxygen conftitutes no neceffary part of healthy refpiration. In truth, in fome inftances where a mixture of oxygen and hydrogen gafes was refpired, the oxygen and carbonic acid in the expired air uniformly exceeded, by one *per cent.* the total oxygen infpired (Phil. Tranf. 1809, p. 425.); from which it may be inferred, that thefe variations in the proportions of the expired air proceed entirely from accidental caufes, and are totally independent of any abforbent function in the lungs. Further Inquiry, v. 2. ch. 4.

If we are correct in reprefenting that the air undergoes no diminution of volume in breathing, it will follow neceffarily that no part of it can be abforbed in the lungs. This notion of abforption is not only at variance with the refults of the moft accurate direct experiments, but it is alfo repugnant to our knowledge of the ftructure of the lungs. The fineneffs of the abforbing veffels, the mucus perpetually fmearing the furface of the cells, the elaftic nature of air itfelf, fo that it neither penetrates moift paper, cloth, nor fkin—all demonftrate that no air gets into the blood by this route. If, indeed, air were taken up by the abforbents, it muft pafs to the right fide of the heart, and change the colour of the blood there, which does not happen.

But if, either by the function of abforption, or by the operation of chemical affinity, air did enter into the blood, we may furely with reafon demand fome proof of its prefence; yet, fays Haller, "Nulla unquam in vivo calido animali bulla aëris in fanguine vifa eft." (Primæ Lin. f. 306.) This opinion is confirmed by the direct experiments of Dr. Darwin; for having inclofed a portion of the jugular vein of a fheep between two ligatures, it was cut out, ftripped of its adhering cellular membrane, and then thrown into a glafs of water of temperature 100°, ftanding under the receiver of an air-pump. It at once funk to the bottom, and did not rife when the air was exhaufted; nor, when afterwards taken out, wiped dry, and laid on the floor of the receiver, did it exhibit any fwelling under the exhauftion of the veffel. The experiment was repeated with a fimilar refult on a portion of the vena cava of a pig. Phil. Tranf. v. lxiv. p. 345.

Neither do the effects refulting from the admixture of aëriform fluids with the blood, favour the notion of the entrance of air into that fluid. "Animal, cui aër in fanguinem inflatur," fays Haller, "perit certo et velociter; neque quidquam fatis certi eft in fanguinis venarum pulmonalium aucto rubore." (Loc. cit.) This affertion is confirmed likewife by direct experiment. When Dr. Girtanner injected oxygen gas into the jugular vein of a dog, he cried dreadfully, breathed quick, and died in three minutes; when nitrogen gas was thrown in, death happened in 20 feconds. (Memoirs on Irritability, pp. 221. 223.) Air, fays Bichat, thrown into the vafcular fyftem, quickly brings on agitation, convulfions, and death. (Récherches fur la Vie et la Mort, p. 179.) By forcing air through the windpipe into the lungs with a fyringe, and confining it there, he has made it to enter into the blood-veffels, which immediately brings on agitation and exertion in the animal; and if an artery in the leg or foot be now opened, the blood will fpring out frothy, and full of bubbles of air. If hydrogen gas has been ufed, the bubbles may be inflamed; and when this frothy blood has flowed 30 feconds, the actions of life ceafe, and cannot again be reftored, even although frefh air be fupplied. Ibid. 303. Inquiry, § 102, 103.

If, then, no proof exift of the paffage of air into the blood by the ordinary courfe of the abforbent veffels, the only other mode of effecting this purpofe that has been hitherto fuggefted, is the power of *chemical affinity*. What then are the chemical affinities fubfifting between venal blood and atmofpheric air? About the middle of the 17th century, Dr. Lower obferved, that the upper furface of venal blood, received into a veffel, acquired a fcarlet colour by expofure to the air; that if this furface was removed, the fubjacent one was foon changed to the fame colour; that if the cake of blood, after being allowed to fettle in the veffel, was inverted, its exterior and upper furface fpeedily alfo affumed a florid hue; and, laftly, that if venal blood was fhaken in a veffel, fo that the air thoroughly intermixed with it, it became entirely florid. (De Corde, p. 178.) Thefe opinions were afterwards held by Sig. Fracaffati and Dr. Slare, the latter of whom obferves, that the blood thrown up by a rupture of the capillary veffels of the lungs, is frothy and of a fcarlet colour; the firft of which effects he attributes to the intermixture of air, and the latter to its tinging power. (Lowthorpe's Abridg. Phil. Tranf. v. iii. p. 235.) Mr. Hewfon employed fimilar arguments to prove, that the florid colour, acquired by venal blood on expofure, was produced by the contact of the air; and, by injecting air into the jugular vein of a rabbit, he found that it there alfo rendered the blood florid. (Hewfon on the Blood, p. 9.) M. Cigna not only confirmed the foregoing facts, but proved alfo that the change of colour in this fluid did not take place when the blood was covered with oil or placed *in vacuo*; and Dr. Prieftley afcertained that not only by common air, but more efpecially by oxygen gas, this florid colour was produced on the black crafamentum of blood. On Air, v. iii. p. 66.

In effecting thefe remarkable alterations in the colour of the blood, the air itfelf, at the fame time, fuffers material changes. Dr. Prieftley found, that in twenty-four hours oxygen gas was fo far depraved by being in contact with venal blood, that one meafure of it and two of nitrous gas occupied the fpace of a meafure and a half, whereas, at the beginning of the experiment, they occupied the fpace of no more than half a meafure. (Loc. cit. p. 75.) Dr. Good-

wyn confined venal blood under a jar of oxygen gas inverted in mercury, and repeatedly obſerved that the change of colour was always very ſudden, and, after ſeveral minutes, the mercury aſcended two or three lines; from which he concluded that a ſmall portion of the air had diſappeared. (Eſſay, p. 61.) The preciſe change, however, which the air underwent, ſeems firſt to have been obſerved by Dr. Girtanner, who placed ſix ounces of venal blood in a jar of oxygen gas inverted in mercury; the blood preſently aſſumed a florid colour; the air was ſomewhat diminiſhed in bulk, and contained a portion of carbonic acid, which was attracted by lime-water. (Beddoes' Obſ. on Calculus, &c. p. 219.) Dr. Boſtock obſerves alſo, that a diminution of oxygen and production of carbonic acid take place when a piece of craſſamentum is placed in a jar filled with oxygen gas. (On Reſpiration, p. 227.) The ſame production of carbonic acid occurs when blood is placed in contact with atmoſpheric air. A quantity of this fluid was received into a cup, and confined in a jar of air inverted in water, a glaſs of lime-water having been previouſly placed in the cup. The internal ſurface of the jar was ſoon bedewed with moiſture, and a pellicle began to form on the lime-water, which, in a few hours, was increaſed to a thick cruſt of carbonate of lime. The craſſamentum was then removed, and a freſh glaſs of lime-water was placed in the ſerum, which, in thirty-ſix hours, had acquired a cruſt like the former, and the water had riſen conſiderably into the jar. In another experiment, where the ſerum was placed for twenty-four hours in a jar of air inverted in mercury, the reſidual air rendered lime-water milky, and the remainder had loſt a part of its oxygen. A ſimilar production of carbonic acid ſeems to have occurred, when, with a ſmall diminution of the gas, a ſlight change of colour was produced on venal blood by placing it in contact with nitrous oxyd, in the experiments of Mr. Davy; for when a ſolution of ſtrontian was admitted to the oxyd, it became ſlightly clouded, and, with the diminution of bulk that followed, minute portions of carbonic acid and nitrogen gas were produced. (Reſearches, pp. 377. 380. 387.) Hence then we learn, that when venal blood is expoſed to the contact of atmoſpheric air, of oxygen gas, or of nitrous oxyd, it preſently aſſumes a florid colour, and, at the ſame time, the volume of air is ſomewhat diminiſhed, and a portion of carbonic acid is produced.

Does then the carbonic acid, which is here met with, proceed ready formed from the blood, or is it in part formed by the decompoſition of the air? No one has yet proved that any aëriform fluid, much leſs that carbonic acid, exiſts naturally in the blood; and if this be true, no ſuch aërial acid can be expected to iſſue from it. The carbonic acid alſo, is not formed by blood when it is confined in nitrogen gas; neither does the colour of the blood, in that caſe, undergo any ſenſible change; but this acid is formed by blood, either in oxygen gas, in nitrous oxyd, or in atmoſpheric air, all of which are deteriorated thereby; whence it follows, that without the preſence of oxygen gas, the blood is unable to form carbonic acid, and that this acid, therefore, is, in part, formed out of that gas. If the oxygen gas that diſappears do not contribute to form the carbonic acid that is produced, in what other manner can its loſs be accounted for? or from what other ſource than the oxygen gas of the air, in contact with the blood, can that ingredient of the acid be derived? Thoſe who ſuppoſe the carbonic acid to be furniſhed by the blood, independent of the air employed, muſt likewiſe ſuppoſe that the nitrogen gas is furniſhed by it alſo; for the experiments of Mr. Davy teach us, that a portion of that gas, as well as of carbonic acid, is always preſent when nitrous oxyd is decompoſed, which renders it probable that the ſame thing likewiſe occurs when air is changed by venal blood. But in what manner the blood ſhould be able to furniſh nitrogen gas, it is not eaſy to conceive, ſince no affinity exiſts between that gas and venal blood. (Davy's Reſearches, p. 375.) We infer, therefore, from theſe facts, that atmoſpheric air is decompoſed by being placed in contact with venal blood, its oxygenous portion being in part converted into carbonic acid, and a quantity of its nitrogen being, in conſequence, left free.

But, ſuppoſing the air to be thus decompoſed by the blood, it ſtill remains a queſtion, whether it has been firſt attracted by that fluid, then decompoſed, and afterwards in part expelled; or, whether the decompoſition has been effected without ſuch previous attraction and intermixture of air. The only evidence of this ſuppoſed attraction ſeems to be the ſmall diminution of bulk, which the air in all caſes ſuffers; but this cannot be conſidered as a proof of the attraction of the air; for it is a neceſſary conſequence of that converſion of oxygen gas into carbonic acid, which has been ſhewn to take place, when theſe ſubſtances are brought into contact. Even granting to the blood this power of attracting air, or its oxygenous portion, it is not eaſy to conceive, why it ſhould ſo readily loſe it, and again give out this air in the form of carbonic acid. No change of quality in the blood, nor any variation of temperature, can have taken place ſufficient to alter ſo rapidly its affinity for theſe ſubſtances: and it cannot proceed from a want of affinity between the blood and the carbonic acid that is formed; for that acid ſuffers a greater diminution, either than oxygen gas or atmoſpheric air, by being placed in contact with blood. We incline, therefore, to the opinion, that neither the air nor its oxygen gas is attracted by, and diffuſed through the blood, as happens with ſeveral gaſes when placed in contact with certain fluids: but that the air is decompoſed, and its oxygen gas changed into carbonic acid, without entering into the ſubſtance of that fluid.

But, for the formation of this acid, the blood muſt ſupply carbon, ſince no other ſubſtance was preſent from which it could be derived: and it is well known alſo, that carbon enters largely into the compoſition of that fluid; and our experiments prove, that it exiſts as well in the ſerous as in the more ſolid parts. By ſome it may be objected, that becauſe carbonic acid is formed directly by the combuſtion of charcoal, it cannot be produced at ſo low a temperature as exiſts in theſe experiments. To this we can reply only by an appeal to the general facts exhibited through the whole courſe of our enquiry, by which it appears, that both by the living functions of vegetables and animals, and by the decompoſition of animal and vegetable matter, this acid is in like manner formed at temperatures equally low. Even thoſe, who conſider this acid to have proceeded ready formed from the blood, cannot attribute its production to the operation of heat; for in the animal body, the temperature of the blood ſeldom exceeds 100°—a degree of heat incompetent to form carbonic acid by any proceſs analogous to combuſtion. The combination of many bodies is, indeed, greatly accelerated by being expoſed to very high temperatures; but this ſurely does not ſet aſide the fact of their ſpontaneous union at temperatures much more low. From this review of the effects, which take place between the blood and air, we conclude, that the chemical phenomena, which ariſe when the ſubſtances are

are placed in contact, do not prove an attraction and diffusion of air through the blood; but shew only that a reciprocal action takes place, by which a new product is formed: no inference, therefore, in favour of an attraction of air by the blood in the lungs, can be drawn from the reciprocal action which they exert on each other out of the body. Inquiry, § 96—100.

It is, farther, an objection to this supposed operation of oxygen, that in the lungs the blood and air do not come into contact, and therefore although the combination of oxygen with that fluid might be conceived to happen, when they are placed together out of the body, yet the intervention of organised membranes may be supposed to prevent such an union in the living system. In the ordinary operations of chemistry, such an interposition of animal substance would be considered sufficient to vitiate the result of any similar experiment in which it was employed; but in the application of this science to the living body, neither membranes nor blood-vessels are conceived to oppose any obstacle to the exertion of chemical action, or, in the smallest degree, to affect its result. In support of this supposed operation of oxygen on the blood, some experiments of Dr. Priestley have been appealed to, as affording decisive evidence that this substance has the power of penetrating a compact membranous body, and may, consequently, penetrate the cells and blood-vessels of the lungs. The importance, which has been attached to these experiments, in all the late hypotheses which have been proposed to explain the function of respiration, renders it necessary for us to examine them with some minuteness, in order to discover the true relation which they bear to the present question.

Dr. Priestley, who, as we shall hereafter see, supposed that venal blood became red by imparting its phlogiston to the air, knew well that the blood in the lungs was separated from the air by a membranous substance, which, however, according to Dr. Hales, does not in thickness exceed the $\frac{1}{1000}$th part of an inch. To ascertain the effect of this circumstance, he put some black blood into a bladder moistened with a little serum, and then tying the bladder very close, he hung it in a free exposure to the air. The next day, all the lower surface of the blood, which had been separated from the air by the intervention of the bladder, had acquired a coating of a florid red colour, as thick, it appeared, as it would have acquired, if it had been immediately exposed to the open air; so that this membrane had been no impediment to the action of the air on the blood. This experiment was repeated, without previously moistening the bladder, and with the very same result. Obs. on Air, vol. iii. p. 369.

But although in these experiments the blood was rendered red by the agency of the air, yet we are not entitled to conclude, that this redness was produced by the combination of its oxygen, unless we can shew, not only that this substance comes into contact with the blood, but is likewise capable of changing it to a red colour. Dr. Priestley himself, who believed the blood to become red by the loss of phlogiston, could draw no such conclusion; and it is not a little remarkable that this philosopher, who had before so well observed the reciprocal effects produced in the air, when it thus changed the colour of the blood (loc. cit. p. 336.), should in these experiments have entirely overlooked them. It is still more remarkable, since these experiments have drawn so much attention, and seem now to be the chief or only remaining evidence urged in support of the hypothesis of oxygenation, that some attempt has not been made to inquire farther into the actual circumstances which attend them. It is this examination which we now propose to make, in the hope, that if it do not lead us to a knowledge of the true cause of this phenomenon, it may at least serve to shew to what it is not to be ascribed.

With this view, we procured a quantity of black blood, and putting it into a sheep's bladder, suspended it from the top of a jar containing about 100 cubic inches of atmospheric air. The jar was inverted in a saucer containing mercury, and within it a small cup of solution of potassa was likewise placed. The blood, in a short time, assumed a florid hue, and a dimness extended over the inside of the jar. By the next day, the mercury in the saucer had risen $\frac{2}{10}$ths of an inch into the jar, and it continued to rise several days; so that by the fifth day it had reached nearly to an inch in height. The jar was then raised, and diluted acid being poured upon the alkaline solution, disengaged from it a large quantity of carbonic acid gas. By this experiment, therefore, we are taught, that, when black blood assumes a red colour by being thus placed in a moistened bladder, and exposed to atmospheric air, the air itself, at the same time, undergoes a change; for its volume is diminished, and carbonic acid is produced.

To ascertain these facts with greater precision, we put another quantity of black blood into a small bladder, and suspended it, as before, from the top of a small jar inverted in mercury, and which contained 18.3 cubic inches of atmospheric air. Under this jar also a small cup of solution of potassa was placed. The blood, as before, was soon reddened, and the jar became dim. In two days, the mercury had risen nearly half an inch into the jar, and by the close of the fourth day, it stood seven-eighths of an inch high, where it remained for some time quite stationary. On analysing the residual air, it was found to suffer no change, either from agitation with lime-water, or by being exposed to the contact of phosphorus; so that, though all the oxygen had disappeared, no carbonic acid was present, but that gas was entirely attracted by the water of potassa employed.

The capacity of the jar, in the above experiment, has been stated to be equal to 18.3 cubic inches; and the bladder, with its contents, together with the cup and solution, we found to occupy a space equal to 5.2, which reduces the actual bulk of air, employed in the experiment, to 13.1 cubic inches. The mercury which in consequence of the attraction of the carbonic acid had risen seven-eighths of an inch into the jar, occupied a space equal to three cubic inches; so that of the 13.1 inches of air originally employed, three had disappeared, and $\frac{3}{13.1} = \frac{1}{4.37}$, or a portion of the air, was thus converted into carbonic acid, which comes very near to the proportion of oxygen gas which the atmosphere is known to contain. Hence we infer, that, in this experiment, all the oxygen gas that disappeared was converted into carbonic acid; and consequently we deny that any oxygen penetrated the bladder, in order to combine with the blood.

As thus it is denied that the blood, in these experiments, received any ponderable matter from the air, so likewise it will appear, from the facts which follow, that the air receives no such matter from the blood. We filled bladders with water, and suspended them in jars of atmospheric air, in the manner described above; and found that the oxygen gas of this air was converted into carbonic acid, in the same manner as when the bladders were filled with blood: and if the experiment was continued a sufficient length of time, the whole of the oxygen gas was, in like manner, made to disappear. The same effects followed from the introduction of

of moiſtened empty bladders; and, indeed, it is the uſual effect produced in the air by every moiſtened animal ſubſtance. If, therefore, the moiſtened bladder be thus capable, by itſelf, of acting on the air, we are entitled to conclude that it exerts the ſame action when it is filled with blood; and as, on this ſuppoſition, the oxygen gas will unite with the carbon, furniſhed directly by the bladder, we have no ground whatever to ſuppoſe this carbon to come from the blood. Hence, therefore, when black blood is reddened by the air, through the coats of a moiſtened bladder, the air yields no oxygen to the blood, nor acquires from it any carbon; but the carbon of the bladder, by its combination with the oxygen of the air, paſſes into a ſtate of carbonic acid gas. Further Inquiry, § 581—587.

That this change in the colour of blood is always accompanied by a correſponding change in the air, may be farther inferred from other experiments of Dr. Prieſtley. He found that, when the black craſſamentum of blood was covered by ſerum or milk, it nevertheleſs acquired a florid hue, on being expoſed to the air (Obſ. on Air, vol. iii. p. 370.); and Dr. Wells obſerved, that a covering of albumen, alſo, did not prevent the action of the air on the blood. (Phil. Tranſ. 1797.) Now we know that ſerum and albumen convert the oxygen gas of the air into carbonic acid; and we found by experiment, that the ſame effect was produced by milk, as probably would be the caſe with moſt of the animal fluids. Hence it is evident, that when the blood, in the experiments of Dr. Prieſtley, became florid, through ſeveral inches of ſerum, the oxygen gas muſt have been at once changed by it into carbonic acid, and could never, therefore, in the form of oxygen, be conveyed through this fluid to act on the blood.

On the other hand, Dr. Prieſtley found a thin ſtratum of water to prevent entirely this action of air on the blood. (Obſ. on Air, vol. iii. p. 370.) M. Cigna found the ſame thing to take place, when a pellicle of oil was interpoſed (ibid.); and Dr. Wells aſcribes a ſimilar effect to a ſolution of gum arabic. Theſe ſubſtances, however, act little, if at all, in changing the air; and no change of colour, therefore, takes place in the blood. That black blood ſhould have the power of attracting the oxygen of the air, through ſeveral inches of ſerum, and yet loſe this power when a thin ſtratum of water is interpoſed, ſeems ſomewhat ſurpriſing, if the intervening fluid be, in each caſe, conſidered to be equally paſſive; but proceeding on the fact, that the ſerum exerts an action on the air, which the water is incapable of effecting, a new circumſtance comes into view, and upon it the colouration of the blood may probably depend.

If, then, it appear, that the interpoſition of ſubſtances between the blood and the air neceſſarily prevents that contact, which is eſſential to the chemical union of oxygen with that fluid; if it alſo appear, that the colour of the blood is never, in ſuch caſes, changed, unleſs ſuch ſubſtances be interpoſed, as are themſelves capable of acting on the air; and if, laſtly, it be proved, that when the blood exhibits this change of colour, the air ſuffers a change, and that its oxygen, inſtead of combining with the blood, is really contained in the carbonic acid that is formed, we muſt conclude, that, whatever be the mode in which the air contributes to change the colour of the blood, it cannot be by imparting to it any portion of its ponderable matter. Conſequently, although theſe facts prove that oxygen gas poſſeſſes the power of changing the colour of the blood, as well through dead as through living animal membranes, yet they afford no evidence of the combination of oxygen with that fluid, but ſhew only the converſion of that gas into carbonic acid, preciſely in the ſame manner as this acid gas is formed, when the blood is reddened in the ordinary proceſs of reſpiration.

Even when the air and blood are brought into contact, they only exert a reciprocal action on each other, by which carbonic acid is formed, but no oxygen appears to combine with the blood. We have already given various proofs, that, when the blood is changed in colour by the agency of the air, the oxygen gas of the air diſappears, and carbonic acid is produced. Theſe facts are confirmed by the experiments of M. Berthollet, who confined recent blood in a veſſel of common air, and, at the end of twenty-four hours, the air, on analyſis, afforded nearly $\frac{4}{100}$ of carbonic acid. In two other experiments, ſimilar reſults were afforded; and in all theſe experiments, the acid gas produced was exactly equal to the volume of oxygen that diſappeared. (Mem. d'Arcueil, tom. ii. p. 462.) Unleſs, therefore, it be maintained, that the ſame oxygen can, at the ſame time, exiſt in two combinations, we muſt ſuppoſe, that, in theſe experiments, no oxygen combines with the blood; and from whatever cauſe, therefore, the red colour of the blood may proceed, we may ſafely conclude that it cannot ariſe from the combination of oxygen. Further Inquiry, § 592—595.

Mr. Ellis conſiders that the diminution in bulk, which the reſpired air undergoes, according to the reſults of moſt inveſtigations, may be accounted for by the condenſation which oxygen experiences in uniting with charcoal to form carbonic acid. Crawford eſtimated this diminution at $\frac{1}{7}$th, Lavoiſier at $\frac{1}{25}$th. But the experiments of Allen and Pepys (Phil. Tranſ. 1807), performed with a very perfect apparatus, and therefore apparently deſerving confidence, do not ſupport this notion of condenſation. When they tranſmitted repeatedly oxygen gas over ignited charcoal, ſo as to convert it into carbonic acid, the volume was the ſame at the end of the experiment as at the commencement. The reſearches of theſe chemiſts on reſpiration, publiſhed ſince the appearance of the "Inquiry," making it very probable that there is no loſs of bulk in the air reſpired, coincides with what they have proved concerning the conſtitution of carbonic acid.

Whether the azote of the inſpired air undergoes any change?—Mr. Murray has brought together all that is known on this point, and arranged it ſo clearly, that we avail ourſelves of his labours, without any further remark.

"It is laſtly to be determined, what is the influence of the nitrogen of the atmoſphere in reſpiration; and with regard to this, different concluſions have been formed. Lavoiſier, in his early experiments, conſidered the nitrogen of the atmoſpheric air as ſuffering no change in reſpiration. Mem. de l'Acad. des Sciences, 1777. Mémoires de la Société de Médécine, 1783.

Prieſtley, in the experiments already referred to, in which he breathed the ſame air repeatedly, obſerved an apparent conſumption of its nitrogen, as well as of its oxygen; but he afterwards inclined to the ſuppoſition, that the deficiency of nitrogen aroſe from the greater proportion of it in the lungs after the proceſs than before.

Mr. Davy inveſtigated this, and concluded that nitrogen is conſumed in reſpiration; a quantity diſappearing equal to about two-tenths of a cubic inch at each natural reſpiration, 13 cubic inches being the quantity of air taken into the lungs. As the number of natural inſpirations amounted in a minute to 26 or 27, it followed that, in this time, 5.2 cubic inches of nitrogen are conſumed; a reſult which was confirmed by continued reſpiration, as well as by the reſpiration of animals confined in a portion of air; though,

though, in the latter caſe, the quantity conſumed appeared to be leſs. Chemical Reſearches, p. 434.

This abſorption of nitrogen in reſpiration appeared to be confirmed by other experiments. It was obſerved by Dr. Henderſon, in breathing a portion of air repeatedly from and into a gaſometer. (Nicholſon's Journal, vol. viii. p. 40.) And it ſeemed likewiſe to be eſtabliſhed by the experiments of Pfaff. Nicholſon's Journal, vol. xii. p. 249.

Theſe experiments, however, are not free from fallacy, particularly thoſe where the ſame quantity of air was repeatedly breathed; for, as Mr. Ellis has juſtly obſerved, (Inquiry on Vegetation, Reſpiration, &c. p. 114.) the reſpiration, as it proceeds, becomes more difficult and laborious, and is at length terminated by a feeble expiration, in conſequence of which the due proportion of air is not thrown from the lungs. There appears, therefore, a diminution; and accordingly it is ſtated by Pfaff, that the diminution and the loſs of nitrogen is always the greater, the longer the air is reſpired. There can be little doubt that the apparent diminution ariſes from this cauſe; and accordingly, in the experiments of Allen and Pepys, in which this ſource of error is avoided, there is no apparent conſumption of nitrogen. The ſame reſult is ſtated to have been obtained in the laſt experiments of Lavoiſier and Seguin, "there being neither any diſengagement nor abſorption of nitrogen gas during the reſpiration." (Mem. de l'Acad. des Sciences, 1789, p. 374.) From the experiments of Vauquelin, Spallanzani, and Ellis (Inquiry, &c. p. 87, 88.), it alſo appears that there is no ſenſible conſumption of nitrogen, by the reſpiration of the lower orders of animals, while there is the uſual conſumption of oxygen, and formation of carbonic acid.

Meſſrs. Allen and Pepys, from ſome experiments (Phil. Tranſ. 1809), inferred, that there is even an evolution of nitrogen in reſpiration. They obſerved this, firſt, in the reſpiration of oxygen gas; in one experiment, where 3000 cubic inches of oxygen had paſſed through the lungs, 62 cubic inches of nitrogen being found in the firſt 260 cubic inches expired, though the gas originally contained only ſix cubic inches in this quantity; and in the next 562 cubic inches, 56 cubic inches were found, though this quantity, before it was reſpired, contained only 14; and a ſimilar evolution of nitrogen was obſerved in the repeated reſpiration of the ſame quantity of oxygen, an equivalent quantity of oxygen diſappearing. Much of this loſs of nitrogen may, as they obſerve, be aſcribed to the intermixture of the reſidual air in the lungs; but from comparing the capacity of the lungs with the quantity of nitrogen evolved, they found more of it to be evolved than could be derived from this ſource; and were therefore led to the concluſion, that where oxygen gas is reſpired, a portion of nitrogen is given off from the blood. This concluſion appeared to be confirmed by the reſults of experiments on a guinea pig, confined in a quantity of atmoſpheric air. In one experiment, at the end of an hour and twelve minutes, the increaſe of nitrogen in the air was more than equal to the cubic contents of the body of the animal. In the reſpiration of a mixture of oxygen and nitrogen gaſes, a ſimilar evolution of nitrogen, and diſappearance of an equivalent portion of oxygen, was obſerved; but not in the reſpiration of atmoſpheric air.

Three thouſand four hundred and twenty cubic inches of air, conſiſting of 2.5 azote, and 97.5 oxygen in 100 parts, were breathed for 7′ 25″: the expired air meaſured 3362, therefore the deficiency was 58. The expired air was received in 13 ſucceſſive portions; of which N° 1. contained, in 100 parts, 9 carbonic acid, 25 azote, 66 oxygen. N° 13. conſiſted of 12.5 carbonic acid, 5.5 azote, and 82 oxygen, in 100 parts. When all the thirteen were mixed, the compoſition was 12.0 carbonic acid, 6.5 azote, 81.5 oxygen. The whole quantity of carbonic acid formed in this experiment was 396.78 cubic inches. The quantity of azote taken into the lungs was 85.50; the quantity expired, 263.10: the increaſe is, therefore, 177.60. (Phil. Tranſ. 1808.) In another experiment of a ſimilar nature, 2668 of gas were breathed backwards and forwards for 13 minutes: it contained 4 *per cent.* of azote. There was a deficiency of 124 cubic inches in the expired air, the largeſt ever obſerved by theſe gentlemen. In this experiment there was an increaſe of 105.08 of azote. If the azote emitted from the lungs in theſe experiments be ſuppoſed to have been contained in thoſe organs before the experiments began, it will make their contents more conſiderable than we had before calculated. The following is a ſummary of four experiments on this ſubject:

	Barom.	Therm.	Oxygen gas, &c. inſpired	Gas expired.	Deficiency.	Time.	Quantity reſpired in a Minute.	Azote evolved.	Inferred capacity of Lungs.
N° 1.	——	53°	3260	3193	67	9′ 20″	348	110	141
2.	30.3	70	3420	3362	58	7 25	461	177	225
3.	30.15	70	3130	3060	70	8 45	357	187	236
4.	29.4	51	2668	2544	124	13 0	205	105	133

The particulars of two analogous experiments on the guinea pig follow:

	Barom.	Therm.	Oxygen, &c. inſpired.	Gas after the Exp.	Deficiency.	Carb. acid formed.	Carb. acid per Minute.	Time.	Oxygen miſſing.	Azote added.
N° 1.	29.05	57°	1060	1056	4	106.	1.48	$1^h\ 12^m$	54.07	50.12
2.	——	56	816	814	2	78.91	1.11	$1^h\ 11^s$	36.20	34.20

Philoſ. Tranſ. 1808 and 1809.

The concluſion that the nitrogen, found in theſe caſes, is derived from the reſidual air of the lungs, is ſo probable, that it would at once be admitted, were it not that the quantity evolved is ſo large, as apparently to preclude its admiſſion. Mr. Ellis, however, in ſome very ingenious obſervations on this queſtion, has pointed out a ſource of fallacy to which there is every probability that the reſult is to be aſcribed. It is, that the air in the lungs may be in a condenſed ſtate, or occupy leſs volume than it would do when it is expired; and hence, in the reſpiration of oxygen, a larger portion of nitrogen derived from the reſidual air in the lungs may be given out than could be inferred from their known capacity. The ſtructure of the lungs is cellular, and the air is diffuſed in cells of an immenſe number, and at the ſame time of diameters extremely ſmall. If theſe cells have any degree of contractile power, this may pro-

duce condenſation of the air they contain. But independent of this, it is well known, as Mr. Ellis remarks, that a ſtrong attraction or adheſion is exerted between air and the ſurfaces of all bodies; the more, therefore, the ſurface is increaſed, the greater muſt be the effect from this attractive force. Hence, under the extenſive ſurface of the cells of the lungs, it muſt operate with great effect, and reduce conſiderably the volume of the air. The abſorption of aërial fluids by charcoal, Mr. Ellis adduces as illuſtrating this operation of adheſion; and in the lungs it is ſufficiently probable, that it may be aided by the affinity exerted by the humid ſurface to the aërial matter.

All the phenomena accord much better with this view than with the concluſion that nitrogen is evolved from the blood. Thus the "production of nitrogen is always greateſt in the firſt expiration, and its quantity progreſſively diminiſhes, until towards the cloſe of the experiment, it is reduced almoſt to nothing, circumſtances which ſeem plainly to ſhew that nitrogen is no longer obtained when all the reſidual air in the lungs is removed. If this nitrogen were furniſhed by the blood independent of the reſidual air, no reaſon occurs why it ſhould thus diminiſh, and ceaſe to appear, as this air is abſtracted; for the function of reſpiration goes on, and the blood, as far as depends on itſelf, cannot be conſidered leſs fit to ſupply nitrogen. The fact, alſo, that no ſuch exceſs of nitrogen is furniſhed in natural reſpiration, militates againſt the notion of its proceeding from the blood. No exceſs of nitrogen, too, is ever afforded in other caſes, unleſs its place be ſupplied by an equal or ſuperior bulk of ſome other gas. And this affords evidence, that in this ſuppoſed evolution of nitrogen from the blood, nothing more than a mechanical ſubſtitution of one gas for another takes place." (Farther Inquiries, &c. p. 306.) Murray's Syſtem of Chemiſtry, 3d edit. v. 4. p. 498, et ſeq.

Adopting, as we do entirely, the views of Mr. Ellis on the ſubject of reſpiration (to whoſe clear, logical, and very ſatisfactory works we refer our readers for more ample information), we conclude our review of the changes, which the atmoſphere undergoes in reſpiration, in the words of his "Further Inquiry," § 621.

"From the foregoing ſeries of facts, concerning the reſpiration of the higher claſſes of animals, we feel ourſelves entitled to repeat with increaſed confidence, that 'the whole of the oxygen gas which diſappears in reſpiration is employed to form the carbonic acid produced in that proceſs.' And that 'the nitrogen gas of the air neither ſuffers any change itſelf, nor produces any direct operation on the animal ſyſtem.' Or, in the words of Meſſrs. Allen and Pepys, 'When atmoſpheric air alone is reſpired, no other change takes place in it, than the ſubſtitution of a certain portion of carbonic acid gas for an equal volume of oxygen.' (Phil. Tranſ. 1809, p. 427.) Conſequently in man, as well as in the lower animals, the converſion of oxygen gas into carbonic acid conſtitutes the only eſſential change, which the air of our atmoſphere experiences in the lungs during its reſpiration."

Aqueous Vapour contained in the expired Air.—That the air expelled from the lungs contains a certain quantity of watery vapour, is rendered very obvious by its condenſation, when we breathe cold air. It is not very eaſy to aſcertain its quantity.

Dr. Hales performed many experiments for this purpoſe: he contrived to paſs the air which he expired through a flaſk filled with woodaſhes, which, in conſequence of the potaſh contained in them, have the property of ſtrongly attracting the moiſture. By obſerving the increaſe of weight which the acid had acquired in a given time, he eſtimates that the water emitted from the lungs in 24 hours, will amount to 9792 grains, above 20 ounces. (Statical Eſſays, v. 2. p. 322—4.) The nature of his proceſs, however, did not admit of much accuracy. Dr. Menzies attempted to ſolve this problem, by actually collecting in an allantoid fitted to the mouth, the water emitted from the lungs in a given time; his eſtimate is much leſs than that of Hales; he ſuppoſed that the quantity of water exhaled in 24 hours would amount to no more than 6 ounces, or 2880 grains. (Diſſertation on Reſpiration, p. 54.) Mr. Abernethy, by breathing into a glaſs veſſel of a peculiar conſtruction, collected in an hour 180 grains of water, containing, as he ſuppoſed, a quantity of mucous matter. According to his eſtimate, the quantity emitted in 24 hours, would amount to exactly 9 ounces, or 4320 grains, but as the ſubſtance which he obtained was not pure water, there muſt be ſome deduction made from it on this account. We are not informed what proportion the water bore to the mucus diſſolved in it. Surgical Eſſays, pt. 1. 141.

The difficulty of actually collecting and weighing the pulmonary exhalation, is probably the cauſe which induced Lavoiſier in his experiments upon reſpiration, to aſcertain its quantity by a calculation, founded upon the proportion between its conſtituent parts, compared with the compoſition of the other ſubſtances which are received into and diſcharged from the lungs. He firſt determined by direct experiment the quantity of oxygen conſumed, and of carbonic acid produced; the compoſition of carbonic acid is known, and by comparing the oxygen which had diſappeared with the quantity which would have been neceſſary to form the acid, he found that the oxygen conſumed was more than ſufficient to compoſe the carbonic acid which was actually produced. He ſuppoſed that this ſuperabundant quantity of oxygen was employed in the formation of water, by uniting in the lungs with a portion of hydrogen: he eſtimates the amount of the water by knowing what quantity of it a given weight of oxygen can produce.

In the firſt memoir (1789), the quantity of water emitted from the lungs of a man in 24 hours, is ſtated to be no more than 337.18 grains. In the 2d (1790), this quantity is raiſed to 11180.57 grains, or nearly 2lbs. troy: and in the laſt experiments recorded by La Place, the quantity is ſtill more conſiderable, *viz.* 13704 grains. The proportion between the water and the carbonic acid is very various in theſe different reſearches: in the firſt they are reſpectively 337.18 grains, and 17720.89 grains, or as 19 to 1000 nearly: in the ſecond, 11188.57 and 8450.24, or as 1323 to 1000; and in the third, 13704 and 7550.40, or as 1815 to 1000. Such diſcordant reſults can have no other effect than that of diminiſhing our confidence in the whole of them.

Mr. Murray breathed into a bladder containing acetate of potaſh, a very deliqueſcent ſalt, and calculated the quantity of vapour expired by the increaſe of weight in the bladder and its contents, after the expired air had cooled. In this way he inferred that three grains of watery vapour are expelled from the lungs in a minute. Syſt. of Chemiſtry, v. 4. p. 497.

There are two ways of explaining the production of the watery vapour expelled from the lungs: by evaporation of the mucous fluid covering the inner ſurface of the air-tubes and veſicles by the conſtant paſſage of the air to and from theſe parts, which are kept at a temperature of about 98°; or by exhalation from the pulmonary or bronchial blood-veſſels. The ſecretion of the mucous membrane of the lungs muſt undergo evaporation, under the circumſtances of its

its expofure to the atmofpheric current in refpiration, according to the ordinary operation of phyfical laws: this, therefore, feems the moft probable fource of the expired water.

Lavoifier conceived that the water is generated in the lungs; hydrogen being evolved from the venous blood, and uniting with a part of the oxygen of the infpired air. But this liberation of hydrogen is not fupported by a fingle proof, or fhadow of proof; and we have every reafon to believe that all the oxygen confumed in breathing is employed to form carbonic acid.

III. *Changes produced in the Blood by Refpiration.*—Soon after the doctrine of the circulation had been generally received, the diftinction between arterial and venous blood was pointed out, and it was underftood that this fluid is changed from the latter into the former ftate in the lungs. Various conjectures were reforted to, to explain the nature and manner of this change. Some confidered the alteration to be principally mechanical; conceiving that the blood, while in the pulmonary veffels, experiences a continual and violent agitation, by means of which, its particles, before loofely mixed, and confifting of feveral heterogeneous fubftances, are communicated and perfectly united together, fo that the whole mafs acquires an uniform confiftence. Baglivi fuppofed, that the blood was rarefied, and Helvetius, that it was condenfed in the lungs; Boerhaave thought that its particles acquired that peculiar organization, which he deemed effential to the exiftence of perfect blood. Other philofophers, as Harvey, Boyle, Hales, and Haller, were of opinion, that the blood emitted fome noxious or fuperfluous matter in its paffage through the lungs. Some again fuppofed, that the change from venous to arterial was caufed by fomething imparted from the air to the blood.

Thefe vague fpeculations were foon fuperfeded by the more certain information deduced from experiment and obfervation. We have already enumerated the proofs afforded by the refearches of Lower, Cigna, Prieftley, Lavoifier, Davy, and others, that the change of the blood from venous to arterial is effected by expofure to the oxygenous gas of the atmofphere in refpiration; and that a fimilar change, in colour at leaft, is effected by fuch expofure out of the body: the alteration being accompanied, in both inftances, with a change in the compofition of the air.

The proofs, that refpiration is the fource of the change in colour juft alluded to, that it is ftopped in living animals when breathing is interrupted, and goes on again when the refpiratory procefs is refumed, will be found in the article Lungs.

But is there no other alteration in the properties of the blood confequent on refpiration, befides its change of colour? Undoubtedly there muft be fuch further alteration, for life is quickly ended, if this converfion of venous into arterial blood be ftopped; and we fhall prefently ftate our opinion, that carbon is exhaled from the pulmonary veffels; but chemiftry has not yet fhewn us any difference of compofition beween the two kinds of blood.

"When (fays Mr. Murray) we examine chemically the properties of arterial and venous blood, we find no other difference between them than that of colour. They contain the fame principles, and are fubject to the fame changes from chemical agents. The difference of colour, however, points out fome difference in compofition, though it may be too flight to be difcovered by analyfis; and when we examine the phenomena of refpiration, which are intimately connected with the change of venous to arterial blood, we find, that fuch a difference muft exift." Syftem of Chemiftry, vol. iv. p. 489.

Even the changes of colour of the blood are not well underftood. We know that this fluid is converted from the fcarlet to the black ftate, in the courfe of its paffage through the capillary veffels of the body. But it undergoes the fame change, when extravafated from a large artery, or when confined in an arterial tube between two ligatures. It never feems, however, to fuffer the oppofite change, except when in contact with oxygen gas, or with fome fubftance capable of furnifhing it.

That the paffage of the air through the lungs in refpiration is inftrumental in converting the chyle and lymph, poured from the thoracic duct into the venous fyftem, into blood; or, that it produces fibrine from the materials juft mentioned, has been fuppofed and afferted; but without any direct proof. We cannot, indeed, fee the chyle in the blood after it has gone through the lungs; but we know of nothing further than a mechanical admixture; and are completely ignorant of the circumftances accompanying and determining the generation of fibrine.

IV. *Theories of Refpiration.*—The principal explanations of the phenomena detailed in the preceding divifions of this article, as exhibited in the air and blood, confequently to refpiration, are detailed by Mr. Murray, in his Syftem of Chemiftry, vol. iv.; where they are followed by his own views of the fubject.

Dr. Prieftley, fays he, confidered thefe phenomena as owing to the difengagement of phlogifton from the blood in the lungs, and its combination with the air (Philof. Tranfact. 1776); a theory modified and rendered more comprehenfive by Crawford (Experiments and Obfervations on Animal Heat). Regarding hydrogen as the phlogiftic principle, and fuppofing it to exift in the blood in that ftate in which it is difengaged from vegetable fubftances by heat, the heavy inflammable air of the older chemifts, the carburetted hydrogen of the modern nomenclature, he fuppofed that this hydro-carbon, as it was named, is communicated to the blood in the extreme veffels, by which the converfion from the arterial to the venous ftate is occafioned; in the lungs, he concluded, it is given out, and in its nafcent ftate, or its tranfition to the elaftic form, it combines, he fuppofed, with the oxygen of the air, and forms the carbonic acid gas and watery vapour expired, while the blood, deprived of its hydro-carbon, returns to the arterial ftate. The fame explanation nearly was given by Lavoifier; at leaft he advanced the opinion, that the carbonic acid gas and watery vapour of the expired air are formed by the combination of carbon and hydrogen from the blood with oxygen in the lungs.

Lavoifier had alfo fuggefted, that the combination of oxygen with carbon might take place in the courfe of the circulation (Mem. de l'Acad. des Sciences, 1777, p. 191.), that the oxygen which difappears in refpiration may be abforbed by the blood, while carbonic acid may be given out fully formed. This hypothefis was afterwards endeavoured to be eftablifhed by Haffenfratz and Lagrange (Annales de Chimie, tom. ix. p. 261.) They obferve, that venous blood expofed to oxygen acquires a vivid red colour, which foon changes to a purple hue; and that arterial blood placed in vacuo, or in contact with any gas which does not contain oxygen, quickly affumes the dark purple colour. They conclude, therefore, that the florid red colour of the blood is the refult of the abforption of oxygen, while the dark venous colour arifes from the intimate combination of that oxygen with a portion of the carbon and hydrogen which the blood contains. According to this theory, oxygen is abforbed by the blood in the lungs, remains in the arterial blood for a time in a ftate of folution, or loofe combination,

bination, but it gradually paſſes, in the extreme veſſels, into more intimate combination with carbon, forming carbonic acid, in conſequence of which the blood paſſes to the venous ſtate; and from this venous blood the carbonic acid is diſengaged in the lungs, and a new portion of oxygen abſorbed.

Theſe two hypotheſes have divided the opinions of phyſiologiſts. They are both, however, defective: their principles are not proved, and they involve ſuppoſitions incompatible with the laws which appear to regulate the chemical actions that proceed in the animal ſyſtem. No proof is given, in the ſyſtem of Crawford, of hydro-carbon being communicated to the blood in the extreme veſſels; nor is it eaſy to imagine any ſource whence this principle in an inſulated ſtate can be derived; for, although it has been imagined by Crawford, that it may have its origin in the ſolid parts of the ſyſtem being abſorbed, this is refuted by the conſiderations, that this abſorption is performed not by the veins, but by the lymphatics; that it is not ſufficiently uniform, nor limited to carbon and hydrogen; that to whatever extent it may be carried, the blood muſt, in a ſtate of health, depoſit as much as is removed; and that there is no evident cauſe by which the carbon and hydrogen can be ſeparated from the other elements, and be brought into binary combination. And, in the theory of Haſſenfratz, though it were granted, that a portion of oxygen is abſorbed by arterial blood, there is no proof that this is combined merely with carbon, and that carbonic acid, the reſult of this combination, is contained in venous blood. We have even proof that the latter ſuppoſition cannot be juſt; for, when arterial blood is expoſed to carbonic acid gas until its colour is darkened, it does not recover its florid hue from ſubſequent expoſure to oxygen (Prieſtley, Experiments on Air, vol. iii. p. 363. 365.), and is therefore not venous blood.

Neither are the changes which theſe hypotheſes ſuppoſe, analogous to the uſual chemical operations of the animal ſyſtem, or ſufficiently connected with the purpoſes which the blood ſerves in its circulation. They both ſuppoſe, that the changes which the blood undergoes, depend not on alterations in its compoſition, ſtrictly ſpeaking, but on the alternate communication and abſtraction of a principle held by it in a ſtate of ſolution, and which appears to ſerve no purpoſe in the animal economy, but is aſſumed merely to account for the phenomena of reſpiration. But when the general facility of combination in the principles of animal matter, and the tendency which the actions of the veſſels have to form them into ternary or quaternary compounds, are conſidered, there is little probability in the ſuppoſition of the one hypotheſis,—that oxygen ſhould be abſorbed by the blood in the lungs, without immediately altering its compoſition; that, without being attracted by any of the other principles of the blood, or influenced by the other chemical changes going on in the ſyſtem, it ſhould be merely combined with carbon, in the proportion neceſſary to form carbonic acid; and that this carbonic acid, without affecting the ultimate compoſition of the blood, ſhould be carried the whole length of the venous circulation, and thrown out at the lungs; or in thoſe of the other, that carbon and hydrogen ſhould be brought into a ſtate of binary combination in the extreme veſſels, and ſhould be held merely diſſolved by the venous blood, until acted on by the oxygen of the air in reſpiration.

Still leſs are theſe changes connected with the known changes which the blood ſuffers; for no relation is traced between the proceſſes of aſſimilation or of ſecretion, and the ſuppoſed communication of hydro-carbon, or the combination of carbon and oxygen, in the extreme veſſels. In the theory of reſpiration, the converſion of arterial into venous blood ought to be conſidered as connected with theſe proceſſes; and this converſion, as well as that of venous into arterial blood, muſt be regarded as ariſing from changes in the ultimate compoſition of the known proximate principles of the blood, and not from the alternate communication and abſtraction of a principle which it holds diſſolved in it, or in what is termed a ſtate of looſe combination. According to this view of the ſubject, Mr. Murray gives the following explanation of theſe phenomena.

The blood is the ſource whence the animal products are formed. Its expenditure is ſupplied by the chyle, a fluid leſs completely animalized than the blood itſelf. The peculiar character of animal matter, with regard to compoſition, is a large proportion of nitrogen, and a diminiſhed proportion of carbon. It may therefore be inferred, that in the extreme veſſels, where the animal ſolids and fluids are formed, the general proceſs will be the ſeparation from the blood of thoſe elements of which animal matter is compoſed; and that, of courſe, carbon, which enters more ſparingly into its compoſition, will exiſt in the remaining blood in an increaſed proportion. This is accordingly the general nature of the converſion of arterial into venous blood. Nitrogen, hydrogen, and other elements, are ſpent in the formation of new products, and the proximate principles of the blood, probably the craſſamentum chiefly, remain with an increaſed proportion of carbon. In this ſtate it is expoſed to the atmoſpheric air in the lungs, the oxygen of which abſtracts its exceſs of carbon, and forms the carbonic acid expired, and this conſtitutes the converſion of venous into arterial blood.

There is little reaſon to ſuppoſe, that any combination of the oxygen of the air with the hydrogen of the blood takes place. The ſuppoſition that it does, and that this is the ſource of the watery vapours expired, originated in the hypotheſis of Crawford, which ſuppoſed hydro-carbon to be diſengaged from venous blood. No fact has been ſtated in its ſupport; it is a combination which can apparently ſerve no purpoſe in the animal economy; for hydrogen exiſts in as large a proportion, (and even in a larger,) in animal as in vegetable matter. And the degree of evaporation from a moiſt ſurface, ſo extenſive as that of the internal ſurface of the lungs, at the temperature of 96°, is adequate to account for the whole of the watery vapour expired.

The converſion of arterial into venous blood, is thus conſidered in connection with the other chemical changes going on in the ſyſtem, and is ſubſervient to them. In the extreme veſſels, the conſtituent principles of the blood are expended in the nouriſhment of the ſolid fibre; in the formation of the ſecreted fluids; and in the ſupport perhaps of the living powers. Of theſe principles, carbon is that contained in the ſmalleſt proportion in the ſolids and fluids; it is, therefore, that of which there is the leaſt expenditure, and conſequently it muſt be preſent in a larger proportion in the blood, after it has undergone theſe changes. To preſerve the due proportion, and prevent it from accumulating, it muſt be diſcharged by ſome other proceſs. Hence the neceſſity of the application of oxygen to the blood in the lungs, and the origin of the carbonic acid which is uniformily diſcharged. We thus, too, trace the proceſs of animalization from the reception of the aliment to its completion. All animals live directly or indirectly on vegetable matter. The principal difference in the compoſition of vegetable from that of animal ſubſtances, is in the former containing a larger proportion of carbon. Reſpiration is the function by which this difference is eſtabliſhed. The aliment received into the ſtomach, is ſoon formed into a fluid capable of aſſimilating

with the blood. It is conveyed to the lungs, and loſes part of its carbon, or is partially animalized. It is then diſtributed through the ſyſtem, and, in the extreme veſſels, along with carbon, parts with ſo much hydrogen, oxygen, nitrogen, and other elements, as to leave carbon predominant.

It might be ſuppoſed, that in any view, ſuch as that which has been now given, there muſt be ſome difficulty in conceiving that oxygen gas ſhould combine with carbon with ſo much facility, at a temperature much lower than that which is in general neceſſary for their union, and this, too, with the intervention of the coats of the veſſels through which the blood circulates. On attending, however, to the objection, it will be found to have no real force. Although carbon, in its ſolid and inſulated form, requires to be raiſed to a high temperature to cauſe it to combine with oxygen, yet when it makes part of a ternary or quaternary combination, in which ſtate its coheſion no longer oppoſes the combination, it is abſtracted, and combined with oxygen at any natural temperature. It is thus that many vegetable and animal ſubſtances, when humid, are altered by expoſure to the air, and carbonic acid formed. Blood itſelf is acted upon in this manner. It ſuffers a change preciſely ſimilar to that which it undergoes in the lungs, and this more or leſs rapidly, and to a greater or leſs extent, according to the quantity of oxygen preſent, and the degree of agitation uſed. Arterial blood was expoſed by Fontana to atmoſpheric air for three minutes, when no perceptible alteration was occaſioned in the purity of the air: they were then agitated together for three minutes: the volume of air was diminiſhed and its purity impaired. When oxygen gas was ſubſtituted for atmoſpheric air, the alteration was ſtill more conſiderable, its purity being diminiſhed when agitation was avoided; and when it was agitated, the diminution in purity and volume was ſtill greater. In all theſe experiments, carbonic acid was alſo produced. (Opuſcules Phyſiques, pp. 334, 335.) They therefore prove, that oxygen can attract carbon from arterial blood. With venous blood, the formation of carbonic acid is, according to Luzariaga, ſtill greater. (Diſſertatio Inauguralis, p. 53, 54.) If, therefore, oxygen can abſtract carbon from the principles of the blood, under ſuch circumſtances, it is evident it muſt do ſo ſtill more rapidly during reſpiration, where the circumſtances are ſo much more favourable, where there is comparatively a high and uniform temperature kept up, where the blood is expoſed on an extenſive ſurface, and in a ſtate of extreme diviſion, and where that ſurface, as well as the air itſelf, are rapidly renewed.

Nor can it be ſuppoſed, that the thin membrane which forms the coats of the veſſels through which the blood circulates can oppoſe an obſtacle to this reciprocal action. Every humid ſubſtance is permeable through its whole ſubſtance to elaſtic fluids, and is penetrated by them. Animal membrane, in a much denſer ſtate than that which forms the coats of the extreme blood-veſſels, is, when humid, pervious to gaſeous fluids; and what is in point in the preſent caſe, through ſuch membranes, when humid, oxygen can act on blood, and communicate to it the florid colour, the ſame as when blood is freely expoſed to it. Thus, Prieſtley found by experiment, that if a quantity of black blood were incloſed in a moiſtened bladder, which was tied very cloſe, on hanging it in a free expoſure to the air, it acquired "a coating of a florid colour, as thick as it would have acquired if it had been expoſed to the open air; ſo that this membrane had been no impediment to the action of the air on the blood." Mr. Hunter mentions a ſimilar experiment: "I covered," ſays he, "the mouths of veſſels filled with venous blood with gold-beaters' ſkin, touching the ſurface of the blood, and the blood conſtantly became of a florid red on the ſurface, and even for ſome depth." (Treatiſe on the Blood, p. 62.) Nor is there any reaſon to believe, as has been contended, that in the living ſolids this property is ſuſpended, for it is one connected merely with mechanical ſtructure, and the influence of humidity. The blood, therefore, may be conſidered, when circulating in veſſels ſo fine, as expoſed to the action of oxygen nearly as if no membrane were interpoſed: a part of that oxygen approximated to it will combine with a portion of its carbon, and the carbonic acid, when formed, will, from its elaſticity, recede and be diſcharged. The whole action is purely chemical, and preciſely the ſame as that which is exerted between air and blood out of the body, favoured only by the circumſtances of expoſure, temperature, and agitation, under which it takes place." P. 502. —510.

After adverting to the arguments, by which it is ſhewn that no gas can paſs through the membranes of the bronchial cells and pulmonary veſſels from without, nor any ſubſtance paſs from within through theſe parts, to unite in the lungs by ordinary chemical affinity, conſequently that the carbonic acid is not formed by the union of carbon and oxygen in the blood; and to the facts, in which carbonic acid is formed in the lower animals and even in man, by the ſkin, where we have no proof of any abſorption of oxygen, or paſſage of it through the animal textures, Mr. Ellis declares his opinion, in which we entirely coincide, that the carbon ſupplied in human reſpiration is truly an animal excretion, performed by the exhalent veſſels, which exiſt in ſuch wonderful numbers in the lungs; conſequently, that it depends primarily, like other excretions, on the due circulation and diſtribution of the blood, and is more or leſs affected by all its variations. The changes in its quantity have been found very conſiderable, according as the individual was at reſt or in motion, faſting or with a full ſtomach, &c. in the experiments already noticed of Lavoiſier and Seguin. We conceive, then, that the carbon, thus exhaled or excreted in the lungs, combines in the air-cells with the oxygen of the atmoſphere to form the carbonic acid expired.

As the emiſſion of carbonic acid in reſpiration is carried on through the whole period of living action, and is eſſential to the continuance of it, ſome ulterior ſource muſt be provided, from whence its ſupply may be duly maintained.

"To the organs of digeſtion, aſſimilation, and ſecretion alone, we are enabled to trace it; but the mode in which it is reduced to that ſtate in which it is afterwards expelled by the ſurfaces of the lungs and ſkin, involves a knowledge of the nature and qualities of our food, of the various and ſucceſſive changes which it is made to undergo in the ſyſtem, and of its diſtribution by the blood to the different organs of ſecretion, according to the ſeveral uſes which it is afterwards deſtined to anſwer: concerning all of which ſubjects, we have of late ſucceeded in getting rid of much error and abſurdity, but have not in any inſtance attained to complete knowledge." Ellis's Inquiry, ch. 5.

V. *On the Reſpiration of the different Gaſes.*—No aëriform fluid, ſays Dr. Boſtock, except the compound of oxygen and azote which exiſts in the atmoſphere, is adapted to the permanent ſupport of life. Of the other gaſes, there are ſome which, on account of their irritating nature, it is abſolutely impoſſible to receive into the trachea; theſe properly conſtitute the nonreſpirable gaſes. There are, however, others which it is poſſible to inſpire, though their employment is followed ſooner or later by the extinction of life. We ſhall detail ſome of the principal experiments that have been performed on this ſubject, as the nature of the change produced

duced upon the blood by common refpiration may be in fome meafure illuftrated, by obferving the effects which follow the ufe of the other gafeous bodies.

Soon after the difcovery of the power which the oxygenous part of the atmofphere poffeffes, of fupporting animal life, feveral trials were made of the effects which would refult from breathing it in an unmixed ftate. The accounts given by thofe who were the fubjects of thefe trials were various; Dr. Prieftley, who firft made the experiment, conceived that he felt an agreeable lightnefs in the cheft (Obf. on Air, v. ii. p. 162.); fome perfons fuppofed that it produced exhilarating effects upon the fyftem, while others imagined that the employment of this gas was followed by uneafinefs and pain about the region of the thorax. Thefe different fenfations muft be attributed, in a great degree, to the effects of imagination; in part, however, they may be afcribed to the gas which was employed in the earlier period of the pneumatic experiments having been often in an impure ftate, mixed with acid, acrid, or metallic particles. A difference in the effects produced by the refpiration of the gas, ought perhaps, in fome degree alfo, to be imputed to the manner in which it was received into the lungs, whether only in fmall quantities, or by deep and laborious infpirations, and whether it was employed in a condenfed or a rarefied ftate.

As Dr. Prieftley was the firft perfon who, himfelf, refpired oxygenous gas, fo he was likewife the firft who obferved the effects which it produced upon animals altogether immerfed in it. His experiments were performed upon mice; they decidedly proved the power which this gas poffeffes of fupporting animal life, but no other certain conclufions can be deduced from them. M. Lavoifier afterwards turned his attention to this fubject, and in the experiments upon guinea pigs, to which we have already referred, he noticed with more accuracy the effects refulting from the refpiration of oxygen. He examined the ftate of the internal organs of animals which had been for fome time confined in this gas, and he conceived that a degree of rednefs and turgefcence of the veffels was produced, and other effects which indicated that the fanguiferous fyftem had been in a ftate of increafed action. (Soc. Roy. de Médécine, 1782, 1783, p. 576.) There is, however, reafon to infer, that in this cafe, either the gas employed was in an impure ftate, or that there were fome circumftances attending the fituation of the animals, or the manner in which the experiment was conducted, which affected the refults, for the fame philofopher, in the fubfequent memoir of 1789, where there appears to have been the greateft attention to accuracy, and where the moft perfect apparatus was employed, forms entirely oppofite conclufions. In this paper, we are informed, that he confined guinea pigs in pure oxygen, and in mixtures of oxygen and azote, in different proportions, until the former conftituted only one-fifteenth part of the compound. In all thefe cafes, he found that the fame quantity of oxygen was confumed, a circumftance, he obferves, in which refpiration differs remarkably from combuftion, though, in many refpects, thefe operations are fimilar to each other. The effects produced upon the animals were precifely the fame, whether they were confined in pure oxygen, or in any of the mixtures of it, except that when the proportion of azote was very large, they exhibited marks of drowfinefs. The author expreffly informs us, that neither the temperature nor the circulation were in any refpects affected by the infpiration of pure oxygen for the fpace of feveral days. (Acad. des Sciences, 1789, p. 573.) Thefe experiments muft be confidered as very valuable; there is no reafon to doubt their accuracy, and they may be relied on with more confidence, as the author feems to have had no peculiar theory in view when he performed them; indeed the refults are different from what we might previoufly have expected, and are unfavourable to the analogy which Lavoifier had always endeavoured to eftablifh between refpiration and combuftion.

We have an account by Dr. Higgins of the refpiration of pure oxygen by the human fubject; in one experiment, thirty-eight pints of this gas were refpired without interruption. No inconvenience was experienced, a fenfe of warmth was, however, produced in the cheft, and the pulfe was confiderably quickened, (Minutes of a Society, &c. p. 144—6.) Dr. Higgins, in a fecond experiment, breathed a quantity of oxygen under an additional preffure, and by very full infpirations. He conceived that by thefe means its confumption was much promoted (ibid. 152.); but more numerous and accurate experiments will be required before this inference can be fairly eftablifhed. Effay on Refpiration, p. 139—144.

In the year 1794, Dr. Beddoes publifhed his experiments upon this fubject. (On Factitious Air, pt. i. p. 13.) They were performed upon rabbits, and the attention was principally directed to an examination of the ftate of the internal organs of the animal, after it had been fubjected for fome time to the influence of pure oxygen. In detailing the refults, we fee fuch obvious marks of the influence of the author's pre-conceived notions, that our confidence in them is much diminifhed; and this unfavourable impreffion is ftrengthened by finding that they do not coincide with the reports of other very accurate obfervers. See Boftock on Refpiration, p. 144, et feq.

Mr. Davy has alfo recorded fome trials, which he made with oxygen gas; the refults of which, fo far as they regard the chemical changes of the air itfelf, we have noticed in a previous part of this article. Refearches, p. 444.

Meffrs. Allen and Pepys made fome experiments on the refpiration of oxygen. The pulfe was raifed about 15 beats in a minute, a gentle glow and perfpiration were produced over the whole body, and nothing elfe remarkable occurred. The refpiration of the gas was continued about ten minutes in thefe trials; and the effects foon fubfided. We have detailed the refults of their obfervations concerning the changes of the air, in that divifion of this article in which the quantity of carbonic acid, produced by breathing, is mentioned.

It thus appears that we have no direct proof that the refpiration of oxygen, for a fhort period, is injurious to the animal economy. Whether a much longer ufe of the gas would be hurtful, and what peculiar morbid action or condition of parts would be induced, we have no means of determining.

Among the remaining refpirable gafes, that which appears to be the leaft injurious to the living body is the oxyd of azote. This aëriform fluid was firft difcovered by Dr. Prieftley, and was by him fuppofed to be "in the higheft degree noxious to animals." (Obf. on Air, v. ii. p. 55.) The fociety of Dutch chemifts, who afterwards examined its properties with more accuracy, coincided with Dr. Prieftley, as to its effects upon animal life. (Journal de Phyfique, t. xliii. p. 329.) The experiment was, however, repeated by Mr. Davy, and he difcovered not only that this gas may be refpired for a fhort time without inconvenience, (four or five minutes,) but that the employment of it is fucceeded by a fingular excitement of the nervous fyftem, which differs from that produced by alcohol and

opium, in not producing a ſubſequent ſtate of exhauſtion. The deſcription of its effects in the "Reſearches" is very intereſting. Mr. Davy infers from his experiments, that this gas is abſorbed in large quantities by the venous blood. This blood, when expoſed to the gas out of the body, becomes of a brighter purple, and carbonic acid is formed. We have no doubt, therefore, that carbonic acid is formed when this gas is reſpired; the gas being decompoſed, ſo that the carbon of the venous blood can unite with its oxygen. We have already ſpoken at length againſt the notion of any air being abſorbed by the blood in breathing; and we may refer to Mr. Ellis's Inquiry, chap. iv., for ſatisfactory arguments againſt the ſuppoſed abſorption of this gas in particular.

Hydrogenous gas has been frequently reſpired, and it is now pretty generally agreed, that it is altogether paſſive when received into the lungs, and that death ſucceeds the employment of it in conſequence of the excluſion of oxygen, in the ſame manner as by ſuffocation, or drowning. M. Lavoiſier diſtinctly aſcertained this fact, in his experiments related in the memoir of 1789, and it has been ſince confirmed by Mr. Davy. (Reſearches, p. 466.) It muſt be remarked, however, that a contrary opinion reſpecting the effects produced by the reſpiration of hydrogen has been maintained by ſome eminent chemiſts, even by Dr. Prieſtley himſelf (Obſ. on Air, v. i. p. 229.); but his experiments were made in the earlier period of the pneumatic chemiſtry, when the gaſes were frequently employed in an impure ſtate, and the experiments of Mr. Davy clearly demonſtrate that hydrogenous gas produces different effects upon the ſyſtem, according to the ſubſtances from which it is procured.

The experiments that have been made upon the ſubject of azotic gas are few and imperfect; it has been generally ſuppoſed, that it exerciſes no noxious effects upon the blood, but, like hydrogen, deſtroys life ſimply by preventing the acceſs of oxygen. Dr. Higgins indeed remarks, that an animal dies ſooner when immerſed in this gas, than from the ſimple interruption to reſpiration (Minutes of a Society, p. 133.); but we are not informed upon what data this opinion is founded. Mr. Davy likewiſe experienced the ſenſe of ſuffocation more ſpeedily from the uſe of azote, than from that of hydrogen, but it appears that the gas employed in the experiment contained a quantity of carbonic acid, to which we may, with great probability, aſcribe its noxious effects; and the ſame philoſopher, when ſpeaking in general terms of the action of azote in reſpiration, ſeems to conſider it as merely excluding oxygen. This opinion is adopted by Dr. Thomſon, and was uniformly maintained by M. Lavoiſier. It would certainly appear reaſonable to conclude à priori, that a ſubſtance which enters ſo largely into the compoſition of the atmoſphere, and which conſequently compoſes ſo great a proportion of the contents of the lungs, could not exerciſe any noxious effects upon the animal ſyſtem.

The only remaining gaſes which can be received into the lungs are the carbonated hydrogen or hydro-carbon, ſulphurated hydrogen, and carbonic oxyd. They occaſion death immediately, but produce ſome change in the blood. If hydro-carbon be inſpired in an undiluted ſtate, it is followed by inſtant death; and when employed in ſmall quantity only, mixed with atmoſpheric air or with oxygen, if it be uſed for any length of time, it induces vertigo, dimneſs of ſight, convulſions, loſs of ſenſation, and, in ſhort, every ſymptom of approaching diſſolution. It evidently acts more rapidly and powerfully than thoſe gaſes which merely exclude oxygen from the blood, and muſt conſequently be conſidered as exerciſing a poſitively noxious influence upon the animal economy. For an account of the reſpiration of ſulphuretted hydrogen, ſee the Journal de Phyſique, vol. lvi. p. 35.

All the remaining gaſes are found to be ſtrictly non-reſpirable, *i. e.* incapable of being admitted into the trachea. It is obvious that this muſt be the caſe with the irritating acid or alkaline gaſes, and with the nitrous gas, which, during its paſſage into the lungs, muſt unavoidably be brought into contact with oxygen, and thus produce nitrous acid vapour. The only ſubſtance, reſpecting the reſpirability of which there could be any doubt, is the carbonic acid gas, which, though poſſeſſed of the decided characteriſtics of an acid, exhibits them in a much ſlighter degree than that in which they generally exiſt. The impoſſibility of taking it into the lungs, even by the moſt powerful voluntary efforts, when it compoſes a large proportion of the air, was, however, proved by the experiments of M. Pilatre de Rozier, executed with that intrepidity which formed ſo remarkable a trait in the character of this philoſopher. Boſtock's Eſſay, p. 149—153.

He went into a brewer's tub, while full of carbonic acid gas, evolved by fermentation. A gentle heat manifeſted itſelf in all parts of his body, and occaſioned a ſenſible perſpiration. A ſlight itching ſenſation conſtrained him frequently to ſhut his eyes. When he attempted to breathe, a violent feeling of ſuffocation prevented him. He ſought for the ſteps to get out; but not finding them readily, the neceſſity of breathing increaſed, he became giddy, and felt a tingling ſenſation in his ears. As ſoon as his mouth reached the air, he breathed freely, but for ſome time he could not diſtinguiſh objects: his face was purple, his limbs weak, and he underſtood with difficulty what was ſaid to him. But theſe ſymptoms ſoon left him. He repeated the experiment often, and always found, that as long as he continued without breathing, he could ſpeak and move about without inconvenience; but whenever he attempted to breathe, the feeling of ſuffocation came on. Journal de Phyſique, vol. xxviii.

Blumenbach made an experiment on three dogs of nearly the ſame ſize, to ſhew in a comparative view how long three different aërial fluids could ſupport life. He prepared a bladder with a pipe attached to it, and holding about 20 cubic inches. This, filled with oxygen, was tied in the trachea, and the animal died in 14 minutes. The ſecond animal periſhed in ſix minutes, when the ſame bladder, filled with atmoſpheric air, was placed in the ſame way in the trachea. The bladder containing the air, at the end of the laſt experiment, was put into the trachea of the third animal, which died in four minutes. Inſtit. Phyſiolog. 1798, p. 114, note *q*; or more at length in his Mediciniſche Bibliothek, vol. i. p. 174, et ſeq.

VI. *Effects produced on the Air by the Reſpiration of Animals.*—The reſults of obſervation warrant us in aſſerting that no living being can ſubſiſt long without a ſupply of freſh air. That inſects die, when their ſtigmata are covered with oil or honey, has been long known. "Oleo illito inſecta omnia exanimantur," ſays Pliny. Mr. Derham found that waſps, bees, hornets, and graſshoppers, ſeemed dead in two minutes, when placed under the exhauſted receiver; but revived in two or three hours, on being reſtored to the air, even although they had remained in vacuo 24 hours. (Phyſico-Theology, p. 8, 7th edit.) Snails ſurvived ſeveral hours in the exhauſted receiver, newts two or three days, and leeches five or ſix. (Hutton's Math. Dict. art. *Air-pump.*) Zoophytes, according to Davy, require air in the water which they inhabit, and act on it like fiſhes. (Beddoes's Contributions, p. 138.) When ſome pepper-water had remained in vacuo 24 hours, ſome of its animalcules were

were dead, and ſome alive. (Phyſico-Theol. p. 8.) Spallanzani never found any animalcules produced in vegetable infuſions in vacuo. When infuſions, containing animalcules, were placed under the exhauſted receiver, they lived many days, but periſhed ſooner than others of the ſame kind in the open air. (Tracts, p. 1, 2.) Hooke found that the eels of vinegar died in a very ſhort time, when the fluid was put into a phial, and ſtopped cloſe. (Microgr. p. 217.) Scheele incloſed leeches in a phial, with a little air: they lived only two days, although they would have lived as many years, if the water had communicated with the air. Mr. Ray remarked, that fiſhes cannot live in water without air: they will live in a veſſel of water with a narrow mouth for months or years; but if the veſſel be ſtopped, ſo as wholly to exclude the air, or interrupt its communication with the water, they will be ſuddenly ſuffocated. (Wiſdom of God in the Creation, p. 81.) Dr. Prieſtley confined ſeveral ſmall fiſhes in a veſſel, containing three pints of rain water, that had been previouſly well boiled to deprive it of its air, and they lived only between three and four hours. (Obſ. on Air, vol. v. p. 139.) Mr. Davy introduced a large thornback into a jar, containing three cubic inches of water, which had been deprived of its air by diſtillation through mercury: he was very quiet for four minutes and a half, but then began to move about, and, in ſeven minutes, had fallen on his back, but ſtill continued to move his gills. In eleven minutes, he was motionleſs, and when taken out, after thirteen minutes, he did not recover. (Reſearches, p. 367.) Amphibious animals, likewiſe, cannot live without air, but its deprivation is not immediately fatal to them. Frogs and toads bear the pump for two or three hours, and a frog recovered on expoſure to the air, after remaining in vacuo ſeemingly dead for eleven hours. Hence we ſee, that to all theſe animals, whether inhabiting the air or the water, a conſtant renewal of freſh air is required, while the actions of life continue. What then are the changes produced on atmoſpheric air, by theſe ſeveral claſſes of animal beings, whereby it is rendered ſo eſſential to the maintenance of vital action?

For the firſt and moſt accurate knowledge we poſſeſs concerning the changes which the air ſuffers by the reſpiration of inſects, we are indebted to the labours of Scheele, who placed bees and flies in phials with air, and found the oxygen removed, and carbonic acid gas ſubſtituted in its place. (On Air and Fire, p. 148—155.) M. Vauquelin examined the ſubject more accurately. The experiments of this excellent chemiſt were made on the graſshopper (gryllus viridiſſimus), which is deſcribed as having 24 ſtigmata, or breathing pores, ranged parallel with, but exterior to, two white lines, extending longitudinally on the middle of the belly. In this inſect they are of an oval form, but they vary in ſhape in different inſects; and it is chiefly by their mediation, that the changes on the air are effected. A female graſshopper was placed in eight cubic inches of atmoſpheric air: it breathed from 50 to 55 times in a minute, and lived 36 hours. The air had not ſenſibly diminiſhed in volume, but, when examined by the teſt of lime-water, carbonic acid was detected; and after this was removed, the remaining air ſtill extinguiſhed a taper. When many graſshoppers were put at the ſame time into a given bulk of air, and left till they died, the oxygen gas was nearly, but not entirely, conſumed; and phoſphorus melted in the reſidual air, when heat was applied, but burned very little. A male graſshopper lived 18 hours in ſix cubic inches of oxygen gas: its reſpiration was oppreſſive, and it breathed from 60 to 65 times in a minute. The volume of air was not ſenſibly diminiſhed, but it loſt $\frac{5}{100}$ths of its bulk by being waſhed in an alkaline ſolution. (Ann. de Chimie, tom. xii.) From theſe facts we learn, that inſects, by their reſpiration, conſume the oxygenous portion of the air; that carbonic acid is, at the ſame time, produced; and that, when all the oxygen gas has diſappeared, the animal no longer ſurvives.

M. Huber found, that bees very ſpeedily die, when put into nitrogen gas; but that they ſurvive in a cloſe veſſel of atmoſpheric air, until almoſt the laſt atom of its oxygen gas is conſumed. (Mem. ſur la Germination, &c.) We likewiſe confined, ſays Mr. Ellis, a number of flies in a flaſk, containing nine cubic inches of air, and then inverted it into a tall glaſs of mercury. By the third day, the flies were all dead, and the mercury had riſen conſiderably into the neck of the flaſk. The reſidual air loſt about $\frac{18}{100}$ths by agitation with lime-water, and the remainder did not ſuffer the ſmalleſt diminution by being placed in contact for two days with phoſphorus. Theſe reſults, therefore, agree with thoſe obtained by Vauquelin, and prove farther, that, by the reſpiration of flies, the whole of the oxygen gas of the air diſappears, and that a bulk of carbonic acid nearly equal thereto is formed. The ſmall diminution of bulk, alſo, which the air ſuffered, is to be regarded as a neceſſary conſequence attending the converſion of oxygen gas into carbonic acid, and which, as it accounts for the whole loſs the air experienced, ſeems to authorize the concluſion, that while the oxygen gas had, in this caſe, completely diſappeared, the nitrogenous portion of the air continued undiminiſhed, and probably unaltered.

The reſearches of Spallanzani and Reaumur further ſhewed, that the ova of inſects cannot be evolved without air; that the larvæ cannot exiſt without it, nor undergo their change to the pupa ſtate; and that it is equally eſſential to the transformation of the latter into the perfect inſect. Rapports de l'Air avec les êtres Organiſés, tom. i. Memoires pour ſervir à l'Hiſt. des Inſectes, tom. ii.

M. Vauquelin proceeded next to inveſtigate the changes produced on the air by the reſpiration of the vermes claſs of animals. He confined a red ſlug in twelve cubic inches of atmoſpheric air, and it lived 48 hours. The air was not ſenſibly diminiſhed in volume, but it extinguiſhed candles, and copiouſly precipitated lime from water. Phoſphorus was melted in this air, but did not ſuffer any combuſtion or change of colour. A ſnail (helix pomatia) was next put into twelve cubic inches of atmoſpheric air, and lived four days. The oxygen gas entirely diſappeared; for the reſidual nitrogen gas contained not an atom of vital air, and, conſequently, phoſphorus did not burn in it at all: it contained, however, carbonic acid. Slugs and ſnails, therefore, require freſh air while in an active ſtate, the oxygen gas of which, by the function of their reſpiratory organs, is made completely to diſappear, and a quantity of carbonic acid is produced, while the nitrogenous portion of the air remains unaltered: and when theſe changes are effected, living action ſpeedily comes to an end. So exactly do theſe animals ſeparate the oxygenous from the nitrogenous portion of the atmoſphere, that M. Vauquelin ſuggeſts the employment of them for eudiometrical purpoſes. Ann. de Chimie, loc. cit.

The numerous experiments of Spallanzani on worms, ſnails, ſlugs, &c. confirm the ſtatements of Vauquelin in all eſſential points. (Memoirs on Reſpiration. Rapports de l'Air.) He alſo made experiments on muſcles, and ſeveral marine teſtacea: they conſumed the air of water in which they were confined, and the water then attracted more, ſo as to conſume all the oxygen when a ſmall quantity of air was confined in contact with it.

We

We are indebted to Meſſrs. Humboldt and Provençal for ſome experiments on the reſpiration of fiſhes, which poſſeſs great accuracy. Their attention was firſt directed to aſcertain the quantity and compoſition of the air that exiſts naturally in river-water. For this purpoſe, they filled glaſs balloons with given quantities of water, taken from the river Seine, and expelled the air from it by ſubmitting it to ebullition. The air that came over was received in veſſels filled with mercury, or with diſtilled water recently boiled, that no foreign air might mix with that obtained from the water in the balloon. From the reſults of ten experiments, conducted in this manner, they found, that the water of the Seine contained rather leſs than $\frac{1}{30}$th of its volume of air. This air they farther found to be compoſed of about $\frac{21}{100}$ths oxygen, with from 6 to 11 *per cent.* carbonic acid, and the remainder was nitrogen gas. Mem. d'Arcueil, tom. ii.

Having thus determined the quantity and kind of air contained in a given volume of river-water, theſe chemiſts proceeded to aſcertain the changes which it experienced by the reſpiration of fiſhes. With this view, they confined young fiſhes in bell-glaſſes of river-water, inverted over mercury; and ſuffered them to remain till their reſpiration became laborious. The animals were then withdrawn, and the water, in which they had reſpired, was transferred into the balloon, and its air expelled, by ſubmitting it to ebullition, in the manner before ſtated. Seven tenches were, in this manner, confined in 4000 cubic centimeters, equal to 250.5 cubic inches of river-water, where they remained eight hours and a half. A portion of this water, equal to 2582 cubic centimeters, or 161.5 cubic inches, was then transferred from the glaſs-bell into the balloon, and its air expelled by heat. The air, thus obtained, meaſured 453 parts, at temperature 50° Fahrenheit. Theſe 453 parts were then waſhed in lime-water, by which they were reduced to 300, ſo that 153 parts of carbonic acid were thus removed. The reſidue was afterwards analyſed by combuſtion with hydrogen, and by mixture with nitrous gas; and the means of three analyſes afforded 0.035 of oxygen; wherefore it is concluded, that the 453 parts of air, obtained from water which had been in contact with the reſpiratory organs of fiſhes, conſiſted of 10.5 oxygen, 289.5 nitrogen, and 153.0 carbonic acid gas. But by former experiments, it was found, that an equal volume of pure river-water afforded 524 parts of air, conſiſting of 155.9 oxygen, 347.1 nitrogen, and 21.0 carbonic acid; conſequently, ſay theſe chemiſts, theſe ſeven tenches have *abſorbed*, in eight hours, 145.4 of oxygen, and 57.6 of nitrogen gas; and they have produced in the ſame time 132 parts of carbonic acid. (Mem. d'Arcueil, t. ii. p. 376.) Mr. Ellis has pointed out ſome ſources of fallacy, from which theſe apparent reſults may have ariſen, and it is probable from analyſis, that in fiſhes, as in other animals, the change produced by reſpiration is the converſion of oxygen into an equivalent portion of carbonic acid.

The changes which the air undergoes from the reſpiration of Reptiles are detailed in that article. Its alterations in the breathing of mammalia and birds are the ſame as in man.

"The preceding facts," ſays Mr. Ellis, "ſufficiently ſhew, that various animals, in all the foregoing claſſes, and in every ſtage and form of their exiſtence, require the preſence of oxygen gas to maintain the functions of life; that this gas, by the exerciſe of theſe functions, is converted into carbonic acid: and that the degree in which this converſion proceeds, depends much on the healthy condition of the animal, and the vigour of its circulating ſyſtem. Since, alſo, in every inſtance where the experiments have been made with the requiſite accuracy, the bulk of carbonic acid produced, nearly or exactly equalled that of the oxygen which diſappeared, we may conclude, from analogy, that ſuch is univerſally the extent to which this change in the air takes place in animal reſpiration; and ſince, farther, the nitrogen gas of the air appears to ſuffer no neceſſary change in the exerciſe of this function, we may alſo conclude, that, as far as regards the air, the ſubſtitution of an equal bulk of carbonic acid for the oxygen gas that is loſt, compriſes the only eſſential change which the atmoſphere experiences during the performance of this animal proceſs. We have before maintained that the oxygen of the air does not enter the animal ſyſtem, either by the living function of abſorption, or by the operation of chemical affinity; and have conſequently concluded, that the union of this ſubſtance with the animal carbon takes place exterior to the veſſels of the living animal." Further Inquiry, p. 271.

Animal Heat.—Taking the ſpecific caloric of water at 1.0000, Dr. Crawford found that of arterial blood to be 1.0300, and that of venous blood 0.8928; that of oxygen gas compared to water, as 4.7490 to 1.0000; of nitrogen, 0.7936; atmoſpheric air, 1.7900; and of carbonic acid gas, 1.6454. The power of oxygen gas to ſupply heat, ſays Mr. Berthollet, is well known, and there is no ſubſtance which ſuffers ſo much of it to eſcape in the changes of its conſtitution.

In the reſpiration of animals, as well as in the germination of ſeeds, and the vegetation of plants, the oxygen gas of the atmoſphere is converted into carbonic acid. Since the ſpecific caloric of the latter is little more than one-third of that which the oxygen gas itſelf previouſly contained, it neceſſarily follows, that a large quantity of caloric is liberated, whenever this converſion of gaſes takes place. Now, in the living proceſſes juſt alluded to, the preſence of caloric is very obvious: we refer for proofs on theſe ſubjects, to the articles Heat, *Animal*, Mammalia, Birds, Fishes, Insects, Reptiles, and Vermes, in which the facts connected with their vital temperature are detailed; alſo to the two "Inquiries" of Mr. Ellis.

Since, then, all animals poſſeſs a temperature exceeding that of the medium which they inhabit, and ſince this, in man and the ſuperior animals, varies but little under every viciſſitude of heat and cold, conſiſtent with the due performance of the animal functions, there muſt exiſt in all caſes appropriate means of ſuſtaining this function. But no living powers of the animal ſyſtem are ſufficient for this purpoſe, independent of the concurring aid of external agents. No ſuppoſed attrition between the contiguous ſoft parts of the animal; no friction between the veſſels and globules of the blood; no action of the ſolid parts upon one another; no circumſtances ariſing out of digeſtion or fermentation in the living body; no imagined combuſtion of phoſphorus in the blood; no liberation of the phlogiſtic or any other principle, through the ſyſtem, can be received as ſufficient to account for the uniform height and ſteadineſs of this temperature. As, therefore, the animal ſyſtem, by virtue of its own powers, is unable, within itſelf, to produce this high degree of heat, to what external agent ſhall we have recourſe, and to what organs ſhall we refer the production of that more or leſs elevated temperature which is obſervable in all animals.

Inſects, worms, and fiſhes, which have no reſpiratory ſtructure ſimilar to that of the lungs; and reptiles, the ſurface of whoſe lungs, in proportion to that of the body, is comparatively ſmall, and whoſe blood, at each circulation, is but partially expoſed to the influence of the air, poſſeſs a

degree of heat but little above that of the medium in which they live; while the mammalia have a temperature considerably higher; and birds, whose lungs bear the largest proportion to their bodies, are the warmest of all animals. The observation of these facts led naturally to the opinion, that the temperature of animals was immediately connected with the functions of the respiratory organs; and an abundance of facts, collected and arranged by Mr. Ellis, prove that the small excess of temperature, which not only the inferior animals, but which vegetables also possess, is actually derived from the decomposition of the air by these several classes of beings, so long as living action continues. "No explanation, however," says Mr. Ellis, "of the mode in which the air contributes to sustain animal heat, was attempted, till after the great discovery of latent heat by Dr. Black. That excellent philosopher having already proved that the change effected in the air by respiration, consisted in the formation of carbonic acid, similar to what happens in many examples of combustion, ascribed the production of animal heat to the decomposition of the air in the lungs, by which its latent heat was rendered sensible, in the same manner as it is given out in combustion. The blood, in its passage through the lungs, had, he conceived, its temperature by this means raised; and thus was rendered capable of communicating heat to all parts of the body, in the course of its circulation through the system. To this it was objected by Dr. Cullen, that, if true, the temperature of the body ought to be greatest in the lungs, and to diminish gradually, as the distance from the lungs increases, which is not according to fact. This difficulty was removed by the ingenuity of Dr. Crawford, who, by a happy extension of Dr. Black's doctrine, maintained, that the heat, liberated by the decomposition of the air in the lungs, passed into the blood, and existed in that fluid in the form of latent, or, what is now termed, specific heat, in consequence of which its temperature was not raised; and that this heat, by other chemical changes, was given out by the blood in a sensible form during its circulation.

"In what manner, then, does the air, breathed by the superior animals, give out its heat, to support that high degree of temperature above the surrounding medium, which they all possess? We have seen reason to conclude, that the inspired air is decomposed in the bronchial cells of the lungs, and that all its oxygenous portion which disappears, is converted into carbonic acid, by carbon emitted from the exhalent surface of those organs. During this gradual conversion of the oxygen gas, a quantity of specific caloric, much greater than what is necessary to maintain the elasticity of the carbonic acid that is formed, is necessarily set free; and to this excess of heat, thus constantly liberated in the lungs, by the decomposition of the air, do we look as the source of that superiority of temperature, above the surrounding medium, which man and other animals, under every vicissitude of climate, are enabled to exhibit and maintain.

"But if a quantity of caloric be thus constantly disengaged in the lungs, it may be expected that the blood, in its transmission through those organs, should acquire a certain portion of it. To ascertain this point, Dr. Crawford, pursuing the discoveries of Drs. Black and Irvine, mixed together certain quantities of water, at the temperature of 53°, with separate portions of arterial and venal blood; and then measuring the heat of the mixture, at different successive periods, till coagulation took place, he found that the water containing arterial blood preserved a superiority of temperature over that mixed with venal blood; and, from the results of several trials, he concluded, that the specific heat of the arterial blood of a dog, was to that of the venal, as 114 to 100, and that of a sheep as 115 to 100, or as $11\frac{1}{2}$ to 10. (On Animal Heat, p. 279.) These results derive confirmation from the experiments of Mr. Coleman, who, in order to discover the relative specific heat of arterial and venal blood, while yet retained in the system, strangled a cat, and immediately opened its chest, while the blood in the left ventricle was still florid. He then introduced a thermometer, through an opening in the pericardium on each side of the heart, and it stood at 98°: in the left ventricle the temperature was only 97°, and in the right ventricle it was nearly 99°. In fifteen minutes, however, instead of the right ventricle possessing two degrees of heat more than the left, it was found to have four degrees less. Mr. Astley Cooper repeated this experiment in different ways, and found invariably, that although the venal blood was superior in temperature at first, yet before coagulation was complete, the arterial became from three to six degrees warmer. (On Suspended Respiration, p. 42, et seq.) These facts afford clear and decisive proof, that the specific heat of the arterial blood exceeds that of the venal, and demonstrate, likewise, that this excess is obtained during the passage of that fluid through the lungs.

"Admitting the lungs, then, to be the organs in which, by a decomposition of the air, the blood, as it passes through them, obtains its heat, it is next required to shew the sufficiency of this decomposition, to supply heat enough for the maintenance of that superiority of temperature, which the warmer blooded animals possess." (Inquiry, p. 234—236.) For an account of the mode in which this was explained by Dr. Crawford, see HEAT, *Animal*.

Although this explanation of the production of animal heat appears simple and satisfactory, and has been held adequate to account for the phenomena by such philosophers as Black, Crawford, Lavoisier, and La Place, the evidence on which it rests is not so clear as to have commanded universal assent, or entirely set aside objections. It has, indeed, been generally allowed, that respiration, and the changes it produces in the air and animal fluids, are essential conditions of the evolution of the caloric in animals; but it has been thought, that there are other circumstances, hitherto perhaps not well understood, which influence the phenomena.

In external appearance the blood is the same in all the vessels of the fœtus; is this any proof that its temperature is owing to the conversion of oxygen gas into carbonic acid?

Is the uniformity of temperature in the higher animals, under varying states of respiration and circulation, and the consumption of various quantities of oxygen, whether in the same or different individuals, consistent with the theory? and can local variations of temperature be explained from it?

Some recent investigations of Mr. Brodie are particularly calculated to increase our doubts on the subject. Having pithed or decapitated animals, he kept up artificial respiration, and thus maintained their circulation. The blood continued to be changed in the lungs from venous to arterial, and from arterial to venous, in the general circulation.

The respective colours of the two kinds of blood could not be distinguished from those which they exhibit in living and healthy animals. Yet the temperature of an animal thus heated, sunk faster than that of another simply killed and left to itself. The following table exhibits the results of such a comparative experiment.

Time.	Rabbit with artificial Respiration.		Dead Rabbit.	
	Thermometer in the Rectum.	Thermometer in the Pericardium.	Thermometer in the Rectum.	Thermometer in the Pericardium.
Before the experiment	100½		100½	
30 minutes -	97		99	
45 - -	95½		98	
60 - -	94		96½	
75 - -	92		95	
90 - -	91		94	
100 - -	90½	87½	93	90½

The animal, in whom artificial breathing was kept up, instead of having its heat maintained by the conversion of arterial into venous blood, and *vice versâ*, was thus actually cooled by the air conveyed into its chest.

Having thus ascertained, that the ordinary changes are effected in the blood by its circulation and artificial respiration in a decapitated animal, Mr. Brodie proceeded to shew, that the oxygen of the air undergoes its usual conversion into carbonic acid. He found, that a living rabbit formed 50—56 cubic inches of carbonic acid in an hour; a decapitated animal, in whom artificial respiration was kept up, emitted 40—48 cubic inches in the same time. The thermometer in the rectum of the latter had fallen from 97 to 90, while in another rabbit left to itself, but similarly treated in all other respects, it had fallen only to 91. In a rabbit poisoned with woorara, or the essential oil of bitter almonds, not decapitated, and in which artificial breathing was kept up, 51 cubic inches of carbonic acid were emitted in an hour. The thermometer in the rectum had sunk to 91 in 30 minutes; while it stood in another animal treated exactly the same, excepting the artificial breathing, at 92.

These experiments seem fully to warrant Mr. Brodie's conclusion, "that in an animal in which the brain has ceased to exercise its functions, although respiration continues to be performed, and the circulation of the blood is kept up to the natural standard, although the usual changes in the sensible qualities of the blood take place in the two capillary systems, and the same quantity of carbonic acid is formed as under ordinary circumstances; no heat is generated, and (in consequence of the cold air thrown into the lungs) the animal cools more rapidly, than one which is actually dead."

See the Croonian Lecture on some physiological researches, respecting the influence of the brain on the action of the heart, and on the generation of animal heat; Phil. Trans. 1811, p. 36.

And further experiments and observations on the influence of the brain in the generation of animal heat, Phil. Trans. 1812, p. 378.

On the subject of this article, the most valuable works, both for the collection of facts from various sources, for original views and researches, acuteness of investigation, and close reasoning, are those of Mr. Ellis; entitled, "An Inquiry into the Changes induced on atmospheric Air by the Germination of Seeds, the Vegetation of Plants, and the Respiration of Animals," 1807. And, "Further Inquiries, &c." 1811. Dr. Bostock's "Essay on Respiration," 1804, is a very valuable collection of the facts known on this subject up to that time. The preceding article is derived in greatest part from these works. We may refer also to Thomson's System of Chemistry, book 5. ch. 3. § 2; and Murray's System of Chemistry, book 9. ch. 2. § 1. To the valuable memoirs of Messrs. Allen and Pepys, "On the Changes produced in atmospheric Air and Oxygen Gas by Respiration," Phil. Trans. 1808; and "On Respiration," ibid. 1809. To those of Lavoisier in the Memoires de l'Academie des Sciences, 1777 and 1780; and in the Société Royale de Médécine, 1782—3. Of Lavoisier and Seguin in the Mem. de l'Acad. 1789, 1790. See also Crawford, on Animal Heat; Goodwyn, on the Connection of Life with Respiration; Menzies, on Respiration; Coleman, on Suspended Respiration; Davy's Researches; Spallanzani's Memoirs on Respiration, and his Rapports de l'Air avec les êtres Organisés, t. 3. 8vo. Geneva. Priestley on Air. Seguin in Annales de Chimie, t. 5. and 21.

RESPITE, Respectus, in *Law*, &c. a delay, forbearance, or prolongation of time, granted any one for the payment of a debt or the like.

Menage derives the word *respite* from the Latin *respectus*; as *despite* from *despectus*. Du-Cange will rather have it come from *respirare, to breathe*; respite being, in effect, a breathing-while, granted a debtor, &c.

In the customary of Normandy, respite is a judicial delay or demur, given to procedures.

Respite, *Letters of*, or Credit. See Letters.

Respite *of Homage*, is a forbearance of the homage due from the vassal, or tenant, holding by homage, or by knight-service, to his lord.

Anciently, those who held by these tenures paid a small sum every fifth year into the exchequer, to be respited doing their homage or service.

By stat. 12 Car. II. this respite of homage is taken away, as a charge arising from knight-service; which is thereby likewise annulled.

Respite *of Execution*. See Reprieve.

Respite *of Jury*. See Jury.

RESPITED *on the Muster-Roll, To be*, in *Military Language*, is to be suspended from pay, &c.; during which period all advantages of promotion, pay, &c. are stopped. The money which is respited upon the muster-roll is accounted for by the muster-master general, and placed to the credit of the public by the paymaster general.

RESPOND, in *Ecclesiastical History*, was a short anthem sung after reading three or four verses of a chapter: after which they proceeded with the chapter. Gibson 263.

RESPONDEAS Ouster, in *Law*, is to answer over in an action to the merits of the case: or put in a more substantial plea.

RESPONDEAT Superior, a law phrase. Where the sheriffs are removable, as in London, for insufficiency; *respondeat superior*, that is, the mayor and commonalty are to answer for them.

If a coroner of a county is insufficient, the county as his superior shall answer for him. (Wood's Inst. 83.) If a

gaoler conſtitutes another under him, and he permits an eſcape, if he be not ſufficient, *reſpondeat ſuperior;* and ſuperior officers muſt anſwer for their deputies in civil actions, if they are inſufficient to anſwer damages.

For the inſufficiency of a bailiff of a franchiſe *reſpondeat ſuperior*, that is, the lord of the franchiſe is to anſwer.

RESPONDENT, Respondens, in the ſchools, a perſon who maintains a theſis in any art or ſcience.

He is thus called, as being to anſwer all objections propoſed by the opponent, or impugner, &c.

The reſpondent's buſineſs is to ſee whether the oppoſition made by the contrary party be juſt and legitimate; or whether ſome of the laws and conditions of oppoſition be not broken; which is called *ignoratio elenchi*. He is alſo to examine the moods and figures of the ſyllogiſms, to ſee whether the premiſes be juſt, &c. and through the whole to anſwer rather by diſtinguo's, than by direct negation.

Respondent, formed from the Latin *reſpondere, to anſwer*, q. d. *pro alio ſpondere, to promiſe for another*, in *Law*, a perſon who undertakes to anſwer for another; or binds himſelf as ſecurity for the good behaviour of another.

The reſpondent is to anſwer for the damages done by the perſon for whom he reſponds. There are four ordonnances of the kings of France, by which the citizens are expreſsly forbid to take ſervants without reſpondents, bound in writing.

RESPONDENTIA, in *Commerce*, a term applied to money which is borrowed, not upon the veſſel, as in bottomry, but upon the goods and merchandize contained in it, which muſt neceſſarily be ſold or exchanged, in the courſe of a voyage; in which caſe the borrower, perſonally, is bound to anſwer the contract; and he is ſaid to take up money at reſpondentia.

It is enacted, by ſtat. 19 Geo. II. cap. 37, that all monies lent on bottomry, or reſpondentia, on veſſels bound to or from the Eaſt Indies, ſhall be expreſsly lent only upon the ſhip, or upon the merchandize; that the lender ſhall have the benefit of ſalvage; and that, if the borrower has not on board effects to the value of the ſum borrowed, he ſhall be reſponſible to the lender for ſo much of the principal as hath not been laid out, with legal intereſt and all other charges, though the ſhip and merchandize be totally loſt.

Although reſpondentia and bottomry are of themſelves a ſpecies of inſurance, yet the lender has an inſurable intereſt in his ſecurities, and therefore may protect himſelf from the ſea-riſk by inſuring them. The lender can inſure only the amount of the ſum lent, and the borrower has an inſurable intereſt in the ſhip or goods to the amount of the ſurplus value above the ſum lent. If either were to inſure more, it would be a gaming inſurance, and void by the ſtatute 19 Geo. II. c. 37, for all above the real intereſt. But the uſage of trade may take a caſe out of this rule. Upon an inſurance on goods, ſpecie and effects in the India trade, the inſured may recover for money laid out for the uſe of the ſhip, and for which he charged reſpondentia intereſt, it being the uſage of trade to inſure in this form. A policy on bottomry or reſpondentia cannot be ſubſcribed by the borrower of the money, becauſe it is only in conſideration of the ſea-riſk, from which he is exempt, that he agrees to pay the marine intereſt. If he were to become an inſurer, this would be no longer a loan upon bottomry, but a cloak for uſury. Reſpondentia and bottomry ſecurities, though they are the ſubject of inſurance, muſt be particularly and ſpecifically deſcribed in the policy; for under the general denomination of goods, theſe ſecurities cannot be inſured. By 19 Geo. II. c. 32. if an under-writer become bankrupt before a loſs happen, the inſured may claim; and after a loſs, prove his debt under the commiſſion, and receive his dividend, as if the loſs had happened before the bankruptcy. See Bottomry.

RESPONSA Prudentum. See Civil and Response.

RESPONSALIS, in *Law*, he who appears for another in court at a day aſſigned.

Fleta makes this difference between *reſponſalis atturnatus*, and *eſſoniator*, that the *eſſoniator* came only to allege the cauſe of the party's abſence, be he demandant or tenant; whereas *reſponſalis* came for the tenant not only to excuſe his abſence, but to ſignify what trial he means to undergo, the combat, or the country.

RESPONSARY Song, an anthem in which the choriſters ſing by turns.

RESPONSE, Responsal, *Reſponſatio*, an anſwer, reply, or repartee.

The word is chiefly uſed in ſpeaking of the anſwers made to the prieſt, by the people, in the litany, the pſalms, and other parts of the office.

It has its uſe, too, in ſpeaking of the opinions or anſwers of the ancient juriſconſulti, when conſulted on points of law.

The fifty books of the Digeſt are compoſed of *reſponſa prudentum*, the reſponſes of Papinian, Ulpian, Scævola, &c. collected by Juſtinian; who afterwards gave them the force of laws. See Civil *Law*.

The reſponſes of the emperors were more properly called *reſcripts;* which ſee.

RESPONSIONS, Responsiones, a term uſed in the *Military Orders*, for certain penſions or charges, which the knights, or the commandries they held, paid to the order.

Such a knight templar paid a reſponſion of fifty pounds *per annum* to his order, on account of ſuch a commandry.

In Rot. Parl. 9 Ric. II. the word is written *reſponcies*.

RESPONSORIA, reſponſes ſung in chorus by the choir, in anſwer to the prieſt in the cathedral ſervice.

RESSAVA, in *Geography*, a town of European Turkey, in Servia; 46 miles S.E. of Belgrade.

RESSAULT, in *Architecture*, the effect of a body which either projects, or falls back, *i. e.* ſtands either more out or in than another; ſo as to be out of the line, or range, with it.

The term *reſſault* is French, and but little uſed in Engliſh; though the want of a word of equal import pleads for its naturalization.

RESSEL, or Roessel, in *Geography*, a town of Pruſſia, in the province of Ermeland, with a caſtle; 50 miles S. of Königſberg.

RESSELA, a term uſed by Paracelſus to ſignify, as himſelf explains it, any thing that expels heat, in oppoſition to *aſſa*, which with him ſignifies any thing that promotes it.

RESSONS, in *Geography*, a town of France, in the department of the Oiſe, and chief place of a canton, in the diſtrict of Compiègne; 10 miles W.S.W. of Noyons. The place contains 1039, and the canton 9637 inhabitants, on a territory of 170 kiliometres, in 23 communes.

RESSORT, or Resort, a term purely French, yet frequently uſed, by our late writers, to ſignify the juriſdiction or authority of a court.

The word, in its popular meaning, ſignifies *ſpring*, or the force of elaſticity. Hence it is alſo uſed for a juriſdiction, and the extent or diſtrict thereof; as when we ſay, ſuch a thing belongs to his reſſort; a judge out of his reſſort has no authority. But its chief uſe among us is in ſpeaking of a court or tribunal, where appeals are judged; or of a court or perſon who judges finally and ultimately, and whence there is no appeal.

The houſe of lords judge in the laſt reſſort, *en dernier reſſort*. Preſidials judge in the laſt reſſort of all criminals proſecuted by the provoſts of the marſhals. See DERNIER *reſſort*.

RESSORT, or *Reſort*, is alſo uſed in a writ of ayel, or couſenage, in the ſame ſenſe as *deſcent*, in a writ of right.

RESSOURCE, or RESOURCE, a term purely French, yet uſed by Engliſh writers to denote a means or foundation of a man's recovering himſelf from his fall or ruin; or an after-game for the repairing of his damages.

Skinner derives the word from the French *reſoudre*, *to reſolve*. A reſource ſtrictly and literally expreſſes a means which preſents itſelf afreſh.

This merchant has credit and friends ſtill left; he has great reſources.

REST, QUIES, in *Phyſics*, the continuance of a body in the ſame place; or its continual application or contiguity to the ſame parts of the ambient and contiguous bodies. See SPACE.

Reſt is either *abſolute* or *relative*, as place is. See PLACE.

Some define reſt the ſtate of a thing without motion; and hence again reſt becomes either abſolute or relative, as motion is. See MOTION.

Sir Iſaac Newton defines true or *abſolute* reſt to be the continuance of a body in the ſame part of abſolute and immoveable ſpace; and *relative* reſt to be the continuance of a body in the ſame part of relative ſpace.

Thus, in a ſhip under ſail, relative reſt is the continuance of a body in the ſame region of the ſhip, or the ſame part of its cavity. True or abſolute reſt is its continuance in the ſame part of univerſal ſpace, in which the ſhip, with its cavity and contents, are all contained.

Hence, if the earth be really and abſolutely at reſt, the body relatively at reſt in the ſhip will really and abſolutely move, and that with the velocity with which the veſſel moves. But if the earth do likewiſe move, there will then ariſe a real and abſolute motion of the body at reſt; partly from the real motion of the earth in abſolute ſpace, and partly from the relative motion of the ſhip on the ſea. Laſtly, if the body be likewiſe relatively moved in the ſhip, its real motion will ariſe partly from the real motion of the earth in immoveable ſpace, and partly from the relative motion of the ſhip on the ſea, and of the body in the ſhip.

Thus, if that part of the earth, where the ſhip is, move eaſtward with a velocity of 10,010 parts, and the veſſel be carried by the wind weſtward ten parts, and, at the ſame time, a ſeaman aboard walk with the velocity of one part, the ſeaman will be moved really and abſolutely in immoveable ſpace eaſtward, with 10,001 parts of velocity; and relatively on the earth, with nine parts of velocity weſtwards.

It is an axiom in philoſophy, that matter is indifferent as to reſt or motion. Hence ſir Iſaac Newton lays it down as a law of Nature, that every body perſeveres in its ſtate, either of reſt or uniform motion, except ſo far as it is diſturbed by external cauſes.

The Carteſians will have firmneſs, hardneſs, or ſolidity of bodies to conſiſt in this, that their parts are at reſt with regard to each other; and this reſt they eſtabliſh as the great nexus, or principle of coheſion, by which the parts are connected together.

Fluidity, they add, conſiſts in a perpetual motion of the parts, &c. But the Newtonian philoſophy furniſhes us with much better ſolutions. See SOLIDITY, FLUIDITY, and COHESION.

Monſieur de Maupertuis aſſerts, that when bodies are in equilibrio, they muſt be ſo ſituated, that, if any ſmall motion be impreſſed on them, the quantity of action reſulting will be the leaſt poſſible. This he calls the law of reſt, and from this law he deduces the fundamental propoſition of ſtatics. See Mem. de l'Acad. de Berlin, tom. ii. p. 294.

Monſieur de Maupertuis deduces the laws of percuſſion from the ſame principle. See *Quantity of* ACTION.

REST, *Repoſe*, or *Pauſe*, in *Poetry*, is uſed for the cæſura, which, in Alexandrine verſes, falls on the ſixth ſyllable; and, in verſes of ten or eleven ſyllables, on the fourth.

The reſt ſhould never fall on a monoſyllable, on which the voice may not dwell: it is called reſt, becauſe the ear and the pronunciation have both a repoſe, or reſpite.

REST, in *Military Language*, a kind of fork to ſupport muſkets, when preſented in order to fire. Sometimes theſe reſts were armed with a contrivance called a ſwine's feather, which was a ſort of ſword-blade, or tuck, that iſſued from the ſtaff of the reſt, at the head: this, being placed before the muſqueteers when loading, ſerved, like the ſtakes placed before the archers, to keep off the cavalry. See MUSKET.

Reſts were of different lengths, according to the heights of the men who were to uſe them; they were ſhod with ſharp iron ferrils, for ſticking them into the ground, and were, on the march, when the muſket was ſhouldered, carried in the right hand, or hung upon it, by means of a ſtring or loop tied under the head.

REST *Arms, To*, is to bring the firelock to the ſame poſition as in preſent arms.

To REST *upon reverſed Arms*. At military funerals the arms are reverſed: on which occaſions, the ſoldiers belonging to the firing party, reſt upon the butt ends of their firelocks, while the funeral ſervice is performed, leaning with their cheeks ſo as to turn from the corpſe; and the word of command is "Reſt upon your arms reverſed."

REST, in *Tilting Armour*. See TILTING *Armour*.

REST, in *Muſic*, is a pauſe, or interval of time, during which there is an intermiſſion of the voice, or ſound.

Reſts are ſometimes uſed in melody, that is, in muſic of a ſingle part, to expreſs ſome ſimple paſſion, or even for variety ſake; but more frequently in harmony, or compoſitions of ſeveral parts, for the ſake of the pleaſure of hearing one part move on while another reſts, and this interchangeably.

Reſts are either for a whole bar, or more than a bar, or but for a part of a bar. When the reſt is for a part, it is expreſſed by certain ſigns, correſponding to the quantity of certain notes of time; as minim, crotchet, &c.; and is accordingly called *minim-reſt*, *crotchet-reſt*, &c.

The characters or figures of which, ſee under CHARACTERS *of Muſic*, where the notes and correſponding reſts are found together.

When any one of thoſe characters occurs, either on a line or ſpace, that part is always ſilent for the time of a minim, or crotchet, &c. Sometimes a reſt is for a crotchet and quaver together, or for other quantities of time for which there is no particular note; in which caſe the ſigns of ſilence are not reſts, but ſuch ſilence is expreſſed by placing together as many reſts, of different time, as make up the deſigned reſt. When the reſt is for a whole bar, the ſemibreve reſt is always uſed. If the reſt be for two meaſures, it is marked by a line drawn acroſs a whole ſpace. For three meaſures it is drawn acroſs a ſpace and a half, and, for four meaſures, acroſs two ſpaces. But, to prevent ambiguity, the number of bars is uſually written over the ſign.

Some of the more ancient writers in muſic make theſe reſts of different value in different ſpecies of time, *e. gr.* the character of a minim-reſt, in common time, ſay they, expreſſes the reſt of three crotchets in triple time; in that of the

the triples $\frac{6}{8}$, $\frac{6}{6}$, $\frac{12}{8}$, $\frac{12}{16}$, it always marks a half-measure, how different soever these may be among themselves.

They add, that the rest of a crotchet in common time is a rest of three quavers in the triple $\frac{9}{8}$, and that the quaver-rest of common time is equal to three semiquavers in the triple $\frac{9}{16}$. But this variety in the use of the same character is now laid aside. Malcolm's Treat. of Music, p. 409, &c.

Franco, the inventor of musical characters for time, commonly ascribed to John de Muris, in the fourth chapter of his tract in the Bodleian library, entitled "Ars Cantus Mensurabilis," says, "as the sounds in each mood are expressed by different notes or figures, and as discant itself is as much regulated by *silence* as by sound, it will be necessary to treat not only of the signs or representatives of sounds, but of their equivalent rests or pauses."

But though Magister Franco may have invented the first time-table, consisting of full or black notes; John de Muris seems to have arranged the second time-table, consisting of void or open notes, from the maxima to the minim. And in Morley's time, the notes were multiplied and accelerated to the semiquaver, with their equivalent rests. See the *third* TIME-TABLE.

REST-*Harrow*, in *Botany*. See ONONIS.

RESTAUR, RESTOR, in *Ancient Customs*, the remedy or recourse which assurers have against each other, according to the date of their assurances; or against the masters, if the average arise through their default; as through ill loading, want of caulking, or want of having the vessel tight.

The word is also used for the remedy, or recourse, a person has against his guarantee, or other person, who is to indemnify him from any damage sustained. Hence *restaurant* and *restauration*. In the lower Latin they also use the words *restor* and *restaur*.

RESTAURATION, RESTAURATIO, *Restoration*, the act of re-establishing, or setting a thing in its former good estate.

Thus we say, the restauration of a minor to the possession of his effects, alienated in the time of his minority. In the French laws it is an ancient formula, used for the restoring a person to his good name, after he has been wrongfully accused and condemned.

In England we say *the Restauration* or *Restoration*, by way of eminence, for the return of king Charles II. in 1660, after the civil wars.

The 29th of May is an anniversary festival, appointed to be held in commemoration of the restoration of regal and episcopal government, by stat. 12 Car. II. c. 14.

We shall here observe, that the form of prayer for the 29th of May, as well as for the 30th of January, were of a different complexion in the reign of king Charles II. from the present, of which the reason is said to be this: the parliament and other leading men, who were active in his restoration, and who had been concerned in opposing his father's measures, would not be called traitors; and required that a distinction should be made between the commencement of the war and the conclusion of it; they would not suffer the first opposition made to the measures of that unhappy prince to be styled rebellion, though they disapproved of the abolition of regal government which ensued.

And accordingly the offices for these two solemnities were drawn up, without any reflection on the first authors or promoters of the opposition, and, in general, breathe more a spirit of piety than of party, of humiliation than of revenge; and, throughout, are modest, grave, decent, sensible, and devout. King James II. altered these forms, and king William did not venture to reduce them to their primitive state; and so they have continued, with very little variation, to this day.

There is no order in either of these offices for a sermon or homily on this day; and in the office of Charles II., there is no direction for a sermon or homily on the 30th of January: but by the office of James II. it is required that on the said 30th day of January shall be read the first and second parts of the homily against disobedience and wilful rebellion, or else the minister shall preach a sermon of his own composing upon the same argument. The 29th of May is not a holiday in any of the law-offices, and consequently no officer can take an extraordinary fee for business done on that day. 7 Term Rep. 163.

By 12 Car. II. c. 14. it is enacted, to the end that all persons may be reminded of their duty on the 29th of May, and be the better prepared to discharge the same with that piety and devotion which become them, that every minister shall give notice to his parishioners publicly in the church at morning prayer, the Lord's day next before such 29th day of May, for the due observation of the said day, and shall then likewise publicly and distinctly read this present act to the people.

RESTAURATION, in *Architecture*, the act of repairing all the parts of a building gone to decay, either through the course of time, or other injuries; in such manner, as that it is not only re-established in its first form, but considerably augmented.

It is evident, from the plinths of the Corinthian columns of the Pantheon (which are almost wholly under ground), that the pavement of this temple is only a restauration made in the time of Septimius Severus. Daviler.

The temple of Concord, behind the Capitol at Rome, having been burnt long after it was built, and having angular bases different from the rest, seems to have been restored from the ruins of several ancient buildings.

RESTAURATION, in *Sculpture*, is the repairing of a mutilated statue, &c. See REPAIRING.

Most of the antique statues have undergone a restauration; as the Farnese Hercules, the Faunus in the Villa Borghese at Rome, the Wrestlers in the gallery of the great duke of Florence, the Venus of Arles, in the gallery at Versailles. But these restaurations have all been made by the ablest sculptors. Daviler.

RESTIACEÆ, in *Botany*, a natural order of plants, first separated from the *Junci* of Jussieu by Mr. Brown, Prodr. Nov. Holl. v. 1. 243, and named from one of its chief genera; see RESTIO. The characters are these.

Perianth unconnected, deeply divided into from two to six segments, or rather of so many leaves; rarely wanting. *Corolla* none. *Stamens* definite, from one to six; when they are two or three, in a four or six-cleft perianth, they are opposite to its inner leaves. *Germen* of one or several cells, each cell containing one pendulous seed, except in *Xyris*, whose seeds are numerous. *Pericarp* either capsular, or amentaceous. *Seeds* inverted. *Albumen* shaped like the seed. *Embryo* lenticular, situated in the lower end of the seed, opposite to its scar, at the outside of the albumen.

Plants herbaceous or somewhat shrubby, almost all exotic with respect to Britain, and even Europe. *Leaves* simple, narrow, in some cases wanting. *Stems* naked, but often furnished with sheathing scales, cloven at one side, imbricated, or equitant, at the other. *Flowers* for the most part aggregate, spiked or capitate, separated by *bracteas*, the *stamens* and *styles* generally in separate individuals.

This order is distinguished from the *Junci*, by having the embryo external, and contrary to the scar; from the *Commelineæ* of Brown, by the figure of that part, and its not being

being enclosed in the albumen. Those genera which have the habit of the *Cyperaceous* order, are well distinguished from it by the sheaths of the stem being split, not undivided. *Xyris*, though referred to the *Restiaceæ*, and scarcely more akin to any other tribe, still differs widely from the rest of this order; especially in the petal-like inner segments, or leaves, of its perianth; the claws bearing the stamens at their summits; and the numerous seeds. See Observations on the generic character of RESTIO.

The New Holland genera of the present order are *Restio*, *Lepyrodia*, *Lyginia*, *Anarthria*, *Loxocarya*, *Leptocarpus*, *Chætanthus*, *Hypolæna*, *Aphelia*, *Devauxia*, *Alepyrum*, *Eriocaulon* and *Xyris*.

RESTIARIA, a name given by Rumphius, in his Herbarium Amboinense, v. 3. 187, to two or three different shrubs, on account of their fitness for ropes, or cordage; *restiarius* being a sort of base Latin word for a rope-maker. The first of these, *R. alba*, t. 119, is a very well-marked genus, for which the name might have been retained; but Linnæus, in his Supplementum, has called that genus *Commersonia*, after the example of Forster, in his Nova Genera t. 22. (See COMMERSONIA.) Of the second, termed *R. nigra*, Rumphius gives no plate. We shall speak of it presently. The third he has called *Perticaria*, from *pertica*, a staff or pole; which name is also a synonym of the other two. Nothing is known respecting the flowers, or generic character, of this last. Loureiro has adopted the name *Restiaria*, for a plant which he supposes the same with the *nigra* of Rumphius, but of which he knew the female flowers only. The following is his account of it. Loureir. Cochinch. 639. Class, *Diœcia*; Order unknown, as well as the Nat. Ord.

Gen. Ch. Male flowers unknown.

Female on a separate plant. *Cal.* Perianth superior, oblong, capsular; limb in five deep, lanceolate, spreading segments. *Cor.* none. *Pist.* Germen inferior, oblong; style none; stigma concave. *Peric.* Capsule calycine, ovate-oblong, somewhat tapering at each end, five-ribbed, hairy, with two cells and two valves. *Seeds* numerous, compressed, roundish, with a long, thin, membranous, linear wing at each side.

Ess. Ch. Male . . . .

Female, Calyx five-cleft, capsular, superior. Corolla none. Stigma concave. Capsule with five ribs, two cells, two valves, and numerous winged seeds.

Obs. We do not profess to understand Loureiro's expressions of *perianthium capsulare*, and *capsula calycina*, but give them as we find them, having no knowledge of the plant itself. De Theis suggests its affinity to *Gouania*.

1. R. *cordata*. Lour. (R. nigra; Rumph. Amb. v. 3. 188?)—Native of the woods of Cochinchina. A large *shrub*, with a reclining *stem*, and climbing *branches*, destitute of tendrils or thorns. *Leaves* opposite, heart-shaped, rugose, hairy, entire, large. *Flowers* in lax, axillary *panicles*, with long general as well as partial stalks. The *bark* is tough and porous, splitting into long strips, of which torches are made, and which serve also for caulking of vessels. The generic name was adopted by Loureiro, because of the fitness of the stems and branches for cordage.

RESTINCLIERS, in *Geography*, a town of France, in the department of the Herault; nine miles N.E. of Montpelier.

RESTINCTION, RESTINCTIO, in *Chemistry*, the quenching of a metal or mineral in some liquor, in order either to correct or to exalt it; by giving it some new quality, power, &c.

RESTING GROUND, in *Gardening*, the means of refreshing it, and of restoring its fertility by the omission of culinary crops, and the cultivation of such as have this tendency, or by any other methods which may have the same effect. It is a sort of management which is principally accomplished in two different ways: the former of which is that of sowing a certain portion of it, annually, with corn and some sort of grass seeds, suffering it to continue under the latter of them for three or more years, as in arable field lands, in order that it may then be broken up again. This is a very beneficial method, but not much practised, except by market-gardeners, who employ these two crops in feeding and foddering their cattle. When made use of in other ways, as in other gardens, great care should be taken that the grass never runs up to seed, as is sometimes the case in market-gardens, but in all other particulars the practice may be entirely the same. In this way of proceeding, by sowing and laying down a certain quantity of ground every year, the same extent may be broken up, which will, of course, afford so much fresh soil annually, upon which such garden crops as answer best on newly broken up land, may be put in and raised, as those of onions, carrots, turnips, and a great many other kinds.

The latter of the above modes of managing the business, is, however, better adapted to gardens in general, as being more suited to the nature of their culture. It was, probably, first suggested by the author of the "Scotch Forcing Gardener;" and is extremely well suited to produce the same effects and advantages as that which has been already noticed; and it may, indeed, in some cases, be combined with it, or used conjointly, with great benefit; as by such means much fresh surface soil will be yearly at the command of the gardener. The manner of performing it is this; after taking three culinary crops off from the first surface, the ground is to be trenched over three spits deep, by which the bottom and top parts are reversed, and the middle part still remains in that situation; then three similar crops are to be taken off from this surface, and the ground afterwards trenched two spits deep, by which means the top becomes the middle, and the middle the top; three of the same kind of crops being here also taken off from this surface, and then the ground trenched three spits again, that part which was last the middle, and now the top, becomes the bottom; and that which is now the bottom, and was the surface at first, now becomes the surface again, after having had six years' rest. By this alternate manner of proceeding, one time trenching three spits deep, and the other two, the surface will constantly be changed, and will rest six years, while it is three years productive. On which account there will be continually new ground and soil in the garden for the growth of healthy culinary vegetables; and besides, much less manure will be wanted than where the soil is shallow, and the same surface constantly under culinary crops.

Proper and careful modes of cropping, as well as other kinds of management, may likewise, in many cases, contribute greatly to the same intention.

RESTING *Land*, in *Agriculture*, the means of keeping it without any sort of crop, or only under particular kinds, in the view of restoring its fertility. This is done in the practice of naked fallowing, as well as that of cultivating green crops by way of a fallow, and by laying land down to the state of grass, in order to its being afterwards broken up for grain crops. See FALLOW and FALLOWING, also GREEN *Crops*, and LAYING *down to grass*.

RESTIO, in *Botany*, from *restis*, a cord, because many of the genus serve, at the Cape of Good Hope, where they abound, to make ropes, baskets, &c. *Restio* is properly a person who sells cord, or ropes. ELEGIA, see that article, is

is nearly related in habit, as well as characters, to the present genus, and was finally united to it by Linnæus, contrary to Thunberg's opinion.—Linn. Syst. Nat. ed. 12. v. 2. 735. Schreb. 676. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 368. Brown Prodr. Nov. Holl. v. 1. 244. Thunb. Diss. May 17. 1788. Rottb. Gram. 1. Juss. 44. Labill. Nov. Holl. v. 2. 77. Lamarck Illustr. t. 804. (Chondropetalum; Rottb. Gram. 10. Calorophus; Labill. Nov. Holl. v. 2. 78.)—Class and order, *Dioecia Triandria*. Nat. Ord. *Calamariæ*, Linn. *Junci*, Juss. *Restiaceæ*, Brown.

Gen. Ch. Male, *Cal.* Catkin ovate or oblong, many-flowered; its scales coriaceous, imbricated, keeled. Perianth compressed, of four or six, nearly equal leaves; two of the outer ones boat-like, the third flat; the three innermost lanceolate, thinner, one of them broader than the rest. *Cor.* none, except the three inner leaves of the calyx be so considered. *Stam.* Filaments three, sometimes but two; anthers oblong, simple, peltate.

Female, on a separate plant, *Cal.* and *Cor.* as in the male. *Pist.* Germen superior, triangular; style one, deeply divided into two or three parts; stigmas feathery. *Peric.* Capsule with two or three lobes, and as many cells, bursting at the prominent angles. *Seeds* solitary, somewhat oval.

Obs. *Chondropetalum* of Rottboll differs from the rest of the species, in having the inner segments of the calyx longer, and of a cartilaginous texture. This difference, and the still more remarkable one in *Xyris*, between the outer and inner segments of the calyx, might surely authorize us to call the three latter a corolla, in both these instances.

Ess. Ch. Male, Catkin imbricated. Perianth of four or six leaves, shorter than the scales of the catkin, destitute of internal scales. Corolla none. Anthers peltate.

Female, Catkin and Perianth like the male. Stigmas two or three. Capsule of two or three lobes, and as many cells, bursting at the angles. Seeds solitary.

The plants of this genus have a hard, rigid, smooth, rushy habit. The *root* is scaly, creeping, and perennial. *Stems* rushy, simple or branched, leafless, sheathed with scales split at one side. *Catkins* either solitary, spiked or panicled. Mr. Brown observes, that the scar of the *seed* is naked in the New Holland species, but in those from the Cape of Good Hope it is bordered. Several things which Thunberg and Rottboll have referred to *Restio*, are by Mr. Brown removed to other genera; see LEPTOCARPUS and THAMNOCHORTUS. This author defines 24 New Holland species, in his Prodromus. How many are found at the Cape, we have no means of determining, because of the uncertainties respecting their generic characters, which we have not materials to remove. The following may serve as examples.

Section 1. *Stem simple.*

R. *tectorum*. Thatch Rope-grass. Linn. Suppl. 425. Ait. n. 1. (Chondropetalum deustum; Rottb. Gram. 10. t. 3. f. 2.)—Stem simple. Leaves none. Catkins racemose, mostly leaning one way, drooping, bracteated, roundish, triangular. Gathered by Thunberg at the Cape, from whence Mr. Masson sent living plants to Kew, in 1793. They are kept in the greenhouse, blossoming in May and June. The *root* is perennial, small and tapering, throwing out horizontal scaly shoots. *Stems* several, a foot and half high, erect, very straight, round, slender, smooth, unbranched, with short taper-pointed sheaths at the joints. *Cluster* terminal, compound, about two inches long, variegated with black, or dark purple, and brown. The stems are used for thatching, for which their hard rigid nature is well calculated; nor is this thatch disturbed by the very high winds that prevail in southern Africa. *Thunberg.*

R. *cernuus*. Pendulous-headed Rope-grass. Linn. Suppl. 425. Thunb. Rest. n. 4. t. 1. f. 2.—Stem simple. Leaves none. Catkins turbinate, pendulous, on capillary stalks. Native of the Cape, on hills about the Table mountain. The *stem* is slender, jointed and smooth, two feet high, or more, with scales at the joints, but no leaves. *Catkins* three, four, or five, at the top of each stem, about the size of a pea, brown, obtuse, tapering at the base, pendulous, each supported by a capillary stalk. *Scales* obtuse, with a small point.

R. *dichotomus*. Fork-leaved Rope-grass. Linn. Syst. Nat. ed. 12. v. 2. 735. Rottb. Gram. 2. t. 1. f. 1. (Schœnus capensis; Linn. Sp. Pl. 64?)—Stems simple. Leaves repeatedly compound, with awl-shaped leaflets. Panicle drooping. Catkins oblong. Scales taper-pointed. Common at the Cape. *Stems* several, a foot or more in height, bearing a few sheaths. *Leaves*, or, as some call them, barren stems, much shorter than the flowering stems, slender, twisted, branched, with a sheath at each joint; their ultimate subdivisions awl-shaped, channelled. *Panicles* at the top of each stem, of 10 or 12 drooping oblong *catkins*, whose scales are of a shining brown, and very finely pointed.

Section 2. *Stem branched.*

R. *verticillaris*. Horse-tail Rope-grass. Linn. Suppl. 425. Thunb. Rest. n. 22. t. 1. f. 7.—Branches whorled, jointed; with ovate scales. Panicle compound, close.—Found about the banks of rivers at the Cape. *Stem* five or six feet high, resembling an *Equisetum* in its copious, slender, whorled branches, from every joint; bearing numerous ovate, taper-pointed, small scales. We confess ourselves unable to draw a line between these branches, and what we have termed leaves in the last-described species, except that the latter are mostly, if not entirely, radical, and these grow from every joint of the stem. The *catkins* are extremely small and numerous, in branched, repeatedly compound, dense clusters.

R. *tetraphyllus*. Four-leaved Rope-grass. Labill. Nov. Holl. v. 2. 77. t. 226, 227. Brown n. 24.—Stems semicylindrical, with blunt sheaths. Leaflets setaceous. Panicle terminal, compound. Catkins nearly globose. Scales pointed. Male flowers six-cleft; female four-cleft.—Native of New South Wales and Van Diemen's island. *Stems* numerous, stout, three feet high, with a few leafy branches in the upper part, whose ultimate divisions are bristle-shaped. *Catkins* stalked, ovate in the female plant, nearly globose in the male. The perianth of the female flowers has but four leaves, that of the male six.

RESTITUTION, RESTITUTIO, in *Physics*, the returning of elastic bodies forcibly bent to their natural state, by some called the *motion of restitution*. See ELASTICITY.

Contraction being the proper and natural action of muscular fibres, some authors ascribe dilatation to a motion of restitution; but the expression, as well as the idea, is very faulty.

RESTITUTION, in the moral and legal sense, is the act of restoring a person to his right, or of returning something unjustly taken or detained from him.

Restitution is reducible to commutative justice; and till it be made, the casuists determine the party all the while guilty of theft.

The illegal incumbents of benefices are condemned to a restitution of the fruits of the benefices. In the Romish church, usurers, &c. are obliged to a restitution of their ill-gotten goods; otherwise the priest has no authority to give them absolution.

RESTITUTION *in Blood*. See CORRUPTION *of Blood*, ATTAINDER, and PARDON.

Restitution *of Conjugal Rights.* See Conjugal *Rights.*

Restitution *of Stolen Goods*, in *Law*, is allowed to the profecutor, on a conviction of larciny, by ſtat. 21 Hen. VIII. c. 11. For, by the common law, there was no reſtitution of goods upon an indictment, becauſe it is at the ſuit of the king only; and therefore the party was forced to bring an appeal of robbery, in order to have his goods again. But it being conſidered that the party, proſecuting the offender by indictment, deſerves as much encouragement as he who proſecutes by appeal, this ſtatute was made, which enacts, that if any perſon be convicted of larciny by the evidence of the party robbed, he ſhall have full reſtitution of his money, goods, and chattels, or the value of them out of the offender's goods, if he has any, by a writ to be granted by the juſtices. And this writ of reſtitution ſhall reach the goods ſo ſtolen, notwithſtanding the property of them is endeavoured to be altered by ſale in market overt; or elſe, without ſuch writ of reſtitution, the party may peaceably retake his goods, wherever he happens to find them, unleſs a new property be fairly acquired therein; or, laſtly, if the felon be convicted and pardoned, or be allowed his clergy, the party robbed may bring his action of trover againſt him for his goods, and recover a ſatisfaction in damages; but ſuch action lies not before proſecution, for ſo felonies would be made up and healed. See Recaption.

Restitution *of Temporalities of Biſhops.* See Temporalities, and Restitutione *Temporalium.*

Restitution *in Integrum*, is uſed for what is otherwiſe called *reſciſſion.*

Religious obtain reſtitution againſt their vows, *i. e.* they are freed from their obligation, when they proteſt againſt them within five years of their profeſſion.

In the hiſtory of Germany for the ſeventeenth century, the firſt day of January, 1624, is called the *term of reſtitution;* becauſe by the peace of Munſter, then concluded, the Lutheran and Calviniſt princes were obliged to reſtitute, or reſtore what they had taken from the Roman Catholic churches in their territories till that day.

By the peace of Weſtphalia in 1648, the reſtitution-edict was abrogated, and both the contending parties confirmed in the perpetual and uninterrupted poſſeſſion of whatever they had occupied in the beginning of the year 1624. And all the articles agreed upon by this peace were confirmed and ratified, in the year 1650, at Nuremberg.

Restitution *of Medals*, or *Reſtituted Medals*, is a phraſe uſed by antiquaries, for ſuch medals as were ſtruck by the emperors, to renew or retrieve the memory of their predeceſſors.

Hence it is, that in ſeveral medals we find the letters rest. Claudius was the firſt who began this practice, by ſtriking afreſh ſeveral medals of Auguſtus. Nero did the ſame; and Titus, after the example of his father, ſtruck reſtitutions of moſt of his predeceſſors. Some, however, have maintained that the reſtituted medals of Claudius and Nero are modern and ſpurious, and that the practice began under Titus.

Gallienus ſtruck a general reſtitution of moſt of the preceding emperors in two medals, the one bearing an altar, the other an eagle, without the *reſt.* F. Joubert chooſes rather to call them *converſations* than reſtitutions, as being done quite anew. Theſe were deſigned to preſerve the remembrance of the conſecration of thoſe emperors in honour of whom they were ſtruck; and they have all the ſame legend on the reverſe, *viz.* consecratio.

RESTITUTIONE *extracti ab eccleſia*, in *Law*, a writ anciently granted for the reſtoring a man to the church, or ſanctuary, from which he had been forced way.

Restitutione *Temporalium*, a writ which lies where a man is elected and confirmed biſhop of a dioceſe, for the recovery of the temporalities, or barony, of the ſaid biſhopric.

It is directed from the king to the eſcheator, or rather ſheriff of the county.

RESTIVE, or Resty, a term applied to a horſe, &c. that ſtops, or runs back, inſtead of advancing forwards.

In the manege, a reſtive horſe is a rebellious, refractory, ill-broken horſe, which only goes where it will, and when it will. The word is formed from the Latin *reſtivus*, which ſignifies the ſame thing. (See Ramingue.) A horſe of this ſort, who has been too much conſtrained and tyrannized over, ſhould be treated with the ſame lenity as a young colt. The ſpurs are improper to be uſed to either; inſtead of which a ſwitch ſhould be uſed, in order to drive him forward, as he will be thus leſs alarmed; becauſe the ſpurs ſurpriſe a horſe, abate his courage, and are more likely to make him reſtive than oblige him to go forward, if he refuſes to do ſo. There is likewiſe another method to puniſh a reſtive horſe, which is to make him go backward the moment he begins to reſiſt. Theſe corrections generally ſucceed; but the general rule is to puſh and carry your horſe forward, whenever he refuſes to advance, and continues in the ſame place, and defends himſelf either by turning or flinging his croupe on one ſide or the other; and, for this purpoſe, nothing is ſo efficacious as to puſh him forward vigorouſly. Berenger's Horſemanſhip, vol. ii. p. 29, &c. See Ride.

RESTOR. See Restaur.

RESTORATION. See Restauration.

Restoration, in *Theology*, a term applied by thoſe who maintain the doctrine of the final happineſs of all mankind, to the recovery of tranſgreſſors from a ſtate of guilt and miſery to pardon and felicity, in conſequence of the penal diſcipline which they are doomed to endure in a future world. See this doctrine diſcuſſed under the article Hell.

Restoration *Cove*, in *Geography*, a bay on the weſt coaſt of North America, in Burke's canal, ſo called by Vancouver, from the 29th of May, the day of its diſcovery. Among the ſkins brought to ſale at this bay were thoſe of the animal which produces the wool, of which the garments worn by ſome of the Indians are made. Their length, excluſively of the head and tail, was 50 inches; and their breadth, excluſively of the legs, was 36 inches. All the ſkins that were brought to captain Vancouver were white, or rather of a cream colour. The pelt was thick, and of a fine texture; but from their ſtate of mutilation, the ſpecies of animals to which they belonged could not be aſcertained. The women, who appeared to be of the greateſt importance, were adorned by an horizontal inciſion about three-tenths of an inch below the upper part of the under lip, extending from one corner of the mouth to the other; and in this ſlit was fixed a piece of wood, confined cloſely to the gums of the lower jaw, and projecting by its external ſurface horizontally. Theſe wooden ornaments were of an oval form, and reſembled a ſmall oval platter or diſh, concave on both ſides: the ſmalleſt of them was about $2\frac{1}{2}$ inches, and the largeſt $3\frac{4}{10}$ inches long, and $1\frac{1}{4}$ inch broad; the others decreaſed in breadth in proportion to their length. The clothing of the natives here conſiſted either of the ſkins of the ſea-otter, or of garments made of the pine-bark, into which was neatly wrought ſome of the fur of the ſea-otter, and their ſides and bottoms were decorated with various colours. In this they uſe only woollen yarn, very fine, well ſpun, and dyed for that purpoſe, particularly with a very

lively and beautiful yellow. N. lat. 52° 1′. E. long. 232° 20′.

Restoration *Island*, a small island in the South Pacific ocean, near the east coast of New Holland, discovered by captain Bligh in 1789. S. lat. 12° 39′.

Restoration *Point*, a cape on the west coast of Vashon's island. N. lat. 47° 30′. E. long. 237° 46′.

RESTORATIVE, in *Medicine*, such substances both in the way of food, drink, and medicines, which are calculated to restore the vigour of the constitution, after the cessation of acute diseases, after violent hæmorrhages, fatigue, watching, or want of food. These of course comprehend the most nutritious parts of animal substances, jellies, broths, &c.; and the vegetable starches, arrow-root, sago, &c. with milk, rice, and other light nourishment. The restorative medicines will be selected from the bitter and aromatic vegetables, and some of the metallic salts, especially those of iron; their principal use being to give tone and vigour to the digestive organs, and thus enable them to extract and digest the nutriment, which the food affords.

RESTOUN, in *Geography*, a town of Syria, anciently called "Arethusa;" 12 miles S.E. of Hamah.

RESTOW, a town of Austrian Poland, in Galicia; 72 miles W. of Lemberg.

RESTRAINING Statute. See Remedial.

Restraining *Statute of Leases*. See Leases *by Statute*.

RESTRAINT is when an action is hindered, or stopped, contrary to volition, or the preference of the mind.

RESTRICTION, the act of modifying, limiting, or restraining a thing to narrower bounds.

General laws always bear some restriction. In contracts it is usual to have *restrictive clauses*, which bind the covenants down to certain bounds.

Restriction, *Mental*. See Reservation.

Restriction, among *Logicians*, is understood of the limiting a term, so as to make it signify less than it usually does.

In which sense the name philosopher is restrained to Aristotle; Great, to Alexander; City, to Rome, &c.

RESTRICTIVE Proposition. See Proposition.

Restrictive *Suture*. See Suture.

RESTRINGENT, in *Medicine*. See Astringent.

RESTY. See Restive and Ride.

RESULT, what is gathered from a conference, an inquiry, meditation, discourse, or the like; or the conclusion and effect thereof.

The usual result of disputes, Mr. Bayle observes, is, that each person remains more attached to his own opinion.

RESULTING Use, in *Law*. See Use.

RESUMMONS, Resummonitio, a second summons or calling a man to answer an action, where the first summons is defeated, or suspended, by an accident; as the death of a party, &c.

RESUMPTION, Resumptio, in a law-sense, signifies the taking again into the king's hands such lands or tenements as before, upon false suggestions, or other error, he had delivered to the heir, or granted, by letters patent, to any man.

Resumption, in the *Schools*, a summary repetition, or running over, of an argument, or of the substance of it, in order to refute it.

Resumption is also used by *Logicians* for the reduction of some figurative or quaint proposition, to a more intelligible and significant one.

RESUMPTIVE, in *Pharmacy*, an epithet given to a kind of unguent, used to recruit and restore arid languishing constitutions, and to dispose the dry bodies to receive nourishment. It is called in Latin *unguentum resumptivum*.

RESUPINATUM Folium, in *Botany*, a reversed leaf, has its proper under side turned uppermost, as in *Pharus latifolius*, and *Alstroemeria pelegrina*. See Leaf.

RESUPINATUS Flos, a reversed flower, is so circumstanced, that what, according to analogy, ought to be its upper side, is really the under. Of this *Lavandula*, Lavender, is an example, the longer lip of its corolla being uppermost, while the other, with the stamens and style, are downwards.

RESURRECTION, Resurrectio, *Resuscitation*, the act of returning to a new or second life, after having been dead.

The great argument for the truth of Christianity, and that urged with the most force and conviction for the same, is drawn from the resurrection of our Saviour. The circumstances of it are such as almost admit of a demonstration; which has accordingly been attempted on the strict principles of geometricians. See Ditton on the Resurrection.

The records of the fact of our Lord's resurrection are contained in the four gospels of St. Matthew, St. Mark, St. Luke, and St. John; and though the accounts given by these historians have been charged with some discrepancies and contradictions, the difficulties occasioned by them admit of a satisfactory solution. Among those who have made attempts for this purpose, Mr. Gilbert West (ubi infra) is entitled to our particular notice. With this view, he states the several incidents of this wonderful event, according to the order in which they seem to have arisen. He premises with observing, that our Saviour Christ was crucified on a Friday (the preparation, or the day before the Jewish Sabbath); gave up the ghost about three o'clock in the afternoon of the same day; and was buried that evening, before the commencement of the Sabbath, which, among the Jews, was always reckoned to begin from the first appearance of the stars on Friday evening, and to end at the appearance of them again on the day we call Saturday. He adds, that, some time, and most probably towards the close of the Sabbath, after the religious duties of the day had terminated, the chief priests obtained of Pilate, the Roman governor, a guard to watch the sepulchre, till the *third* day was past; pretending to apprehend that his disciples might come by night, and steal away the body, and then give out that he was risen, as he had predicted while he was yet alive. Accordingly a guard was set, the sepulchre made sure, and, to prevent the soldiers themselves from conniving with the disciples, a seal was put upon the stone which closed up the entrance of the sepulchre.

Some have objected to the evangelical statement of the time that elapsed between our Lord's death and resurrection; and they say, that the resurrection happened a day sooner than the prediction imported. But in the "Trial of the Witnesses," it is alleged, that the objection is founded upon a mistake of a mode of speaking, common to the Jews and other people; who, when they name any number of days and years, include the first and the last of the days or years to make up the sum. Christ, alluding to his own resurrection, says, "In three days I will raise it up." The angels report his prediction thus: "The Son of man shall be crucified, and the third day rise again." Elsewhere it is said, "after three days;" and again, that he was to be in the bowels of the earth "three days and three nights." These expressions are equivalent to each other; for we always reckon the night into the day, when we reckon by so many days. If you agree to do a thing ten days hence, you stipulate

ſtipulate for forbearance for the nights as well as days; and, therefore, in reckoning, two days, and two days and two nights, are the ſame thing. That the expreſſion, "after three days," means incluſive days, is proved by Grotius in Matth. xxvii. 63, and others. The prediction, therefore, was that he would riſe on the third day. Now, he was crucified, as we have already ſtated, on Friday, and buried; he lay in the grave the whole of Saturday, and roſe early on Sunday morning. But as the objectors ſay, he ought not to have riſen till Monday: let us try what the uſe of common language requires to be underſtood, in a like caſe. Suppoſe you were told that your friend ſickened on Friday, was let blood on Saturday, and the third day he died: what day would you think he died on? If you have any doubt about it, put the queſtion to the firſt plain man you meet, and he will reſolve it. The Jews could have no doubt in this caſe; for ſo they practiſed in one of the higheſt points of their law. Every male child was to be circumciſed on the eighth day. How did they reckon the days? The day of the birth was one, and the day of the circumciſion another; and though a child was born towards the very end of the firſt day, he was capable of circumciſion on any time of the eighth day. And, therefore, it is not new nor ſtrange, that the third day, in our caſe, ſhould be reckoned into the number, though Chriſt roſe at the very beginning of it. It is more ſtrange to reckon whole years in this manner; and yet this is the conſtant method obſerved in Ptolemy's canon, the moſt valuable piece of ancient chronology, next to the Bible, now extant. If a king lived over the firſt day of a year, and died the week after, the whole year is reckoned to his reign.

The order of the incidents our author conceives to have been as follows. Very early on the *firſt* day of the week (the day *immediately following* the ſabbath, and the *third* from the death of Chriſt), Mary Magdalene and the other Mary, in purſuance of the deſign of embalming the Lord's body, which they had concerted with the other women who attended him from Galilee to Jeruſalem, ſet out, in order to take a view of the ſepulchre, juſt as the day began to break; and about the time of their ſetting out "there was a great earthquake," &c. (Matth. xxviii. 2—4.) During the amazement and terror that occurred, Chriſt came out of the ſepulchre; and the keepers recovered from their trance and fled, when an angel, who till this time ſat upon the ſtone, quitted his ſtation on the *outſide*, and entered *into* the ſepulchre; and probably diſpoſed the linen clothes and napkin in that order in which they were afterwards found, and obſerved by John and Peter. Mary Magdalene, in the mean while, and the other Mary, were ſtill on their way to the ſepulchre, where, together with Salome (whom they had either called upon, or met as they were going), they arrived at the riſing of the ſun. And as they drew near, "they ſaid among themſelves, Who ſhall roll us away the ſtone from the door of the ſepulchre? for it was very great:" and they themſelves (the two Maries at leaſt) had ſeen it placed there two days before, and ſeen with what difficulty it was done. But whilſt they were deliberating (for it does not appear that they knew any thing of the guard), "lifting up their eyes," being yet at ſome diſtance, they perceived it *was* already *rolled* away. Alarmed at ſo extraordinary and ſo unexpected a circumſtance, Mary Magdalene, concluding that, as the ſtone could not have been moved without a great number of hands, it muſt have been rolled away with ſome deſign; and that this deſign could have been no other but to remove the Lord's body; and being convinced by appearances that this was the caſe, ran immediately to inform Peter and John of what ſhe had ſeen, and what ſhe ſuſpected; leaving Mary and Salome there, ſo that, if Joanna and the *other* women ſhould come in the mean time, they might acquaint them with their ſurpriſe at finding the ſtone removed, and the body gone, and of Mary Magdalene's running to inform the two above-mentioned apoſtles of it. While ſhe was going on this errand, Mary and Salome went on and entered into the ſepulchre; and there ſaw an angel "ſitting on the right ſide," &c. (Mark, xvi. 5—8.) After the departure of Mary and Salome came John and Peter, who, having been informed by Mary Magdalene, that the body of the Lord was taken away out of the ſepulchre, and that ſhe knew not where they had laid him, "ran both together to the ſepulchre," &c. (John, xx. 4—17.) After the appearance of Chriſt to Mary Magdalene, to whom, as St. Mark ſays expreſsly, he appeared firſt, the other Mary, and Salome, who had fled from the ſepulchre with ſuch terror and amazement, that "they ſaid not any thing to any man," (Mark, xvi. 8.), that is, as the expreſſion may be underſtood, had not told the meſſage of the angel to ſome (probably John and Peter, who were running with Mary Magdalene to the ſepulchre, about the time that theſe women were flying from it, and whom in their fright they might not immediately recollect), whom they met, and to whom they were directed to deliver it, were met on their way by Jeſus Chriſt himſelf, who ſaid to them, "All hail!" &c. (Matth. xxviii. 9, 10.) Theſe ſeveral women, and the two apoſtles, being now gone from the ſepulchre, "Joanna, with the other Galilean women, and others with them," &c. (Luke, xxiv. 1—9, 11.), Peter, who, upon the report of Mary Magdalene, had been *at* the ſepulchre, had *entered into* it, and, with a curioſity that beſpoke an expectation of ſomething extraordinary, and a deſire of being ſatisfied, had obſerved that the *linen clothes* in which Chriſt was buried, and the *napkin that was about his head*, were not only *left* in the ſepulchre, but carefully *wrapped up*, and laid in *ſeveral places*, and who, from theſe circumſtances, might begin to ſuſpect, what his companion St. John from the ſame circumſtances ſeems to have believed:—Peter we ſay, hearing from Joanna, that ſhe had ſeen a viſion of angels at the ſepulchre, who had aſſured her that Chriſt was riſen, ſtarting up, ran thither immediately; and knowing that the angels, if they were *within* the ſepulchre, might be diſcovered without his *going in*, he did *not*, as before, *enter in*, but *ſtooping down*, looked ſo far in as to *ſee* the *linen clothes*; and "departed, wondering in himſelf at that which was come to paſs." (Luke, xxiv. 12.) And either *with* Peter, or *about that time*, *went* ſome *other* diſciples, who were preſent when Joanna, and the other women, made their report; "and found it even ſo as the women had ſaid."—"The ſame day, two" of the diſciples "went to a village called Emmaus," &c. (Luke, xxiv. 13—35.) Such, according to Mr. Weſt, is the order in which the ſeveral incidents above related appear to have ariſen: and he concludes, that by this order, in which all the different events naturally and eaſily follow, and, as it were, riſe out of one another, the narration of the evangeliſts is cleared from all confuſion and inconſiſtencies; and, moreover, the proof of the reſurrection is better eſtabliſhed by thus *ſeparating* the women into two or more diviſions, than upon the contrary ſuppoſition, which brings them *all together* to the ſepulchre; for, in the laſt caſe, inſtead of *three different* appearances of angels to the women, and *two* of Jeſus Chriſt, we ſhould have but *one* of each; whereas, in the former, there is a train of witneſſes, a ſucceſſion of miraculous events, mutually ſtrengthening and illuſtrating each other, and equally and jointly concurring to prove one and the ſame fact:—a fact, which, as it was in its own nature more aſtoniſhing, and in its conſequences of the

the utmoſt importance to mankind, required the fulleſt and moſt unexceptionable evidence. Never, ſays our author, was a fact more fully proved; and in ſtating this proof, with a brevity correſponding to our limits, and yet, we truſt, with a clearneſs anſwerable to the importance of the ſubject, we ſhall avail ourſelves of the luminous arrangement which our author has made of the principal arguments that eſtabliſh the intereſting fact of our Lord's reſurrection, and that rendered it credible to the apoſtles and firſt diſciples; and by means of their teſtimony to perſons of countries and ages remote from thoſe in which it occurred. In its reference to the conviction of the apoſtles and firſt diſciples, the *firſt* object of conſideration comprehends the characters and diſpoſitions of the perſons who were themſelves to be convinced, and who were to be witneſſes of the reſurrection to the world in general; the *ſecond* includes the manner, *i. e.* the method and order in which the ſeveral proofs were laid before them; and the *third* is the matter of the evidence. The knowledge of the character and diſpoſition of the apoſtles and diſciples, for whoſe conviction the proofs of the reſurrection were primarily deſigned, is neceſſary to evince their aptitude and their ſufficiency for this purpoſe, and will ſerve to ſhew us, that the manner in which they were adduced, and the matter, or facts, of which they conſiſted, were ſelected with conſummate wiſdom. The apoſtles and firſt diſciples were, for the moſt part, perſons of low birth and mean occupations, unaccuſtomed to abſtract reaſoning and deep inquiry, and ſtrongly poſſeſſed with the national prejudices of the Jewiſh religion, as it was then taught by the Scribes and Phariſees. Although it appears from many paſſages in the goſpel hiſtory, that they were convinced by the numerous miracles which Jeſus of Nazareth performed, and by the accompliſhment of many prophecies in the hiſtory of his life, of his being the promiſed and expected Meſſiah; yet they were deluded by the notion prevalent among their brethren, the Jews, that the Meſſiah would be a temporal prince, a redeemer and ruler of Iſrael, who ſhould never die. Our Saviour, in many of his diſcourſes, laboured to undeceive them; but their prepoſſeſſions and errors were ſo deeply rooted, that all his efforts for this purpoſe proved ineffectual. He had, indeed, moſt circumſtantially foretold his own ſufferings, death, and reſurrection: but it ſufficiently appears, that they did not underſtand theſe predictions, until ſome time after their accompliſhment. As, in their opinion, immortality and temporal dominion were the characteriſtics of the Meſſiah, the ſufferings and death of Jeſus muſt have convinced them, before his reſurrection, that he was not the Meſſiah, or that perſon in whom they had truſted as the Redeemer and king of Iſrael. When he actually died according to his prediction, and his enemies ſeemed to have obtained a complete triumph over him, their minds muſt have been agitated by prejudice, doubt, perplexity, deſpair, and terror. The evidence, therefore, that was adapted to recover them from this ſtate, muſt, in the *manner* of its being preſented to them, as well as in its own nature, be of a peculiar kind: otherwiſe it could not have ſerved the purpoſe of converting them from being incredulous and ready to deſert their Maſter, into believers, teachers, and martyrs of the goſpel. The firſt alarm they received was from Mary Magdalene, who, early in the morning, on the third day from the burial of our Saviour, came running to inform Peter and John, that the ſtone was rolled from the mouth of the ſepulchre, and that the body of the Lord was removed. Theſe two apoſtles haſtened to the ſepulchre, and having entered it, found the fact that had been announced to them actually verified. Thus were their minds prepared for the extraordinary events that afterwards occurred. The life of Jeſus, they knew, had been a life of miracles; and his death had been attended with prodigies and wonders; and yet none of them, John excepted, believed that he was riſen from the dead; *for as yet* (as that apoſtle aſſures us) *they knew not the ſcriptures, that he muſt riſe again from the dead;* that is, they did not underſtand from the prophets, that the Meſſiah was to riſe again from the dead; being, on the contrary, perſuaded, that theſe very prophets had foretold the Meſſiah ſhould *not* die, but *abide for ever.* The next report they received was from Joanna, and her companions, who acquainted them that angels had appeared to them, and had told them that Jeſus was riſen, reminding them, at the ſame time, that Chriſt himſelf had, not only from the ſpirit of prophecy with which it was known that he was endowed, but from the prophets alſo, predicted his own ſufferings and death, and riſing again from the dead on the third day. But then they did not underſtand what was meant by his "riſing from the dead." In order to explain to them the meaning of the reſurrection, they were probably acquainted, in the next place, by Mary Magdalene, that ſhe had ſeen, not angels only, but Chriſt himſelf. Nevertheleſs ſome doubts and difficulties ſtill remained. He had been ſeen only by Mary Magdalene. To relieve them in this ſtate of heſitation and perplexity, nothing could be better calculated than the account given by the other Mary and Salome, who had alſo been at the ſepulchre, and had there ſeen an angel, who not only aſſured them that "Chriſt was riſen," but had ordered them to tell his diſciples, "that they ſhould meet him in Galilee," agreeably to what he himſelf had ſaid to them in his lifetime. The only ſcruple that now remained in the minds of the apoſtles, aroſe from their not having ſeen him themſelves; and till they did, they ſeemed reſolved to ſuſpend their belief of his being riſen from the dead, and treated all thoſe viſions of the women as ſo many idle tales. They were left for ſome time to ruminate over the wonderful events that had rapidly occurred, to examine the ſcriptures, and to recollect the predictions and diſcourſes of their Maſter, to which they were referred both by the angels and himſelf. In order to aſſiſt them in their inquiries, and lead them to the true ſenſe of the ſcriptures, the only rational means of conquering their prejudice, Chriſt himſelf appeared to two of his diſciples, on their way to Emmaus, whom he found diſcourſing and reaſoning as they went upon thoſe very topics. The deſign of Chriſt in his converſation with theſe diſciples, and particularly in his expoſition of the prophets, was to ſhew, that, by the proper exerciſe of their underſtandings, they might, from thoſe very ſcriptures, whoſe authority they allowed, have been convinced that the Meſſiah "ought to have ſuffered," as they had ſeen him ſuffer, "and to riſe from the dead on the third day." That is, Chriſt choſe rather to convince them by *reaſon*, than by *ſenſe;* or, at leaſt, to prepare their minds, that their aſſent afterwards to the teſtimony of their ſenſes, ſhould be with the concurrence of their reaſon. Having duly prepared them for receiving the teſtimony of their ſenſes, he diſcovered himſelf to them by an act of devotion, "in breaking of bread;" a form of devotion which he had inſtituted in remembrance of his death. Accordingly they were convinced, and "returned that ſame hour to Jeruſalem," where they found the apoſtles aſſembled together, and debating apparently upon the ſeveral reports they had heard that day, and particularly upon what Peter had told them, to whom, ſome time on that day, Chriſt had appeared. The apoſtles having now had every kind of evidence laid before them that was requiſite to convince them of the reality of the reſurrection of Chriſt, and being alſo enabled by the gift of that Spirit, which inſpired the prophets, to underſtand the true meaning of thoſe ſacred oracles

to

to which their Maſter conſtantly referred them for the marks and characters of the Meſſiah, which *he* affirmed to be found in himſelf; they were left again to themſelves, that they might conſider and examine at leiſure the ſeveral proofs of the reſurrection, which they had heard and ſeen, and particularly thoſe ariſing from the accompliſhment of the predictions contained in the holy ſcriptures. Accordingly he forebore viſiting them for eight days, after which he condeſcended to ſubmit himſelf to a farther examination, in order to remove the unreaſonable ſcruples of St. Thomas, one of the apoſtles. After this there ſeems to have been no ſcruple left in the minds of any of the apoſtles, to whom, however, Chriſt was ſtill pleaſed to continue his viſits; "being ſeen of them," as St. Luke teſtifies (Acts, i. 3.) "forty days after his paſſion, and ſpeaking of the things pertaining to the kingdom of God."

It is obſervable, that all the appearances of Chriſt already mentioned, ſeem to have been intended only for the *conviction* of his apoſtles; and thoſe that follow, which were probably much more numerous than the evangelical hiſtory records, rather for their *confirmation* and *inſtruction* in the faith and doctrines of the goſpel. The ſacred writers have been very particular in their accounts of the former, whilſt they have mentioned but very few of the latter; and the reaſon of their different proceeding is very obvious. The apoſtles are to be conſidered both as *witneſſes* of the miracles, and the ſufferings, the death, and the reſurrection of Jeſus Chriſt, and as *teachers* and *preachers* of his doctrine. In the character of *witneſſes*, a circumſtantial account of the means and opportunities they had of knowing certainly the ſeveral facts atteſted by them, muſt neceſſarily give great force and credit to their evidence: whereas in that of *preachers*, it is ſufficient if their auditors were ſatisfied, in general, that the doctrines taught by them were derived from the inſtructions, and authoriſed by the commiſſion given them by their Maſter, "to teach all nations;" and of this, the various gifts of the Holy Spirit, poured out, not upon the apoſtles *only*, but *by* them upon *all* believers, were full and unqueſtionable proofs.

From a review of the method and order in which the ſeveral proofs of the reſurrection were laid before the apoſtles, it is manifeſt that Chriſt required of them a reaſonable and well-grounded faith, and that he alſo purſued the moſt proper and effectual means for the attainment of that end. With this view, inſtead of bearing down their reaſon, and dazzling their underſtanding by a full manifeſtation of himſelf at once, we ſee him letting in the light upon them by little and little, and preparing their minds by the gradual dawning of truth, that they might be able to bear the full luſtre of the Sun of righteouſneſs riſing from the grave; to conſider and examine, and know that it was he himſelf, and to aſſure the world it was impoſſible they could be deceived. By referring them to the ſcriptures, and ſubmitting himſelf to the ſcrutiny and judgment of their ſenſes, he not only waved all authority, but required them in a ſtrong and particular manner to exerciſe their reaſon in examining the evidence brought before them; for which purpoſe he alſo improved their faculties by the infuſion of his holy ſpirit. Never, ſays Mr. Weſt, was evidence more fairly offered to conſideration: never was inquiry put into a more rational method, as indeed there never were any facts that could better abide the teſt.

Theſe facts, of which the *matter* of the evidence of the reſurrection conſiſted, may be compriſed under three heads, *viz.* the appearances of the angels, the appearances of Chriſt to the women, and the appearances of Chriſt to the diſciples and apoſtles. Our limits will only allow us briefly to recite them. Thoſe of the *firſt* claſs, at the ſepulchre on the morning of the reſurrection, are ſuch as were obſerved by the Roman ſoldiers, who kept the ſepulchre, by the other Mary and Salome, by Mary Magdalene and by Joanna, and her companions. Mr. Weſt has ſatisfactorily proved, by a train of reaſoning which we have not room to purſue, that theſe appearances of the angels were neither the effects of illuſion, the phantoms of a diſtempered viſionary mind, nor the operations of artifice and impoſture. The *ſecond* claſs comprehends the appearances of Chriſt, which were two; the firſt to Mary Magdalene; the ſecond, to the other Mary and Salome. Some perſons have very abſurdly inferred from our Lord's prohibition to Mary, expreſſed in theſe words, "Touch me not, for I am not yet aſcended to my Father," that our Saviour was not clothed with a real or material body: whereas the evident meaning of the words is "detain me not, for I am not yet aſcending to my Father," and therefore they imply, that ſhe ſhould have another opportunity, before his departure from the world, of expreſſing her regard and maintaining intercourſe with him. The *third* claſs of appearances includes thoſe of Chriſt to his diſciples, for the 40 days after his paſſion, which undoubtedly were numerous, though only few are recorded. An objection has been founded on one of theſe appearances, in recording which St. John ſays, "that Jeſus came (the doors being ſhut) and ſtood in the midſt," againſt the reality of the body of Chriſt; but it is needleſs to reply to ſo groundleſs a ſuggeſtion, as that the body of Chriſt paſſed through the ſolid door; when it is poſſible that he might enter, unperceived by them, through an open door.

The third time of our Saviour's appearance to any number of his diſciples together after his reſurrection was at the ſea of Tiberias, called alſo the ſea of Galilee (John, xxi. 14.); and ſubſequent to this was his appearance on a mountain in Galilee, mentioned by St. Matthew. One reaſon that has been aſſigned for his ſhewing himſelf in Galilee, after his reſurrection, ſeems to have been, that, where he was perſonally known to ſo many people, having reſided there above 30 years, he might have the greater number of competent witneſſes to his reſurrection. It is probable that the greateſt number of his appearances for the 40 days after his paſſion were in Galilee, where he would have a favourable opportunity of diſcourſing to his diſciples of "things pertaining to the kingdom of God," (Acts, i. 3.); and of preparing his apoſtles eſpecially for teſtifying to the reality of his reſurrection, and for executing the commiſſion with which they were entruſted. Here they would be more ſecure, as well as more retired, than at Jeruſalem.

It might be further urged that the reſurrection of Chriſt was a neceſſary fulfilment of ancient prophecies pertaining to the Meſſiah, and alſo of our Lord's own predictions: and that it was a no leſs neceſſary appendage to his office as a teacher and ſaviour than his death. Without the reſurrection, the great ſcheme of divine mercy for the benefit of mankind would have been incomplete; by that, it was perfected, and the triumph over death added to that over ſin; the Meſſiah thus accompliſhing all that the ſcriptures foretold of his glory and power. This event authenticates and confirms the promiſe of future exiſtence, and is indeed the pledge and earneſt of immortality.

But it has been objected, that all the proofs of our Lord's reſurrection which have been above adduced were not exhibited to all the Jews. (Acts, x. 41.) That Chriſt made choice of a ſelect number of diſciples, and particularly of twelve, (who were called apoſtles,) to be witneſſes of the great actions of his life, and eſpecially of his reſurrection, and preachers of his goſpel to all the world, is a well-known and indiſputable

able fact. He not only, on many occasions, both *before* and *after* his crucifixion, discoursed to them in particular of things "pertaining to the kingdom of God," and poured upon them all the various gifts of the Holy Spirit, but gave them every kind of evidence of his "being risen" from the dead, which the most scrupulous and sceptical could imagine or require; "shewing himself alive to them by many infallible proofs," such as eating and drinking with them, "for 40 days after his passion." And, indeed, it is highly expedient that those, upon whose testimony and credit the truth of any fact is to be established, should have the fullest and most unexceptionable evidence of it, that can be had; because their having had all possible means of information must necessarily add great weight and authority to their depositions. That their perfect knowledge of the things which they were to testify was necessary for those who were ordained to be apostles, is further evident from the words of St. Peter, Acts, i. 15—26. It was the peculiar and distinguishing character of the apostles to be witnesses of the resurrection, and it was their office to testify to the reality of this fact: but all the infallible proofs of our Lord's resurrection were not vouchsafed by him to his disciples, merely from a particular favour and regard to *them*, that *they* might believe and be saved; but with a further view, that *others* also, by their testimony, founded on the most complete and exact information, might likewise believe and be saved. If Christ had intended nothing more than to induce his disciples to *believe* his resurrection, he might have left them to the *testimony* of the Roman soldiers; to that of the *women;* to the *writings* of *Moses* and the *prophets;* to his own *predictions;* to the *state* of the sepulchre, and that wonderful circumstance of his body's being *no where* to be found; and they would have been without excuse, if they had still continued unbelieving. But though the apostles had, upon *this* evidence, believed their master to be risen from the dead; yet, without those other *infallible* proofs mentioned by St. Luke, they would certainly have not been so *well* qualified for being witnesses of the resurrection to all the world: the heathens would not have admitted the *testimony* of Moses and the prophets, of whose writings they knew nothing, and of whose divine authority they had no proof. And as to the depositions of the *women;* besides their being strangers to *their* characters, they might, from Christ's appearing to *them*, with some colour have demanded, why he did not appear likewise to those whom he commissioned to *preach* his gospel, and to be *witnesses* of his resurrection. But when, on the contrary, the apostles could tell them, that they *themselves* had *seen* Christ, had *handled* him, *eat* and *drank* with him, and *conversed* with him for *forty* days *after* that he *was risen* from the dead, they could not but allow them to have had the *fullest* evidence of the resurrection, supposing what they told them to be *true;* and of this the purity of their doctrines, the holiness of their lives, their courage and constancy in defying and undergoing all kinds of hardships, dangers, pain, and death, in advancing a cause, which every worldly interest obliged them to desert, joined to the attestation of the Holy Spirit, "working with them, and confirming the word with signs following," were such assurances as no other man could give of his veracity. It has been said, however, that our Lord did not shew himself, after he was risen, to the Jews, to the chief priests and elders, to the Scribes and Pharisees, and mistakenly interpreting a passage in Matt. xii. 39, 40, Christ has been charged with a violation of his promise to this purpose. Of his rising again from the grave on the third day, the Jews had the testimony of the prophets, of the predictions of Christ himself, the evidence of the Roman soldiers, of his body's being no where to be found, of the women and disciples, and apostles, to whom he had appeared; and who, before the Sanhedrim, bore witness to his resurrection, and having just before wrought a miracle upon a lame man (Acts, iv. 10.) declared, that they had done it in the name of "Jesus of Nazareth, whom," say they, "ye crucified, whom God raised from the dead." This surely was evidence sufficient to convince any reasonable and unprejudiced person, and, consequently, to acquit our Lord of his promise of giving that "evil generation" satisfactory proofs of his being risen from the dead. To the evidence vouchsafed by Christ, neither out of favour to those "who had forsaken all and followed him;" nor to those whom he had chosen to be "witnesses of him to all the world," they certainly could have no just pretensions; who, instead of being his disciples, had rejected his doctrine, and put him to death as an impostor and blasphemer; and instead of shewing any disposition to embrace and propagate his gospel, opposed it with all their power, and, by threats and punishments, forbade his apostles to preach any more in his name. It deserves consideration in this place, that the apostles were not chosen merely to be witnesses of the fact of our Lord's resurrection, but they were appointed to their office, and commissioned to publish it to the world, because, having often seen Christ after his resurrection, they were duly qualified for the service assigned them, and were able to testify the truth of it from their own knowledge. Although our Saviour did not think proper to appear to the people at large; that is, to the multitude of the Jews, who were the declared enemies of his person and religion, and particularly to the chief priests and magistrates, who had been the instruments of his crucifixion; he *shewed himself openly*, without reserve and disguise, to those who had been accustomed to associate with him; and to no fewer than to five hundred such persons at one time; and of the number of these were the twelve apostles, who were specially appointed to preach his doctrine, and to declare the fact of his resurrection, as a distinguishing evidence of its truth and importance. Their office commenced during the period of his public ministry; and one necessary qualification for the future exercise of it was their being able to attest his resurrection. Others might have borne a similar testimony. They were prepared and disposed to do it. But the apostles were particularly selected and ordained for this purpose.

It is a very natural inquiry, why the Jews in general, and the priests and rulers in particular, should not have had an opportunity of seeing Christ after his resurrection, and conversing with him, and ascertaining the reality of the fact? As this was the evidence of his divine mission and character, to which he had often appealed; should not those who persisted in their incredulity, notwithstanding the proofs of supernatural powers, which he had exhibited in the course of his life and ministry, have enjoyed the benefit of it? And if it had been sufficient to overcome their obstinate prejudices, would not their testimony have contributed, more effectually than any other concurring circumstance, to the conviction of mankind in general, and to the credit and influence of Christianity? This kind of reasoning, we allow, seems, on a slight and superficial consideration of it, to be very plausible; and it has been strongly urged and very pertinaciously maintained by sceptics and infidels.

Let us examine the principles upon which it is founded; and we shall perceive that it is more plausible than just, and that it will not warrant the conclusion that has been drawn from it. It supposes, that the Jewish priests and magistrates had a right to expect personal evidence of our Saviour's resurrection; that some useful and important end

would

would have been anſwered by its being afforded them; and that no injury to the character and religion of Chriſt could have reſulted from their being thus indulged and gratified. If neither of theſe ſuppoſitions can be reaſonably admitted; if, upon farther inveſtigation, they ſhould appear to be fallacious and unfounded; it cannot be alleged againſt the evidence of our Saviour's reſurrection, that it was defective and partial, becauſe it was not communicated to the Jewiſh prieſts and rulers.

The plea of right cannot be urged in their favour by any, who duly conſider, what their diſpoſition and conduct had been during our Saviour's life and miniſtry. Men who had diſcovered no inclination to examine the nature of his doctrine and the deſign of his miſſion; who had ſlighted and reſiſted the means of information and conviction, which his preaching and miracles had afforded them; and who had purſued him with malignity and violence to the croſs and grave;—ſuch men could ſurely have no juſt claims on his farther attention: they could have no reaſon to expect, that he would condeſcend to uſe any new efforts for removing their prejudices, when every paſt endeavour had not only proved fruitleſs, but had ſerved to exaſperate their reſentment, and to provoke a perſecution which terminated in his death. Their oppoſition to him had been ſuch both in its nature and degree, as to render them altogether unworthy of any forbearance and indulgence. Much leſs diſcernment than he poſſeſſed would have been ſufficient for perceiving, that no evidence was likely to avail with perſons of their temper and character. They had juſtly forfeited every token of his regard. They had merited the moſt ſignal puniſhment. It would have been not only a vain, but an impious and daring preſumption in them to expect any other evidence of his reſtoration to life beſides that, which they might derive from the teſtimony of perſons leſs guilty and more deſerving than themſelves. Beſides, our Saviour's particular commiſſion to the Jews expired with his death; and he had previouſly informed them that they ſhould not ſee him till they were better diſpoſed to receive him. Every perſonal claim muſt, in this caſe, be ſet aſide.

The plea of right being diſmiſſed as unfounded, the next queſtion that occurs is, whether any important and valuable purpoſe to themſelves or others, would have been anſwered by our Saviour's appearance to them, after his reſurrection? Have we any reaſon to imagine, that they would have been convinced of the truth of his miſſion and doctrine by ſuch an appearance? The ſame prejudices and intereſts that prevented the effect of the miracles which he had performed, and of which they had been witneſſes, would have reſiſted the conviction, which his reſurrection tended to produce. The ſame antipathy to the doctrine he taught and the religion he meant to eſtabliſh, would have prevailed againſt the evidence of this fact; and it is probable, that they would have only aggravated their guilt and condemnation by obſtinately perſiſting in their unbelief.

But though they were convinced of the reality of our Saviour's reſurrection, would they avow their conviction? Would they publicly teſtify the truth of that fact? By an undiſguiſed and open declaration of it, would they lead others to believe and acknowledge it? This, indeed, would have been a very ſignal triumph of truth over prejudice and malice. But it would have been a triumph over their own prejudice and malice, of ſo extraordinary a kind, that it was very unlikely to happen. Pride and intereſt would have been very reluctant in acknowledging that they had perſecuted and murdered a divine Meſſenger; in renouncing the worldly rank and influence which they poſſeſſed; and in ſubmitting to be taught and governed by the authority of Jeſus of Nazareth, whom they had deſpiſed, calumniated, and crucified. If they were conſtrained to aſſent to the truth of our Saviour's reſurrection, it was not very probable that they would confeſs to the world, that he, whom they had perſecuted during his life, and doomed to a premature and ignominious death, was the promiſed Meſſiah and Saviour. It was not very probable, that in ſo doing they would publiſh their own diſgrace, and that they would proclaim to the world, that they were perſecutors and murderers. It would have required a degree of virtuous fortitude, of which we diſcover no traces in the Jewiſh Sanhedrim, to bear public teſtimony to the reſurrection of a perſon whom they had ſo lately condemned and crucified as a malefactor. Without ſuch a teſtimony, of what avail would have been the conviction of their own minds to the general credit of the Chriſtian cauſe? Afraid or aſhamed of avowing it, and thus of forfeiting the reputation and influence annexed to their character and office, and of incurring popular cenſure and reproach; no benefit could have accrued from it either to their contemporaries or to future generations. They were, therefore, very unfit to be witneſſes of a fact, which it was their intereſt to conceal, and which they were not likely to acknowledge, if they had believed it to be true.

Beſides, their teſtimony, if truth had extorted it from them, and if they had poſſeſſed honeſty and reſolution ſufficient to avow it, would have been liable to ſuſpicion. It was the teſtimony of men whoſe minds muſt have been oppreſſed and terrified by a conſciouſneſs of their guilt; and it might have been ſaid, that they were haunted by ghoſts and ſpectres, and that their imagination converted a phantom into the real perſon of him whom they had expoſed to public deriſion, and ſentenced to an ignominious death. Their teſtimony would have gained little credit with men of their own rank and ſtation, and of principles and characters ſimilar to their own. It would have died with themſelves; and produced no effect beyond the circle of their own acquaintance and the age in which they lived.

It ought to be conſidered farther, that the character and religion of Chriſt might have been very materially injured by his appearance to the Jewiſh prieſts and rulers, after his reſurrection. They had no right to expect this kind of evidence. No good purpoſe could be anſwered by it. We now obſerve, that it might have been very detrimental in its effects. If they had remained unconvinced, which might moſt probably have been the caſe, the fact would have been queſtioned. The multitude would have become obſtinate and irreclaimable in their incredulity; and they would have pleaded the authority of their ſuperiors in ſtation and office, as an apology for neglecting inquiry and rejecting the means of conviction. If they had been convinced, without honeſty and reſolution to declare the truth, the fact would ſtill have been conſidered as doubtful, or at leaſt of no great importance. But if with their conviction they connected the public avowal of its truth, our Saviour would have incurred the charge of an impoſtor, and his religion of fraud. Loud would have been the clamour of a combination between him and the rulers of the ſtate. Suſpicion would have attached itſelf to the evidence of men, who had the care of his ſepulchre, who appointed the guard, and ſealed the ſtone that ſecured it, and who could eaſily have propagated a report, which would have gained credit with the ſervile multitude. Chriſtianity would have been repreſented, by perſons who are prone to aſcribe all religion to ſtate policy, as a contrivance of the prieſts and magiſtrates

rates of Judea, to anſwer ſome purpoſe of worldly emolument or ambition. Its progreſs and prevalence would have been attributed to the ſecular influence of its advocates; and it would have been deprived of that moſt diſtinguiſhing and ſatisfactory evidence which it now poſſeſſes, that it derived its origin from God, and owed its ſucceſs to the ſignal interpoſition of divine power.

Allowing that the apoſtles and firſt diſciples had ſufficient evidence of our Lord's reſurrection, we are next to inquire, in the diſcuſſion of this intereſting ſubject, how the fact may be aſcertained to the ſatisfaction of thoſe who live in ages and nations far remote from thoſe in which it occurred. Such perſons muſt recur for conviction, firſt and principally to the *teſtimony* of the original witneſſes, choſen to announce the fact to the world, tranſmitted from one country and one age to another in writings, either penned by themſelves, or authorized by their inſpection and approbation. Theſe writings are contained in the *Goſpels*, the *Acts*, the *Epiſtles*, and the *Revelation;* and for proofs of their authenticity and credibility, we refer to theſe titles, and alſo to BIBLE, CANON, and TESTAMENT; and for an account of their authors, to MATTHEW, MARK, LUKE, JOHN, PAUL, PETER, &c. How far we may ſafely, and without danger of miſtake, rely on the teſtimony of the witneſſes of our Saviour's reſurrection, thus tranſmitted to us, will appear, if we conſider, that they were men, not only capable of knowing the truth, and duly informed concerning it, but, on account of their general character, unlikely to report and propagate a falſehood. They had been raiſed from private and obſcure ſtations to the office they ſuſtained. They were deſtitute of thoſe natural talents and external advantages which ſuggeſt and favour a plan of impoſture and deceit. Artleſs and undeſigning, and unconnected with perſons of extended views and worldly influence, they were unfit inſtruments for concerting and executing a deliberate and complicated ſcheme of deluſion. The principles they had embraced, and the profeſſion they had aſſumed, ſince their converſion to Chriſtianity, were altogether incompatible with a combination to promote the prevalence of a known falſehood. Integrity and a regard to truth, under the awe of the God of truth and juſtice, and in the proſpect of righteous judgment and retribution, were the avowed principles of their conduct; and they muſt have been impoſtors, chargeable with the moſt atrocious guilt and the moſt conſummate folly, if they had propoſed, by the wickedneſs of deceit, to promote the cauſe of truth and virtue. But the falſehood of aſſerting, that Chriſt was riſen, was ſuch as would never have engaged their concurrence and ſupport. It was an event of which they had no expectation. Their prejudices and falſe hopes had led them to ſurrender their cauſe, as altogether defeated, when their Maſter ſubmitted to death. They had either forgotten or miſunderſtood his predictions; and when ſome of them firſt received the report of his reſurrection, they were departing from Jeruſalem with dejected and deſpairing ſpirits; and they needed very peculiar evidence of the fact, before they were diſpoſed to admit the reality of it. If Chriſt had not actually riſen from the dead, theſe men would have returned to their former attachments and occupations. All their prepoſſeſſions in favour of the perpetuity of the law of Moſes would have revived. Diſappointed in their erroneous expectations, they would have been the leſs inclined to propagate an impoſture.

More eſpecially when we conſider, that all their intereſts, as well as their prejudices, militated againſt their public declaration of a fact, which had never exiſted. Can we ſuppoſe, that they would have incurred the reſentment of the whole body of the Jews; and that they would have hazarded their lives in the ſupport of a cauſe, the founder of which had deceived and betrayed them? On the contrary, we diſcern in the temper and conduct of the witneſſes of our Lord's reſurrection undeniable evidence of their conviction of its truth, and of their ſincerity in avowing and publiſhing it. Nothing leſs than the evidence of truth can account for the change which they manifeſted both in their ſentiments and conduct. Men, who a little while before were timid and deſpairing, become bold and fearleſs; declare the fact on the ſcene, where they report it to have happened, and in the preſence of thoſe, who, after having ſucceeded in procuring the crucifixion of Chriſt, employed all the means in their power for preventing any deluſion with regard to his reſurrection; and who expoſe themſelves to perſecution and death in aſſerting and proclaiming it. With new views, with reſpect to the nature and extent of the Chriſtian diſpenſation; with a knowledge and zeal, with a ſteadineſs and conſtancy, which indicate a conſciouſneſs of truth and an extraordinary illumination; they publiſh the fact, and propagate the doctrines and duties which it was deſigned to eſtabliſh and enforce.

Beſides, "the apoſtles wrought miracles in confirmation of the truth of their teſtimony." The God of truth concurred with them, and atteſted their credibility; and thus obviated every doubt and difficulty, which prejudice and malignity might have ſuggeſted. Every miracle they performed was a new atteſtation to the fact which they reported, and the extraordinary powers they poſſeſſed, and which they derived from the Sovereign of nature, qualified them for being proper witneſſes of it to the world. He, who appointed them to this office, aided them in the execution of it. Their ſucceſs, inſufficient as they were of themſelves to combat the prejudices and powers of the world, afforded an increaſing and permanent evidence of the fact, on which their commiſſion was founded. To us their teſtimony has deſcended with every ſanction and with every circumſtance of credibility, that can juſtify our aſſent, and our attachment to the doctrine they taught, and to the practice of the duties they inculcated.

In the prevalence and duration of Chriſtianity, and in the proſpect of its continued ſubſiſtence and increaſing ſpread and triumph, we diſcern traces of its divine original: we ſee exiſting proof of the reſurrection of its founder; and we perceive reaſons and motives for holding faſt the profeſſion of our faith in it without wavering. Our religion is founded on evidence, that cannot be reaſonably queſtioned: the objections to which it is liable, furniſh, on due examination, arguments in its favour. It needs only an impartial ſcrutiny and trial, in order to approve itſelf *the wiſdom and the power of God.*

From the exiſtence of the Chriſtian religion, which we may conſider as a diſtinct argument in proof of our Saviour's reſurrection, may be deduced the ſame kind of evidence of this fact, as is exhibited to us of the deluge by the many petrifactions of ſhells and bones of fiſhes, and other animals of diſtant regions, &c. found often in the bottoms of the deepeſt mines, and the bowels of the higheſt mountains; for, as it is impoſſible to account for thoſe various petrifactions being lodged in ſo many parts of the earth, ſome many leagues diſtant from the ſea, others very much above the level of it, without admitting ſuch a ſubverſion and confuſion of this globe, as could not have been occaſioned by a leſs violent cauſe than the "breaking up of the fountains of the great deep, and the waters flowing above the tops of the higheſt hills;" ſo will it be extremely difficult to account for the propagation and preſent exiſtence of Chriſtianity in ſo many regions

regions of the world, without ſuppoſing that "Chriſt roſe from the dead," aſcended into heaven, and enabled his diſciples, by the miraculous gifts of his holy ſpirit, to ſurmount ſuch obſtacles, as no mere human abilities could poſſibly overcome. See CHRISTIAN *Religion*. "Obſervations on the Hiſtory and Evidences of the Reſurrection of Jeſus Chriſt," by Gilbert Weſt, eſq. "Obſervations on the Converſion of St. Paul," by the right hon. George lord Lyttelton. "The Trial of the Witneſſes of the Reſurrection of Jeſus." Rees's Sermons, vol. i. Serm. 4.

The reſurrection of Chriſt is a moſt important fact, not only as it certifies his divine miſſion, the character he aſſumed, and the truth of the doctrine he taught, but as it aſſures us of the reality of a future ſtate of righteous retribution. This event exhibits a triumph over death, which proves not merely the poſſibility, but the certainty, of a general reſurrection of mankind. It is the pledge and earneſt of that reſtoration to life, which Jeſus Chriſt, as a divine teacher, both predicted and promiſed. Many curious queſtions have been propoſed on the mode of the future exiſtence of mankind; as well as on the place of abode of the good and wicked (ſee HEAVEN and HELL); and alſo on the time when this intereſting event ſhall happen. (See SLEEP *of the Soul.*) With regard to the mode of our future being, it is generally allowed, both by thoſe who believe and thoſe who deny the eſſential diſtinction between matter and ſpirit, that we ſhall exiſt hereafter in a corporeal form; but the difference between our preſent bodies and thoſe in which we ſhall exiſt after the general reſurrection is a ſubject, which, however it may have engaged the attention and employed the pens of metaphyſicians and polemical theologians, is more curious than uſeful; and provided that we ſhall exiſt hereafter, we need not be anxious about the deciſion of this queſtion. It is important merely as it relates to the doctrine of a future exiſtence in general, the truth of which, whatever may be the conjectures of the learned, it does not invalidate.

Many Chriſtians believe the reſurrection of the ſame identical body, the very ſame fleſh and bones, at the day of judgment. The two principal philoſophical objections againſt it are theſe:

1. That the ſame piece of matter, or ſubſtance, may happen to be a part of two or more bodies. Thus a fiſh feeding on a man, and another man afterwards feeding on the fiſh, part of the body of the firſt man becomes firſt incorporated with the fiſh, and afterwards in the fiſh, with the laſt man. Again, inſtances have been known of one man's feeding immediately on another; and, among the cannibals of the Weſt Indies, the practice has been frequent.

Now, where the ſubſtance of one is thus converted into the ſubſtance of another, each cannot riſe with his whole body; and to which ſhall the common part be allotted?

To this objection ſome anſwer, that, as all matter is not fit or diſpoſed to be aſſimilated to the body, and incorporated with it, human fleſh may very probably be of this kind; and, therefore, what is thus eaten, may be again excreted, and carried off. But Mr. Leibnitz's anſwer ſeems the more ſolid. All that is eſſential to the body, he urges, is the original ſtamen which exiſted in the ſemen of the father; nay, and on the footing of the modern theory of generation, which exiſted in the ſemen of the firſt man. This we may conceive as the moſt minute ſpeck or point imaginable; and therefore, not to be ſeparated, or torn aſunder, and any part of it united with the ſtamen of any other man. All this bulk we ſee in the body, is only an accretion to this original ſtamen; an addition of foreign matter, of new juices, to the primary, ſolid ſtamen: there is, therefore, no reciprocation of the proper matter of the human body.

The ſecond objection is this: the human body, we know, by the late diſcoveries in the animal economy, is continually changing; a man has not entirely the ſame body to-day as he had yeſterday; and it is even computed, that in leſs than ſeven years' time, his whole body undergoes a change, and not a particle of the ſame body remains. Which of thoſe many bodies, then, which the ſame perſon has in the courſe of his life, is it that ſhall riſe? or does all the matter that has ever belonged to him riſe again? or does only ſome particular ſyſtem thereof? The body, *e. gr.* he had at twenty, at thirty, or at ſixty years old? If only this or that body ariſe, how ſhall it be rewarded or puniſhed for what was done in the other? with what juſtice does one perſon ſuffer, &c. for another?

To this it may be anſwered on Mr. Locke's principles, that perſonal identity, or the ſameneſs of a rational being, conſiſts in ſelf-conſciouſneſs; in the power of conſidering itſelf the ſame thing in different times and places. By this every one is to himſelf what he calls *ſelf;* without conſidering whether that ſelf be continued in the ſame or divers ſubſtances. So far reaches the identity of that perſon. It is the ſame ſelf now it was then; and it was by the ſame ſelf which now reflects on an action, that action was performed.

Now, it is this perſonal identity that is the object of rewards and puniſhments, which we have obſerved may exiſt in different ſucceſſions of matter; ſo that to render the rewards and puniſhments juſt and permanent, nothing needs but that we riſe again with ſuch a body as that we retain the conſciouſneſs of our paſt actions.

RESUSCITATION. See RESURRECTION, and REVIVIFICATION.

RESUSCITATION *of Plants*, in *Chemiſtry*, the art of reproducing a plant from its aſhes. See PALINGENESIA.

Many have pretended to this art, and have ſhewn reſuſcitated plants in vials; but all theſe ſeem only particular inſtances of artificial chemical vegetations, of which many others may be given. The external appearances of theſe reſemble plants, and the ignorant may eaſily take them for ſuch; but when cloſely conſidered, there is a great difference to be found. See *Artificial* VEGETATION.

RETAIL, in *Commerce*, &c. the buying of goods in the great, or by wholeſale, and ſelling them out again in ſmall parcels.—"Qui rem integram ementes, per minutiores eam partes diſtrahebant."

RETAIN, *To*, ſpoken of mares, ſignifies *to hold*, *i. e.* to conceive after covering.

RETAINER, in *Law*, a ſervant not menial or domeſtic, that is, not continually dwelling in the houſe of his lord and maſter, but only wearing his livery, and attending on ſpecial occaſions.

This livery was anciently given by a great man, and frequently for the maintenance of quarrels; whence it was juſtly prohibited by ſeveral ſtatutes; as under Richard II. on pain of impriſonment, and grievous forfeiture to the king.

It was further prohibited by other ſtatutes of the ſucceeding kings, by which the delinquents were ſubject to make ranſom at the king's pleaſure; and knights and eſquires hereof duly attainted were to loſe their ſaid liveries, and forfeit their fees for ever.

Edward IV. added a ſpecial penalty of five pounds *per* month on every man that gave ſuch livery, and as much on every perſon ſo retained, either by writing, word, or

oath. But moſt of theſe ſtatutes are repealed by a ſtatute 3 Car. I.

RETAINER *of Debts*, a remedy which the law gives to an executor or adminiſtrator for the debt, by allowing him to retain ſo much as will pay himſelf, before any other creditors whoſe debts are of equal degree. (See DEBT.) The debts of co-executors ſhall be diſcharged in proportion. An executor of his own wrong ſhall not, in any caſe, be permitted to retain.

RETAINING-FEE, is the firſt fee given in any cauſe to a ſerjeant or counſellor at law, by which to make him ſure, that he ſhall not be on the contrary ſide.

RETALIATION, RETALIATIO, the act of returning like for like. See TALIONIS *Lex*.

When a nation cannot obtain juſtice, either for a loſs or an injury, it has a right to do itſelf juſtice. But before it declares war, there are various methods practiſed among nations for obtaining ſatisfaction. Among theſe is that called the law of retaliation, according to which we make another ſuffer exactly ſo much evil as he has done. Many have extolled this law, as being derived from the moſt ſtrict juſtice; and can we be ſurpriſed at their having propoſed it to princes, when they have even dared to give it for a rule to the Deity himſelf! The ancients called it the law of Rhadamanthus. Although a nation may puniſh another which has done it an injury, if it refuſes to give juſt ſatisfaction; yet it has not a right to extend the penalty beyond what is required by its own ſafety. Retaliations, unjuſt between private perſons, would be much more ſo between nations, becauſe here the puniſhment would, with difficulty, fall on thoſe who have done the injury. What right would you have to cut off the noſe and ears of the ambaſſador of a barbarian, who had treated yours in the ſame manner? As to thoſe repriſals in time of war, which partake of the nature of retaliation, they are juſtified on other principles. (See REPRISALS.) All that is true in this idea of retaliation is, that every thing be equal; the pain ought to bear ſome proportion to the evil required to be puniſhed; the end and even the foundation of puniſhment requiring thus much.

RETARDATION, RETARDATIO, in *Phyſics*, the act of retarding; that is, of delaying the motion or progreſs of a body, or of diminiſhing its velocity.

The retardation of moving bodies ariſes from two great cauſes, the *reſiſtance of the medium*, and the *force of gravity*.

The RETARDATION *from the Reſiſtance* is frequently confounded with the reſiſtance itſelf; becauſe, with reſpect to the ſame moving body, they are in the ſame proportion. See RESISTANCE.

With reſpect to different bodies, however, the ſame reſiſtance often generates different retardations. For if bodies of equal bulk, but different denſities, be moved through the ſame fluid with equal velocity, the fluid will act equally on each; ſo that they will have equal reſiſtances, but different retardations; and the retardations will be to each other as the velocities which might be generated by the ſame forces in the bodies propoſed; that is, they are inverſely as the quantities of matter in the bodies, or inverſely as the denſities.

Suppoſe, then, bodies of equal denſity, but of unequal bulk, to move equally faſt through the ſame fluid, their reſiſtance increaſes according to their ſuperficies; that is, as the ſquares of their diameters. But the quantities of matter are increaſed in proportion to the cubes of the diameters: the reſiſtances are the quantities of motion; the retardations are the celerities ariſing from them; and dividing the quantities of motion by the quantities of matter, you will have the celerities; therefore the retardations are directly as the ſquares of the diameters, and inverſely as the cubes of the diameters; that is, inverſely as the diameters themſelves.

If the bodies be equal, move equally ſwift, and are of the ſame denſity, but move through different fluids, their retardations are as the denſities of thoſe fluids.

And when bodies equally denſe, and of equal bulk, are carried through the ſame fluid with different velocities, the retardations are as the ſquares of the velocities.

The RETARDATION *from Gravity* is peculiar to bodies projected upwards. A body thrown upwards is retarded after the ſame manner as a falling body is accelerated; only, in the one caſe, the force of gravity conſpires with the motion acquired; and in the other, it acts contrary to it.

As the force of gravity is uniform, the retardation from that cauſe will be equal in equal times.

Hence, as it is the ſame force which generates motion in the falling, and diminiſhes it in the riſing body, a body riſes till it has loſt all its motion; which it does in the ſame time in which a body falling would have acquired a velocity equal to that with which the body was thrown up.

Thus, alſo, a body thrown up will riſe to the ſame height, from which falling, it would acquire the velocity with which it is thrown up; therefore the heights, which bodies thrown up with different velocities can riſe to, are to each other as the ſquares of the velocities.

Hence, the retardations of motions may be compared together: for they are, firſt, as the ſquares of the velocities; ſecondly, as the denſities of the fluids through which the bodies are moved; thirdly, inverſely, as the diameters of thoſe bodies; laſtly, inverſely, as the denſities of the bodies themſelves.

The numbers in the ratio compounded of thoſe ratios, expreſs the proportion of the retardations; multiplying the ſquare of the velocity by the denſity of the fluid, and dividing the product by the product of the diameter of the body multiplied into its denſity; and working thus for ſeveral motions, the quotients of the diviſions will have the ſame compound ratio to one another.

RETARDATION *of Motion, Laws of*. 1. If the motion of a body be uniformly retarded, that is, if its celerity be diminiſhed equally in equal times, the ſpace it paſſes over is one half of that it would paſs over in the ſame time by an uniform motion.

2. The ſpaces deſcribed in equal times by an uniformly retarded motion, decreaſe according to the uneven numbers 9, 7, 5, 3, &c. See ACCELERATION and MOTION.

RETCH, or RETCHES, a name given by our farmers to an iron, or a pair of irons, which in the common plough ſerve to faſten the ſheet to the beam. The retches are faſtened to the ſheet with nails, and to the beam with pins.

RETCHANI, in *Geography*, a town of Ruſſia, in the government of Pikov; 16 miles S. of Tropetz.

RETCHING, or REACHING, the effort or endeavour to vomit. See NAUSEA.

RETCHNA, in *Geography*, a circar or province of Hindooſtan, ſituated between the rivers Rauvee and Chunaub; in which are the cities of Lahore, Ameenadab, Sealcot, and ſeveral other towns.

RETE MALPIGHII, in *Anatomy*, the network compoſing the cellular ſtructure of the lungs.

RETE *Mirabile*, the plexus of veſſels formed by the internal carotid arteries of animals, before they branch out to the brain. See MAMMALIA.

RETE *Mucoſum*, the ſoft delicate layer of the integuments interpoſed between the cuticle and the true ſkin, in which

which the colour of the ſkin reſides. This part is much thicker in the dark coloured than in the light races of man, and is black in the Negro. See INTEGUMENTS.

RETE *Teſtis*, a part of the excretory apparatus of the teſticle. See the deſcription of that gland in the article GENERATION.

RETE *Peny*, in *Ancient Records*, a cuſtomary due of one penny for every perſon to the pariſh prieſt.

RETEH, or ARRATAMA, in *Geography*, a diſtrict of Africa, in the country of Sugulmeſſa.

RETEINER, or RETAINER. See RETAINER.

RETENEGI, in the *Materia Medica*, a name uſed by Avicenna, and others, to expreſs the common reſin of the pine, or fir-tree, and ſometimes common black pitch. The lexicographers have given us *ſtorax* as the explanation of retenegi, but this is not warranted by any paſſage in the authors who uſe the word. It is certain, indeed, that the generality of authors have confounded the ſeveral ſorts of reſin and pitch-making trees together, and among them the pine, fir, cedar, and turpentine trees, are called by the ſame name, but the ſtorax-tree is never included among the number. Theſe were only confounded together, becauſe of the ſimilitude of the things they produced; but the ſtorax was too different from all theſe, and too precious a gum not to be diſtinguiſhed.

RETENTA, a word uſed by the medical writers to expreſs things retained in the body, or which are not to be retained in a ſtate of good health.

RETENTIO, RETINENTIA, in our law-books, is ſometimes uſed to ſignify retinue.

RETENTION, RETENTIO, a faculty of the human mind, by which, in order to a farther progreſs in knowledge, it keeps or retains thoſe ſimple ideas, which it before received by ſenſation or reflection.

This is done two ways. Firſt, by keeping the idea which is brought into the mind for ſome time actually in view. This is called *contemplation*.

Secondly, by reviving thoſe ideas in our minds, which have diſappeared, and have been, as it were, laid out of ſight. This is *memory*, which is, as it were, the repoſitory of our ideas.

RETENTION is alſo uſed, in *Medicine*, &c. for the ſtate of contraction in the ſolids, or vaſcular parts of the body, which makes them hold faſt their proper contents.

In this ſenſe, retention ſtands oppoſed to evacuation and excretion.

Retention and excretion make two of the non-naturals.

RETENTION is alſo frequently conſidered as a diſorder, and defined the act of retaining the excrements, humours, &c. ſo as they cannot be voided out of the body. See INFANT.

It is the retention of peccant humours which cauſes ſuch a diſeaſe.

RETENTION *of Urine*. See URINE, *Retention of*.

RETFORD, EAST, in *Geography*, a market and borough-town in North Clay diviſion of the wapentake of Baſſetlaw, county of Nottingham, England, is ſituated on the eaſtern bank of the river Idle, at the diſtance of 29 miles N.N.E. from Nottingham, and 145 miles N. by W. from London. Retford conſiſts of two diſtinct parts, or diſtricts, reſpectively named, from their poſition to the river, Eaſt and Weſt Retford; the former of which is ſtrictly the market-town, and the latter a ſeparate pariſh, or ſuburb. Edward II. granted to the burgeſſes the right of choofing bailiffs for the government of the town; and Henry III. granted them a fair. By a charter from Henry VI., the bailiff was empowered to hold a court of record, and to execute the office of eſcheator and clerk of the market. Theſe immunities have ſince been confirmed, and others added by James I.; under whoſe charter, Retford is now governed by two bailiffs, a ſteward, twelve aldermen, two chamberlains, a town-clerk, and two ſerjeants at mace. The bailiffs and ſteward for the time being are juſtices of the peace, and of the quorum, within the borough. Retford ſends two members to the national ſenate, and theſe are choſen by about 150 voters, compoſed of the bailiffs, aldermen, and freemen. Like moſt other ſmall boroughs, it has occaſionally been the ſcene of warm election conteſts. This place firſt exerciſed the right of repreſentation in the early part of the reign of Edward II.; but it ſeems to have allowed this privilege to remain dormant from the ninth year of that king till the thirteenth year of queen Elizabeth, when the ſame was reſumed, and has continued to be regularly exerciſed ever ſince. Formerly the county aſſizes were held here; but of late years all criminal trials have taken place at Nottingham, the county town.

Retford market-day is Saturday, weekly; and there are, beſides, two annual fairs for horſes and black cattle, held on the 23d of March and the 2d of October. At the commencement of the laſt century, a conſiderable malting buſineſs was carried on here; but Workſop has occaſioned its decline. At preſent, Retford is ſupported principally by its hat and ſail-cloth manufactories. Major Cartwright ſome years ago eſtabliſhed a worſted mill in the immediate vicinity; but the project, having proved unſucceſsful, has been abandoned. An agricultural ſociety was eſtabliſhed here in 1799, under the auſpices of the duke of Portland, viſcount Newark, colonel Eyre, and others.

The public buildings in Retford are the town-hall, Sloſwick hoſpital, a free-ſchool endowed by Edward VI., an alms-houſe for twelve poor women, and the pariſh church. The laſt, called the corporation church, is a ſmall, but neat, edifice, in the Engliſh ſtyle of architecture, though much modernized, particularly in the interior. The living is a vicarage, in the patronage of the duke of Devonſhire.

On the weſtern bank of the Idle, and connected with the borough by a handſome modern bridge, is the village of Weſt Retford, which, however, is altogether diſtinct from Eaſt Retford, both as to civil and eccleſiaſtical juriſdiction. Here is an hoſpital, which was founded in 1666 by John Dorrel, M.D., for ſixteen poor perſons, who are allowed annually 10*l.* each, beſides clothing, coals, &c. Much injury was done to this village by a heavy flood, which occurred in 1795; but it is nevertheleſs a very thriving place, as well as Eaſt Retford, and derives conſiderable advantage from its proximity to the Cheſterfield canal. Weſt Retford Hall, a ſeat of the Emerſon family, is the moſt conſpicuous ornamental object in the immediate neighbourhood. St. John's well, a mineral ſpring about a mile from Retford, has been long famed for its medicinal qualities. South-eaſt of Retford is Grove-Hall, the ſeat of Anthony Hardolph Eyre, eſq., M.P. for the county. The houſe is ſeated on an eminence in a finely wooded park. Thoroton's Hiſtory of Nottinghamſhire, folio, 1663. republiſhed with large additions by John Throſby, 3 vols. 4to. vol. iii. Beauties of England and Wales, vol. xii. by Mr. Laird.

RETHEL, a town of France, and principal place of a diſtrict, in the department of the Ardennes; before the revolution, the capital of a ſmall country, called the "Retelois." The place contains 4862, and the canton 12,473 inhabitants, on a territory comprehending 200 kiloметres, in 23 communes. N. lat. 49° 30′. E. long. 4° 27′.

RETHEM, a town of Weſtphalia, in the principality of

of Luneburg Zell, on the Aller; 32 miles W. of Zelle. N. lat. 52° 51′. E. long. 9° 18′.

RETHONDES, a town of France, in the department of the Oise; 5 miles N.E. of Compeigne.

RETHWISCHE, a town of the duchy of Holstein; 25 miles N.E. of Hamburg.

RETI, in *Hindoo Mythology*, a personification of Affection, and the fabled consort of Kama, the god of love. She is represented in pictures as a beautiful woman, on horseback sometimes, and in the act of throwing a lance. Allusions to this goddess, proverbial for beauty, occur very frequently in Hindoo writings. Under the article RADHA, that lovely goddess describes the glances of her eye as "keener than the arrows darted by the husband of Reti." She sometimes is styled "mother of Kama." That appellation occurs in the article RUNEKA of this work. Kama is often called "he who loveſt the goddess Reti." On the occasion of the combustion of the god of love, as noticed under KAMA, the lamentations of the afflicted Reti are very touchingly related by the celebrated Kalidasa, author of Sakuntala. A whole book of his poem, entitled "Kumarasambhava, or the Birth of Kumera," is occupied with her tender sorrows. This book sir W. Jones's teacher, a learned Vaidya (see VAIDYA), was restrained from reading; considering the ceremonies of a marriage, that of Kama and Reti, at which Brahma himself officiated as father of the bridegroom, as too holy to be known by any but Brahmans. An instance somewhat similar, of a book being too holy to be read by individuals of an inferior class, is given under RAMAYANA. Farther particulars connected with the interesting goddess, the subject of this article, will be found under KAMA, KRISHNA, and PRADYAMNA.

RETIARII, in *Antiquity*, a kind of gladiators, thus denominated from a net which they made use of against their antagonists, who were called *secutores*, and sometimes *myrmillones*. See GLADIATOR.

The word is formed from the Latin, *rete*, *net*; or perhaps from *retejaculum*; for they call their net *jaculum*, and sometimes in one word *retejaculum*.

This net they carried under their buckler, and, when opportunity served, cast it over the head of their antagonist, and, in this condition, killed him with a trident, or three-grained spear, which they bore in the other hand.

Lipsius and others observe, that they fought in tunics, and were furnished with sponges to wipe off the sweat, blood, &c. and to stop their wounds.

RETICENCY, RETICENTIA, a figure in *Rhetoric*, by which we make oblique mention of a thing, in pretending to pass it over unmentioned.

Thus: *to say nothing of the nobility of his ancestors: I forbear to speak of his courage, and pass over the severity of his morals.* See APOSIOPESIS and PRETERITION.

RETICULA, RETICULE, in *Astronomy*, a contrivance for the exact measuring of the quantity of eclipses, introduced several years ago by the Royal Academy of Paris. See ECLIPSE.

The reticule is a little frame, consisting of thirteen fine silken threads, equidistant from each other, and parallel; placed in the focus of object-glasses of telescopes; that is, in the place where the image of the luminary is painted in its full extent. Of consequence, therefore, the diameter of the sun and moon is by this seen divided into twelve equal parts or digits; so that, to find the quantity of the eclipse, there is nothing to do but to number the luminous and the dark parts.

As a square reticule is only proper for the diameter, not for the circumference of the luminary, it is sometimes made circular, by drawing six concentric equidistant circles. This represents the phases of the eclipse perfectly.

But it is evident, that the reticule, whether square or circular, ought to be perfectly equal to the diameter or circumference of the sun or star, such as it appears in the focus of the glass, otherwise the division cannot be just. Now this is no easy matter to effect, because the apparent diameter of the sun and moon differ in each eclipse; nay, that of the moon differs from itself in the progress of the same eclipse.

Another imperfection in the reticule is, that its bigness is determined by that of the image in the focus; and of consequence it will only fit one certain magnitude.

But M. de la Hire has found a remedy for all these inconveniencies, and contrived that the same reticule shall serve for all telescopes, and all magnitudes of the luminary in the same eclipse. The principle on which his invention stands is, that two object-glasses applied against each other, having a common focus, and there forming an image of a certain magnitude, this image will increase in proportion as the distance between the two glasses is increased as far as a certain limit.

If, then, a reticule be taken of such a magnitude, as just to comprehend the greatest diameter the sun or moon can ever have in the common focus of two object-glasses applied to each other, there needs nothing but to remove them from each other, as the star comes to have a less diameter, to have the image still exactly comprehended in the same reticule.

Another improvement is, that whereas the silken threads are subject to swerve from the parallelism, &c. by the different temperature of the air; a reticule may be made of a thin looking-glass, by drawing lines or circles on it with the fine point of a diamond; which shall be safe from any alteration of the air. See MICROMETER.

RETICULAR BODY, *corpus reticulare*, in *Anatomy*, a body of vessels lying immediately under the cuticle or scarf-skin. See INTEGUMENTS.

RETICULAR *Plexus*, *plexus reticularis*, sometimes denotes the choroides, which is thus called, because its fibres are interwoven like a net.

RETICULARIA, in *Botany*, a genus of *Fungi*, named by Bulliard, from the reticulated appearance of its structure when ripe. It is the LYCOGALA of Micheli, Persoon, and others; see that article.

RETICULARIS MEMBRANA, in *Anatomy*, a name sometimes given to the cellular substance. Dr. Hunter speaks of the cellular substance, which contains no fat, under this name, giving the appellation of adipous cellular substance to the other.

RETICULUM, in *Comparative Anatomy*, one of the divisions of the stomach in ruminating animals, so called from the reticulated arrangement of the folds of its internal membrane. See MAMMALIA.

RETIERS, in *Geography*, a town of France, in the department of the Ille and Vilaine, and chief place of a canton, in the district of Vitré; six miles W.S.W. of La Guerche. The place contains 2384, and the canton 14,638 inhabitants, on a territory of 237½ kiliometres, in 10 communes.

RETIMO, a town of the island of Candia, built on the ruins of the ancient Rithymna. The environs of this town afford prospects that are very picturesque:—gardens planted with orange-trees, among which rise some date-trees; fields covered with olive-trees and kitchen-garden plants; rising grounds, on which the vine, the fig-tree, the mulberry-tree, and the almond-tree grow together; and farther

farther on, wooded mountains:—to the weſt, the citadel, the harbour, and the ſea. In a word, every thing concurs to render Retimo the moſt agreeable town in the iſland. It would alſo have become, perhaps, the richeſt, and the moſt populous, if the harbour, ſmall as it is, had been kept in order. At preſent it is only practicable for the barks of the country; ſhips remain in the road, but rarely anchor here; and thus Retimo, which, from its poſition, the abundance of oil which is collected in its vicinity, and the other productions of its territory, might be an important place of trade, has, as well as Candia, ſeen a part of its population paſs to Canea. Its preſent population, ſays Olivier, conſiſts of from 5 to 6000 inhabitants, half Greeks, half Turks: the Jews here are not ſo numerous as at Candia.

This town, weakly defended, was plundered and ravaged by the Turks, as far back as the year 1572, while Selim II. was cauſing the ſiege of Famaguſta, in Cyprus, to be puſhed on with vigour; but it was not till the reign of Ibrahim, in 1645, that the Venetians were driven from it for ever; 40 miles W. of Candia. N. lat. 35° 20′. E. long. 24° 21′.

The province of Retimo is one of the beſt cultivated and moſt productive of the iſland; it furniſhes a great deal of oil, a little barley and wheat, and a tolerably large quantity of wine. The riſing grounds and hills which ſkirt the ſhores of Armiro are almoſt all covered with vines. On the neareſt mountains which lie to the ſouth, is a foreſt of common and native oaks, maples, and carob-trees, into which the inhabitants of Retimo come to cut the wood, of which they ſtand in need. To the ſouth of Retimo are the two provinces of Aïon-Vaſſali and Amuri, the only ones that are compriſed in this pachalic; they furniſh wheat, barley, oil, and ſome fruits. The former, ſituated to the N.W. of the other, furniſhes, beſides, excellent cheeſe, which is confounded in trade with that of Sphachia. The Greeks are more numerous than the Turks in the provinces of Aïon-Vaſſali and Amuri. Olivier and Sonnini.

RETINA, in *Anatomy*, a membrane of the eye, formed by the expanſion of the optic nerve, and conſtituting the immediate organ of viſion. See EYE.

RETINA, in *Optics*. The retina is uſually ſuppoſed to be the great organ of viſion, which is effected by means of the rays of light reflected from each point of the objects refracted in their paſſage through the aqueous, vitreous, and cryſtalline humours, and thus thrown on the retina, where they paint the image of the object; and where they make an impreſſion, which is continued thence, by the fine capillaries of the optic nerves, to the ſenſory. See EYE and VISION.

Indeed, whether the retina, or the choroides, be the principal organ of viſion, and that on which the images of objects are repreſented, has been much controverted between ſeveral members of the Royal Academy; particularly Meſſrs. Mariotte, Pecquet, Perrault, Mery, and de la Hire. Mariotte firſt referred viſion to the choroides, and was ſeconded by Mery; the reſt aſſerted the cauſe of the retina.

The retina was always judged to have all the characters of the principal organ. It is ſituated in the focus of the refraction of the humours of the eye; and of conſequence receives the vertices of the cones of rays, proceeding from the ſeveral points of objects. It is very thin, and conſequently very ſenſible. It has its origin from the optic nerve, and is itſelf wholly nervous; and it is the common opinion, that the nerves are the vehicles of all ſenſations. Laſtly, it communicates with the ſubſtance of the brain, where all ſenſations terminate.

As to the choroides, its uſe was ſuppoſed to be to ſtop the rays, which the extreme tenuity of the retina ſhould let paſs; and to do the ſame office with reſpect to the retina, which the quickſilver does to a looking-glaſs; eſpecially in thoſe animals in which it is black.

But from an experiment of a cat plunged into water, M. Mery conceived a different opinion. (See PUPIL.) He obſerved the retina to diſappear abſolutely on that occaſion, as well as all the other humours of the eye; while the choroides ſtill appeared diſtinctly, and even with all the lively colours which it has in that animal. Hence, he concluded, that the retina was as tranſparent as the humours, but the choroides opaque; conſequently the retina was not a proper inſtrument to terminate and ſtop the cones of rays, or to receive the images of objects; but that the light muſt paſs through it, and could only be ſtopped on the choroides; which therefore would become the principal organ of viſion. The black colour of the choroides in man is extremely favourable to this opinion; the principal organ ſhould ſeem to require, that the action of the light ſhould terminate on it as it arrives; which it is certain it here does in the black, that abſorbs all the rays, and reflects none; and it ſhould alſo ſeem neceſſary, that the action of the light ſhould be ſtronger on the organ of ſight than any where elſe: now it is certain that the light, being received and abſorbed in a black body, muſt excite a greater vibration there than any where elſe; and hence it is that black bodies are kindled by a burning-glaſs much ſooner than white ones.

The ſituation of the choroides behind the retina is another circumſtance on its ſide; M. Mery having obſerved the ſame poſition of the principal organ behind a mediate organ in the other ſenſes, which makes an happy analogy. Thus the cuticle extended over the ſkin is the mean organ of feeling; but the cutis underneath is the principal organ. The like is obſerved in the ear, noſe, &c.

The retina, therefore, ſhould ſeem a kind of mediate or ſecondary organ, ſerving to break the too ſtrong impreſſion of the light on the choroides, or to preſerve it; which is the uſe aſcribed to the cuticle. Add to all this, that the retina is inſenſible, as having its origin from the medullary ſubſtance of the brain, which is ſo too; and the choroides, on the contrary, is very ſenſible, as ariſing from the pia mater, which is certainly ſenſible in a great degree.

This laſt argument being doubted of, M. Mery was engaged to prove it; which he did before the Royal Academy, where he ſhewed that the optic nerve is not compoſed, like the other nerves, of fibres; that it is only a train of the medulla incloſed in a canal, out of which it is eaſily ſeparable.

This ſtructure of the optic nerve, hitherto unknown, ſhews that the retina can be no membrane; it is only a dilatation of the medulla, incloſed under two membranes; and a pith or medulla ſeems no proper ſubſtance to be the ſeat of ſenſation. It can ſcarcely ſerve for any thing but to ſiltrate the ſpirits neceſſary for the action of viſion. The vibration, by which the ſenſation itſelf is effected, muſt be made on a part more ſolid, more firm, and more ſuſceptible of a briſk impreſſion.

For other arguments in favour of the choroides being the ſeat of viſion, ſee CHOROIDES.

RETINA, *Paralytic*, and *Diſeaſed*. See GUTTA SERENA.

RETINACULUM, the name of a chirurgical inſtrument uſed in caſtration, and in the operation for a hernia, to prevent the inteſtines from falling into the ſcrotum.

RETINARIA, in *Botany*, was ſo called by Gærtner, from *rete*, a net, or rather more immediately perhaps from the

the anatomical word *retina*, applied to the nervous network of the eye. This genus was founded, by the above author, on a fruit given him by professor Hermann, and said to belong to a climbing shrub of the Mauritius. So nearly do Gærtner's plate and description approach to the fruit of *Gouania domingensis*, that we have no doubt of their belonging to some species of the same genus; probably to one that we have described in our article GOUANIA, though, possessing none but the *domingensis* in fruit, we cannot exactly appropriate Gærtner's synonym. He seems not to have been acquainted with the fruit of a *Gouania*.

RETINASPHALTUM, in *Mineralogy*, a name given to an inflammable kind of resinous substance, accompanying Bovey coal. It has a pale brown ochre-yellow colour, is very brittle, and breaks with a vitreous fracture. Its specific gravity is 1.135. When held in the hand for some time, it emits a slightly resinous smell, but when burned it has a fragrant odour; at last the smell is bituminous. On the first application of heat it melts and smokes, and then burns with a bright flame. When the melted mass is cooled, it is black and brittle, and breaks with a glassy fracture. It is not acted on by water, but is partly dissolved by alcohol, potash, and nitric acid; the dissolved portions having the properties of a resin; the undissolved of asphaltum. It was analysed by Mr. Hatchett, and is composed of

55 Resin,
41 Asphaltum,
3 Earths.

A similar substance occurs in the wood coal at Cologne, and was also recently discovered in making the excavation for the Tunnel at Highgate. It may be doubted, however, whether these substances are more entitled to be ranked among minerals than the other vegetable matters found in alluvial ground.

RETINUE, RETINENTIA, the attendants or followers of a prince, or person of quality, chiefly in a journey.

In *Law*, those persons are properly said to be of a nobleman's retinue, who belong to him in quality either of servants or retainers.

RETIRADE, in *Fortification*, a kind of retrenchment made in the body of a bastion, or other work, which is to be disputed inch by inch, after the first defences are dismantled. It usually consists of two faces, which make a re-entering angle. When a breach is made in a bastion, the enemy may also make a retirade, or a new fortification behind it.

RETIRED FLANK. See FLANK.

RETIRED *List*, a list on the marine establishment, on which superannuated officers are placed.

In the East India service, the company have resolved that a military officer, after 20 years' actual service in India, who comes to Europe upon leave, may be allowed to retire on the pay of his rank, provided he signifies his intention of so doing, within 20 months after his arrival. Officers on leave who are desirous of retiring, and who declare their intention to that effect, within 12 months from their arrival, will be permitted to retire on the pay of the rank to which they may be intitled at that period. An officer having completed 22 years' residence in India will be allowed to retire on the full pay of his rank, directly on his leaving India.

RETMANDORF, or RADOVELZA, in *Geography*, a town of the duchy of Carniola, on the Save; 52 miles W. of Cilley. N. lat. 46° 22′. E. long. 14° 5′.

RETONVILLER, a town of France, in the department of the Somme; four miles N.E. of Roye.

RETORBIO, a town of Italy, in the Pavese; 14 miles S. of Pavia.

RETORNO *Falso Brevium*, in *Law*. See FALSO.

RETORNO *Habendo*, &c. See RETURNO *habendo*, and REPLEVIN.

RETORT, RETORTA, in *Chemistry*, a kind of crooked matrass, or a round bellied vessel, made of earth, glass, or metal, with a slender crooked beak or neck, to which the recipient is to be fastened.

From this form this vessel has been probably called a *retort*. The most capacious part is called the belly; its upper part the arch or roof of the retort; and the bent part, which makes with the belly an angle of about sixty degrees, is the neck; and the passage from the belly to the neck should be free and wide, and gradually diminishing to the extremity of the neck or mouth of the retort. Retorts differ in form and materials; their bellies are generally round; some of them are oblong, and shaped like a cucurbit, and these are called *English* retorts. They are preferable for the distillation of matters which are subject to swell, and to pass into the receiver before they be decomposed.

A retort, which has a little hole pierced in its roof, is called a *tubulated* retort. This hole must be capable of being exactly closed with a stopper of proper materials. Retorts of this kind are employed in distillations, where some matter must be introduced into the retort after the receiver is joined to it, as in the distillation of smoking marine acid, and in the operations for procuring the several kinds of clyssus.

When the retort is of glass, it is usually covered with a lute of loam, &c. an inch thick, to enable it to bear the fire the better; and it is used for all operations which require a less heat than is sufficient for its fusion. Earthen retorts are necessary when great heat is requisite, as in the preparation of phosphorus.

The retort seems to draw spirits and oil from woods, gums, minerals, earths, and other matters which require a strong fire.

The retort is a kind of compendium or improvement on the cucurbit and bolt-head; answering all the purposes of both, without the assistance of a capital or head, which the other require.

The quantity of air arising from some substances is apt to burst glasses in distilling; Dr. Browne Langrish has, therefore, given us a new contrivance of applying receivers to retorts, by which such accidents may be prevented. To his first receiver he adapts a second, inserted into an opening at the top of the first, in order to give more room to the rarefied and new generated air. To an opening at the bottom of each of these receivers, he fixes a bottle, tied on close by means of a bladder, so that they may be removed at any time, and another instantly placed in their room; by which means very little of the steam will escape. He also ties on a bladder to an opening, or upper neck of the second recipient; and this bladder being much thinner and weaker than any of the glasses, will always give way first, and prevent their bursting. And even when there is the greatest danger of this accident, the smallest pin-hole made through the top of the bladder, as soon as the fumes begin to rise, will be sufficient to let out the air as fast as it is generated. See Philos. Transact. N° 475. sect. 3. where we have a figure of the whole apparatus. For a farther account of the retort, and the uses to which it is applied; see DISTILLATION and LABORATORY.

RETORTION, in *Political Economy*. When a sovereign is not satisfied with the manner in which his subjects are treated by the laws and customs of another nation, he is at liberty to declare, that he will treat the subjects of that nation in the same manner as his are treated. This is what

is

is called the "law of retortion;" in which there is nothing that is not conformable to just and sound politics; for no one can complain of being treated as he treats others. This law of retortion may also take place with regard to certain regulations, of which we have no right to complain, and which we are even obliged to approve, though it is proper to guard against their effects, by imitating them. Such are the orders relating to the exportation of certain commodities or merchandize. It is also frequently not convenient to make use of retortion; in this respect we ought to follow the dictates of prudence.

RETOW, in *Geography*, a town of Samogitia; 12 miles W. of Medniki.

RETRACTATION, Retractatio, the act of unsaying what a person had said or written.

Galileo made a public retractation of his doctrine of the world, De Mundo, after its being censured and condemned by the pope. See Copernicus and Galileo.

Among St. Augustine's works is a book of "retractations;" where, however, the word is to be understood in a new sense; not as if he recanted or unsaid any thing he taught, but only treated of the same matter, or handled the same subject, a second time. This sense the word will very well bear; being a compound of *re*, *again*, and *tracto*, *I handle*, *treat of*.

RETRACTION, Retractio, formed from *retrahere*, *to draw back*, in *Anatomy*, the contraction or shortening of a part. A retraction of the nerves takes away the use of the limbs.

RETRACTS, among *Horsemen*, pricks in a horse's feet, arising from the fault of the farrier in driving nails that are weak, or in driving them ill-pointed, or amiss.

These, unless timely prevented, fester, and prove very dangerous. When the farrier, in shoeing, perceives the horse to shrink at every blow on the nail, it is a sign of a retract, and the nail is to be pulled out again; which is done without any harm.

When the horse halts immediately after he is shod, it is concluded some of the nails press the veins, or touch him in the quick.

To find where the grievance lies, they knock the nails round with a hammer, till the horse's shrinking upon hitting a particular nail discovers the place.

Some farriers give this as a rule, that throwing water on the hoof, the place where he is hurt will be dry sooner than any of the rest. The places where the horses are most usually pricked, are, the heel in the fore-foot, and the toe in the hind-foot.

RETRAHENS, in *Anatomy*, a muscle of the external ear. See Ear.

RETRAXIT, in *Law*, is where the plaintiff comes into court in person, alone, or with the defendant; and declares he will proceed no farther in his action.

A retraxit is peremptory, and a perpetual bar, and may be pleaded as such to the plaintiff in the same action for ever. See Nonsuit.

RETREAT, in *Ornamental Gardening*, any sort of erection, place, or convenience, formed in gardens or pleasure grounds for the purpose of recreation and amusement. These are of very different kinds, according to the nature of the particular grounds or gardens, their circumstances, and situations; as covered, open, or in other forms, as the taste of the proprietor or designer may direct. They may be made either in the different quarters, centre parts, angles, or other places of these situations, or formed in the range of hot-houses, as is the case in some instances. The particular forms, designs, and means of construction of them, are so various, but, for the most part, so well known, that it is unnecessary to give any description of them in this place. Those of the more ornamental kind should, however, in general, be contrived somewhat in conformity to the style of the ground, garden, place, and proprietor; being furnished from designs of great diversity and number, as well as of various degrees of elegance, from that of the simple bower of honeysuckle, hop, or vine, twined upon bent poles, to the Grecian porch or temple of the finest sort of masonry. Great caution is, however, required in the introduction of these sorts of ornamental erections into gardens of the culinary kind. And in them, as with every thing else which relates to them, use, Mr. Loudon supposes, should be the prevailing idea; and that, as *use* and *beauty* go hand in hand, the most vulgar objects may be dignified by the judicious introduction of elegance. A garden of the kitchen kind, though unmixed with productions purely ornamental, is still, it is thought, a pleasing scene, because full of *utility* and *animation*, and constantly varying from the practice of cultivation, as well as from the seasons. It is consequently very generally resorted to at most times of the year, but especially in the early spring months. Of course, in a climate so very variable as this, wherever the walks are frequently made use of at such a season, there should, it is said, be covered retreats or places for retiring to, which should correspond with the whole of which they are conspicuous parts or portions. In this way they may constantly be made to harmonize with the different objects around them.

Retreat, in *War*, the retiring or moving back again of an army, or part of it.

We say, to sound a retreat, to secure a retreat, &c.

What they call a retreat in the armies, is really a flight; only a flight made by design, and with conduct.

The skill and ability of the general is known by his retreats more than his engagements. The retreat of the ten thousand Greeks under the command of Xenophon, has been admired in all antiquity.

The three most celebrated retreats of modern times have been general Moreau's retreat in 1796, that of Prague, and that of general Macdonald in Italy.

Retreat, *Chequered*, *Rétraite en échiquier*, Fr. is so called from the several component parts of a line or battalion, which alternately retreat and face in the presence of an enemy, exhibiting the figures of the chequered squares upon a chess-board. In the "General Rules and Regulations," (part 4.) it is judiciously observed, that all manœuvres of a corps retiring, are infinitely more difficult to be performed with order, than those in advancing. They must be more or less accomplished by chequered movements; one body by its numbers or position, facing and protecting the retreat of another; and if the enemy presses hard, the whole must probably front in time and await him; as the ground narrows or favours, different parts of the corps must double; mouths of defiles and advantageous posts must be possessed; by degrees the different bodies must diminish their fronts, and throw themselves into column of march when it can be done with safety.

The chequered retreat by the alternate battalions or half battalions of a line going to the rear, while the others remain halted, cover them, and in their turn retire in the same manner, is the quickest mode of refusing a part of a corps to the enemy, and at the same time protecting its movement, as long as it continues to be made nearly parallel to the first position.

In the chequered retreat the following rules must be observed: The battalions of the division nearest to the enemy, will

will form flanks as ſoon as there is nothing in their front to cover them; but the other diviſions will not have any flanks except to the outward battalion of each. The battalions always paſs by their proper intervals, and it is a rule in retiring, that the left of each ſhall always paſs the right of the neighbouring one. Whatever advantages the ground offers, thoſe advantages muſt be ſeized, without too critical an obſervance of intervals, or minute adherence to the determined diſtance of each retreat. The diviſion next the enemy muſt paſs in front, through the intervals of the diviſion immediately behind, and any battalion, that finds it neceſſary, muſt incline for that purpoſe. The retiring diviſion muſt ſtep out, and take up no more time than what is abſolutely required to avoid confuſion. The diviſion neareſt the enemy fires by platoons ſtanding; the flanks of its battalions only fire when the enemy attempts to puſh through the intervals. When that diviſion retires, it fires on, ſkirmiſhes by men detached from its light company, if preſent, or from platoons formed of rear rank men of one or two of the companies, and placed behind the flanks of the battalions. But ſhould any of its battalions be obliged to halt and to fire, a ſhorter ſtep muſt then be taken by the line; and ſhould the enemy threaten to enter at any of its intervals, beſides the fire of its flanks, ſuch platoons of the line behind it, as can with ſafety, muſt give it ſupport.

Retreat is a beat of the drum in the evening, at the firing of a piece called the evening-gun, at which the drum-major, with all the drums of the battalion, except ſuch as are upon duty, beat round the regiment; the drums of the quarter-guards, of the general-guards, and all other ſmall-guards, do likewiſe beat; the trumpets at the ſame time ſounding at the head of their reſpective troops. This is to warn the ſoldiers to forbear firing, and the ſentinels to challenge, till break of day, that the reveille is beat.

The retreat is likewiſe called *ſetting the watch*.

In fortified places, this is a ſignal for the inhabitants to come in before the gates are ſhut. See Drum.

Retreat, or *Relay*, in *Maſonry*, denotes a little receſs or diminution of the thickneſs of a wall, rampart, &c. in proportion as it is raiſed.

The retreat is properly the diminution of a wall, without-ſide, or the contraction of its upper courſes more than the foundation. Where the foundation is very large, they uſually make two or three retreats. Parapets are always built with retreats.

RETRENCHMENT, in a general ſenſe, literally ſignifies the cutting off or taking from a thing: in which ſenſe it coincides with ſubtraction, diminution, &c.

The word is French, *retrenchment*, formed of *re*, and *trencher*, *to cut*.

Retrenchment, in *Architecture*, *Carpentry*, &c. is uſed not only for what is cut off from a piece when too large, in order to a better proportioning it, or ſome other convenience, but alſo for the projectures taken out of ſtreets, public ways, &c. to render them more even, and in a line.

Retrenchment, in *War*, denotes any kind of work caſt up to ſtrengthen or defend a poſt againſt the enemy.

Such are ditches with parapets, gabions, faſcines, &c. for a covering, &c.

The enemy came with deſign to oblige them to raiſe the ſiege; but could not force the retrenchments.

Retrenchments are either *general* or *particular*.

General retrenchments are a kind of new defence made in a place beſieged, to cover the defendants, when the enemy becomes maſter of a lodgement on the fortification, that they may be in a condition of diſputing the ground inch by inch, and of putting a ſtop to the enemy's progreſs, in expectation of relief; as, if the beſiegers attack a tenaille of the place, which they judge the weakeſt, either by its being ill flanked, or commanded by ſome neighbouring ground; then the beſieged make a great retrenchment, incloſing all that part which they judge in moſt danger. Theſe ſhould be fortified with baſtions and demi-baſtions, ſurrounded by a good ditch countermined, and higher than the works of the place, that they may command the old works, and put the beſiegers to infinite trouble in covering themſelves.

Particular retrenchments, or retrenchments within a baſtion, (*retranchemens dans un baſtion*, Fr.) muſt reach from one flank to another, or from one caſemate to another. It is only in full baſtions that retrenchments can be thrown up to advantage. In empty baſtions you can only have recourſe to retirades, or temporary barricadoes above the ramparts. The aſſailants may eaſily carry them by means of hand grenades, for theſe retrenchments never flank each other. It is neceſſary to raiſe a parapet, about five or ſix feet thick, before every retrenchment. It muſt be five feet high, and the ditches as broad and as deep as they can be made. There muſt alſo be ſmall mines run out in various directions, for the purpoſe of blowing up the aſſailants, ſhould they attempt to force the retrenchments.

Retrenchment is more particularly uſed for a ſimple retirade made on a horn-work or baſtion, when it is intended to diſpute the ground inch by inch. See Retirade.

It is uſually a re-entering angle, whoſe faces flank each other; and is fortified with ditches, parapets, gabions, &c.

RETRIBUTION, Retributio, a handſome preſent, gratuity, or acknowledgment, given in lieu of a formal ſalary or hire, to perſons employed in affairs that do not ſo immediately fall under eſtimation, nor within the ordinary commerce in money.

Thoſe who miniſtered at the altar anciently lived on retributions, which they received for the ſervices they did the church. But theſe retributions were afterwards judged proper to be fixed to preciſe ſums.

RETRIEVE, Retrouver, to recover, get again, or repair a thing loſt or damaged.

To retrieve, in *Falconry*, ſignifies to bring or find partridges again, which have been once ſprung before.

RETROACTIVE, compounded of *retro*, *backwards*, and *ago*, *I act*, in *Law*, that which has an influence or effect on time paſt.

New laws and ſtatutes, we ſay, have no retroactive effect; that is, they have no force or effect as to what is already paſſed; nor can be alleged as rules for any thing done before their promulgation. Their authority is wholly as to what is to come.

Indeed we have ſome inſtances of laws that have a retroſpect to retroaction, *i. e.* are made with expreſs deſign to extend to things already paſt. Theſe we uſually call laws *ex poſt facto*.

RETROCESSION, Retrocessio, the act of going backwards, more uſually expreſſed by *retrogreſſion*, or *retrogradation*.

Retrocession *of the Equinox*. See Precession.

Retrocession *of Curves*, &c. See Retrogradation.

RETROGRADATION, or Retrogression, the act or effect of a thing moving backwards.

Retrogradation, in *Aſtronomy*, is an apparent motion of the planets, in which they ſeem to go backwards in the ecliptic, and to move contrary to the order or ſucceſſion of the ſigns.

When a planet moves *in conſequentia*, *i. e.* towards the following ſigns, or according to the order of the ſigns, as from

Aries to Taurus, from Taurus to Gemini, &c. that is, from weſt to eaſt, it is ſaid to be direct.

When it appears for ſome days in the ſame point of the heavens, it is ſaid to be *ſtationary*.

And when it goes *in antecedentia*, *i. e.* towards the antecedent ſigns, or contrary to the order of the ſigns, *viz.* from eaſt to weſt; it is ſaid to be *retrograde*.

The ſun and moon always appear direct. Herſchel, Saturn, Jupiter, Mars, Venus, and Mercury, ſometimes direct, ſometimes ſtationary, ſometimes retrograde.

The ſuperior planets are retrograde about their oppoſition with the ſun; the inferior ones about their conjunction. The intervals of time between two retrogradations of the ſeveral planets are unequal.

Theſe changes of the courſes and motions of the planets are not real, but only apparent: when viewed from the centre of the ſyſtem, *i. e.* from the ſun, they appear always uniform and regular. The inequalities ariſe from the motion and poſition of the earth from which they are viewed, and are thus accounted for:

Suppoſe P N O (*Plate* XIX. *Aſtronomy*, *fig.* 12.) a portion of the zodiac, A B C D the earth's orbit, and E M G H Z the orbit of a ſuperior planet, *e. gr.* Saturn; and ſuppoſe the earth in A, and Saturn in E, in which caſe he will appear in the zodiac at the point O. If now Saturn remained without any motion, when the earth arrives at B, he will be ſeen in the point of the zodiac L, and would appear to have deſcribed the arc O L, and to have moved according to the order of the ſigns from weſt to eaſt. But becauſe, while the earth is paſſing from A to B, Saturn likewiſe moves from E to M, where he is ſeen in conjunction with the ſun, he will appear to have deſcribed the arc O Q greater than that O L. In this ſtate the planet is direct, and its motion is from weſt to eaſt, or according to the order of the ſigns. And its motion, now that it is in conjunction with the ſun, and moſt remote from us, is quicker than at any other time.

The earth arriving in C, while Saturn deſcribes the arc M G, he will be obſerved in the zodiac at R. But the earth being advanced to K, and Saturn to H, ſo that the line K H, joining the earth and Saturn, be for ſome time parallel to itſelf, or nearly ſo, Saturn will be ſeen all that time in the ſame point of the zodiac at P, and with the ſame fixed ſtars; and is therefore at this time ſtationary.

But the earth being come to D, and Saturn arrived in oppoſition to the ſun in Z, he will appear in the zodiac in V, and will ſeem to have been retrograde, or to have gone backwards through the arc P V. Thus the ſuperior planets, on optical conſiderations, are always retrograde, when in oppoſition to the ſun.

The arc which the planet deſcribes while thus retrograde, is called the *arc of retrogradation*.

The arcs of retrogradation of the ſeveral planets are not equal. That of Saturn is greater than that of Jupiter; that of Jupiter than that of Mars, &c.

Retrogradation *of the Nodes*, is a motion of the line of the nodes, by which it continually ſhifts its ſituation from eaſt to weſt, contrary to the order of the ſigns; completing its retrograde circulation in the compaſs of about nineteen years: after which time, either of the nodes, having receded from any point of the ecliptic, returns to the ſame again. See Nodes.

Retrogradation *of the Sun*. When the ſun is in the torrid zone, and has his declination A M (*Plate* XIX. *Aſtronomy*, *fig.* 13.) greater than the latitude of the place A Z, but either northern or ſouthern as that is, the ſun will appear to go backwards, or to be retrograde both before and after noon. This can never happen, without the tropics, in a natural way.

For, draw the vertical circle Z G N to be a tangent to the ſun's diurnal circle in G, and another Z O N through the ſun's riſing, in O, it is evident all the intermediate vertical circles cut the ſun's diurnal circle twice; firſt, in the arc G O, and the ſecond time in the arc G I. Wherefore, as the ſun aſcends through the arc G O, it continually arrives at farther and farther verticals. But as it continues its aſcent through the arc G I, it returns to its former verticals; and, therefore, is ſeen retrograde for ſome time before noon. The ſame it may be ſhewn, after the ſame manner, it does for ſome time after noon. Hence, as the ſhadow always tends the oppoſite way to that of the ſun, the ſhadow will be retrograde twice every day in all places of the torrid zone, where the ſun's declination exceeds the latitude.

Retrogradation, or *Retrogreſſion*, in the *Higher Geometry*, is the ſame with what we otherwiſe call *contrary flexion*. See Flexure and Inflexion.

The general rule given by the marquis de l'Hôpital, for finding the point of reflection in curves whoſe ordinates are parallel, is the ſame as that for finding the point of contrary flexure, and conſiſts in taking the ſecond fluxion of the ordinate of the curve, and ſuppoſing it nothing or infinite: but this rule admits of many exceptions. See Maclaurin's Flux. b. i. c. 9. and b. ii. c. 5.

RETROGRADE, Retrogradus, formed from *retro*, *backwards*, and *gradior*, *I go*, ſomething that goes backwards, or in a direction contrary to the natural one.

If the eye and the object both move the ſame way, but the eye much faſter than the object, the object will appear to be retrograde, *i. e.* to go back, or to advance the contrary way from what it really does.

Hence it is that the planets, in ſome parts of their orbits, appear to be retrograde.

Retrograde order, in matters of numeration, is when, in lieu of accounting 1, 2, 3, 4, we count 4, 3, 2, 1.

Retrograde *Verſes* are ſuch as give the ſame words, whether read backwards or forwards: called alſo *reciprocal verſes*, and *recurrents*. Such is

"Signa te ſigna; temere me tangis et angis."

RETROGRADO, Ital. in *Muſic*, a retrograde motion of a melody, or ſubject of canon. This motion is ſometimes termed by the Italians, *imitatione cancherizante*; imitation of the movement of a crab-fiſh. See Canon.

RETROGRESSION, or Retrocession, the ſame with retrogradation.

RETROMINGENTS, compounded of *retro*, *backwards*, and *mingo*, *I make water*, in *Natural Hiſtory*, a claſs or diviſion of animals, whoſe characteriſtic is, that they ſtale backwards, both males and females. Such are lions, cats, &c.

RETROPANNAGIUM, Retropannage, in our *Ancient Law Books*, *after-pannage*; or what is left when the beaſts have done, or eaten the beſt. See Pannage.

"Et debent habere retropannagium a feſto Sancti Martini uſque ad feſtum Pur. Beatæ Mariæ." Petit. in Parl. temp. Edw. III.

RETROSPECT, a look or view backwards. See Retroactive.

RETROVERSIO Uteri, in *Surgery*. The womb is ſubject to two particular changes in the poſition of its fundus, which may be diſplaced either forwards or backwards. The firſt caſe, ſometimes termed *anteverſion*, is the leaſt frequent; the ſecond, or *retroverſion*, is more often met with. In the inſtance of anteverſion, when the ſurgeon makes an

examination with his finger, he finds the fundus of the uterus inclining forwards towards the os pubis over the fundus of the bladder; while the os tincæ is carried backwards towards the ſacrum, upon the middle of the rectum, ſometimes ſo high up that it can hardly be reached with the finger. The patient has generally a conſtant inclination to make water; preſſure juſt above the pubes always gives her conſiderable pain; whenever ſhe gets up to walk, ſhe is conſcious of a hard ſubſtance falling upon the bladder, and obliging her to empty it; and, when ſhe lies down upon her back, ſhe feels the ſame hard body ſlip back again. In one example, a patient had ſuch pain in the abdomen and ſoft parts, that ſhe could ſcarcely move.

In general, the anteverſion of the womb may eaſily be remedied. The patient being laid upon her back, which is to be ſomewhat raiſed up, the ſurgeon is to apply his hand above the pubes, and make preſſure there, by which means the fundus uteri will be forced backwards, and the os tincæ inclined forwards into its natural ſituation. A recurrence of the diſplacement is to be prevented by the application of a peſſary, which will ſupport the os tincæ. The patient is to be kept for a certain time upon her back in bed, and a tight bandage ſhould always be put round the body juſt over the os pubis. The uterus by degrees commonly becomes fixed again in its right poſition, ſo that the uſe of the peſſary can be diſcontinued. The inſtrument muſt not be left off too ſoon, however, leſt a relapſe ſhould be the conſequence.

In the retroverſion, the poſition of the womb is altered in a manner preciſely the reverſe of what occurs in the foregoing caſe. The os tincæ lies towards the pubes; while the fundus uteri is carried towards the ſacrum, and is generally ſunk ſo far down betwixt the vagina and the rectum, as to occaſion, at the poſterior part of the former canal, a protuberance, which cloſes it, and which at the ſame time compreſſes the rectum in ſuch a manner, that the patient cannot void her feces, nor can clyſters be adminiſtered. As in this preternatural poſition of the uterus, the bladder and meatus urinarius are unavoidably diſplaced, the caſe is always complicated with a retention of urine, which is the more afflicting, as it is uſually very difficult, and even impracticable, to introduce a catheter. The opening of the meatus urinarius is ſometimes drawn ſo high up, that it is actually higher than the pubes. Hence, the anterior parietes of the vagina are conſtantly very much ſtretched. When the retention of urine has laſted a certain time, the os tincæ above the pubes cannot be reached nor touched with the end of the finger. In this circumſtance the bladder forms, beneath the os tincæ, a large ſwelling, which hinders the finger from feeling the latter opening. The patient always ſuffers exceſſive pain, which not unfrequently reſembles that of labour, and ariſes partly from the impediment to the evacuation of the urine, and partly from the diſplaced condition of the parts. The diſorder, therefore, has often been miſunderſtood, the patient's ſufferings being regarded as labour-pains, and delivery expected. Indeed, when the complaint is not ſpeedily removed, a miſcarriage is the conſequence. The caſe is frequently attended with fever and inflammation.

The retroverſion of the uterus has never been obſerved, except in pregnancy, and always in the ſecond, third, or fourth month of that ſtate. It is moſt apt to occur in ſuch women as have a wide pelvis. Fat ſubjects are more liable to the diſorder than thin. It is obſerved to be brought on by bodily exerciſes and exertions, as, for inſtance, by violent vomiting, falls, the lifting of heavy burdens, &c. But, Richter thinks it unlikely, that the caſe ſhould ariſe and be ſuddenly produced by theſe cauſes alone. How, he aſks, could the gravid, round, diſtended uterus be thus ſuddenly diſplaced, and become depreſſed betwixt the rectum and the vagina? He conceives it probable, that a prediſpoſition to diſorder, or rather an incipient ſtage of it, muſt have exiſted. He thinks it likely, that the occurrence of the complaint may be promoted by repeatedly neglecting to make water, and by the conſequent diſtention of the bladder, whereby not only the fundus uteri is preſſed towards the ſacrum, but alſo the cervix becomes drawn upwards. Richter believes, that a ſmall degree of retroverſion, that has exiſted a good while, may only be increaſed by the cauſes already hinted at, ſo as to excite notice; and that the fundus of the uterus may now ſoon be forced by the efforts, reſembling thoſe of labour, ſo far down between the vagina and the rectum, that all theſe parts become as it were adherent together. The foregoing ſtatement Richter thinks the more likely to be correct, inaſmuch as caſes have actually been obſerved, where patients have experienced various ſlight complaints a conſiderable time before the retroverſion was known to exiſt; but which complaints might be aſcribed to the incipient ſtage of that ſort of diſplacement of the uterus. How it happens, that retroverſion of this organ is only met with in the early months of pregnancy, is eaſy of comprehenſion. The retroverſion is promoted by the weight of the gravid uterus. During the latter half of the period of geſtation, however, the uterus is too large to be capable of deſcending betwixt the vagina and rectum; and the occurrence of retroverſion, except in pregnancy, is what can hardly be conceived.

The ſurgeon ſhould always endeavour to put the retroverted uterus, as ſoon as poſſible, into its natural poſition again. The longer the retroverſion has laſted, the more difficult it is of removal, and the more preſſing are the dangers, of which there is cauſe for apprehenſion. The moſt urgent peril ariſes from the retention of the urine, and the ſtoppage of evacuations from the bowels. The longer theſe functions are obſtructed, and the more the urine and feces accumulate, the more violent do the painful labour-like efforts become, whereby the fundus uteri is continually preſſed more and more deeply downwards. Beſides, the diſtention of the rectum and bladder operates itſelf as an immediate impediment to the reduction of the uterus. Patients have been known to loſe their lives in conſequence of the bladder giving way. Sometimes abortion happens; and very often the conſequences of ſuch an event are favourable; the urine ſoon afterwards being ſpontaneouſly voided, and all the complaints ſubſiding. (Saxtorph, Collectanea Havnienſia, vol. ii.) The diſorder, however, has been known to continue eleven days, and yet admit of being removed in the moſt favourable manner.

In difficult caſes, the reduction of a retroverted uterus may be facilitated by previouſly emptying the rectum and bladder; an object which is frequently practicable. The diſtended bladder not only renders the reduction difficult, but is attended with ſome danger of that organ burſting in the operation, which often requires the exertion of conſiderable force, eſpecially when the bladder is very much dilated. Hence, before attempting the reduction, the ſurgeon is called upon always to endeavour to draw off the urine. When the bladder has been emptied, the retroverted uterus ſometimes ſpontaneouſly returns into its natural poſition, as ſeveral caſes on record have proved. (Hunter and Cheſton in Medical Communications, vol. ii.; Croft in London Medical Journal, vol. xi.) Such facts muſt fully convince us, how much the reduction may be facilitated by drawing off the urine in the firſt inſtance. A catheter may frequently

frequently be introduced; but it ſhould be of the flexible ſort. A curved inflexible one will alſo ſometimes paſs, if care be taken to keep its concavity turned towards the vagina. Rotating the catheter on its axis is here a particularly uſeful plan. When the catheter cannot be paſſed, other means will ſometimes anſwer for bringing about an evacuation of the urine. In ſome caſes, the water will begin to flow out, when two fingers are introduced betwixt the pubes and os tincæ, and the latter part is preſſed towards the ſacrum. Sometimes preſſing the os tincæ downwards with the finger; on other occaſions, raiſing the fundus uteri backwards and upwards, by means of two fingers in the vagina will have the deſired effect.

When the bladder cannot be emptied in this manner, nor by the catheter, and ſhould it be very much diſtended, and the reduction of the uterus attended with great difficulty, there can be no doubt about the neceſſity of puncturing the bladder; for the immediate and moſt urgent danger ariſes from the retention of urine, and, probably, the diſtended bladder is itſelf the chief impediment to the reduction of the womb into its natural poſition. To theſe conſiderations we may add, that the paracenteſis of the bladder has been performed in theſe caſes with complete ſucceſs. (Cheſton in Medical Communications, vol. ii.) The practitioner muſt alſo endeavour to empty the rectum by means of clyſters, though, it muſt be confeſſed, their application is always attended with a degree of difficulty.

The reduction of the retroverted uterus is executed by preſſing with two fingers applied to the fundus of this viſcus. A principal obſtacle to the ſucceſs of the attempt is cauſed by the projection of the os ſacrum. Hence, it is an indication of the greateſt conſequence to remove the fundus of a retroverted uterus as far as poſſible from that bone, in order that the preceding ſort of hindrance to the reduction may be avoided. With this view the preſſure of the fingers ſhould be ſo directed as not to incline towards the prominence of the ſacrum. During the operation, the patient ſhould reſt upon her elbows and knees, as, in this poſition, the uterus will be at a greater diſtance from the ſacrum. Richter diſapproves of the plan, which ſome writers have recommended, and which conſiſts in introducing two fingers into the vagina, for the purpoſe of reaching and drawing downwards the os tincæ. He aſſerts, that ſuch part can ſeldom be reached, and, that if it could be ſo in a few inſtances, it would not admit of being drawn downwards, while the fundus is incapable of following in the ſame direction. Richter alſo obſerves, that the fundus uteri is at this period the leſs likely to be reduced, becauſe the fingers in the vagina have the effect of preſſing it towards the projection of the ſacrum.

The preſſure of the finger, whereby the fundus uteri is to be puſhed up, ſhould be directed forwards and upwards towards the navel. When the preſſure is made directly upwards, the body of the uterus is forced againſt the projection of the ſacrum, and the attempt cannot poſſibly ſucceed. Indeed, when much force is exerted, as is ſometimes requiſite, preſſure thus directed may do injury to the fœtus and the mother, and bring on abortion. It is advantageous to introduce two fingers into the rectum, with their backs towards the ſacrum, and their inſides towards the vagina; for they may then be uſed for keeping the uterus towards the navel. Perhaps it may likewiſe be adviſeable to lay two fingers on the abdomen above the pubes, in order to prevent the os tincæ from inclining upwards. Perhaps, alſo, two fingers, paſſed into the vagina, might be uſefully employed in preſſing the fundus uteri upwards. In difficult caſes, this double kind of preſſure might be abſolutely neceſſary. If the retroverted uterus ſhould not yield to the foregoing practice, an endeavour may be made, at all events, to puſh the diſplaced viſcus upwards on one ſide of the projection of the ſacrum.

In certain examples, it may be proper not to paſs the fingers into the rectum, but merely into the vagina; 1ſt, becauſe we can thus more certainly and effectually make the preſſure act upon the uterus; and 2dly, becauſe, when the poſterior parietes of the vagina are puſhed with the end of the fingers towards the ſacrum, and the upper part of this tube, ſituated betwixt the fingers and the os tincæ, is ſtretched, the vagina acts upon the uterus in a manner particularly well calculated to promote the reduction. Not more than two fingers, however, ought to be introduced, as more have the effect of dilating the vagina laterally, and preventing it from becoming tenſe in the longitudinal direction. Theden's Bemerkungen, 3 Sheil.

When this method is adopted, the uterus in general begins to yield at firſt ſlowly, and afterwards it ſuddenly returns into its natural ſituation. Sometimes the tendency to retroverſion is ſo great, that the diſorder recurs almoſt immediately after the reduction has been accompliſhed. In this circumſtance, the patient muſt wear a peſſary, until all hazard of another retroverſion is removed by the increaſe of pregnancy. (Hunter in Medical Obſervations and Enquiries, vol. iv.) Sometimes, when the bladder has been very much diſtended with urine during the continuance of a retroverſion of the womb, a retention of urine from weakneſs of the bladder will remain after the reduction of the uterus, and demand the uſe of the catheter. Richter's Anfangſgrunde der Wundarzneykunſt; Hunter in Medical Obſervations and Enquiries, vol. iv.; Cheſton, in Medical Communications, &c.

RETSCHITZ Kardasch, in *Geography*, a town of Bohemia, in the circle of Bechin; 15 miles S.W. of Tabor.

Retschitz *Rot*, a town of Bohemia, in the circle of Bechin; five miles N. of Pilgram.

RETTEN, a town of the duchy of Stiria; 12 miles W. of Friedburg.

RETTERHEIM, a town of the duchy of Wurzburg, inſulated in Wertheim; 16 miles W. of Wurzburg.

RETTERSBACH, a town of the duchy of Wurzburg; five miles S. of Gemunden.

RETTERSWALD, a town of Pruſſia, in Pomerelia; ſeven miles S.E. of Marienburg.

RETTINGBERS, a town of Hindooſtan, in Myſore; 38 miles E. of Chitteldroog. N. lat. 14° 5′. E. long. 77° 4′.

RETTLSTEIN, a town of Stiria, on the Muehr; ſix miles S.E. of Pruck.—Alſo, a mountain of Stiria; eight miles E. of Pruck.

RETTO, Ital. in *Muſic*, ſtraight forward, direct, one of the three movements of muſical notes or ſounds in melody; which are, *moto retto*, *moto contrario*, and *moto obliquo*. *Moto retto* is, therefore, a regular aſcent of the ſcale, or a part of it; as moving from the key-note to the 5th through all the intermediate ſounds, in regular order; as c d e f g, &c. Another ſpecies of movement ſeems wanting to expreſs wide intervals, ſuch as ſkips or leaps beyond the regular progreſſion, which in Latin is expreſſed by the words *per ſaltum*, and in Italian either is, or might be, called *moto de ſalto*.

RETUERTO, in *Geography*, a town of Spain, in Old Caſtile; 18 miles S. of Burgos.

RETURN, Returna, or *Retorna*, in *Law*, hath divers acceptations. As,

RETURN *of Writs* by ſheriffs and bailiffs, is a certificate made to the court by the ſheriff, bailiff, &c. of what is done with regard to the execution of the writ directed to them.

Whence the day, on which the defendant is ordered to appear in court, and on which the ſheriff is to bring in the writ, and report how far he has obeyed it, is called the return of the writ; it being then returned by him to the king's juſtices at Weſtminſter. And it is always made returnable at the diſtance of at leaſt fifteen days from the date or teſte, that the defendant may have time to come up to Weſtminſter, even from the moſt remote parts of the kingdom; and upon ſome day in one of the four terms, in which the court ſits for the diſpatch of buſineſs. See RETURNS, infra.

Such alſo is the *return of a commiſſion*, which is a certificate, or anſwer of what is done by the commiſſioners to whom ſuch commiſſions, precepts, mandates, or the like, are directed,

RETURN is alſo uſed in caſe of a replevin. If a man diſtrain cattle for rent, &c. and afterwards juſtify or avow his act, ſo as it is found lawful, the cattle before delivered unto him that was diſtrained, upon ſecurity given to proſecute the action, ſhall now be returned to him that diſtrained them. See RETURNO *Habendo*, and REPLEVY.

RETURN *of Members of Parliament*. See PARLIAMENT.

RETURN *to a Mandamus*. See MANDAMUS.

RETURNS, *Return-days*, or *days in bank*, *dies in banco*, that is, days of appearance in the court of common pleas, uſually called *bancum*, or *commune bancum*, to diſtinguiſh it from *bancum regis*, or the court of king's bench, are certain days in each term peculiarly ſet apart for the ſeveral kinds of proceedings in any cauſe to be determined. Theſe days are generally at the diſtance of about a week from each other, and regulated by ſome feſtival of the church. On ſome one of theſe days in bank all original writs muſt be made returnable, and therefore they are commonly called the returns of that term; of which every term has more or leſs, ſaid by the Mirror (cap. 5. § 108.) to have been originally fixed by king Alfred, but certainly ſettled as early as the ſtatute of 51 Hen. III. ſtat. 2. But though many of the return-days are fixed upon Sundays, yet the court never ſits to receive theſe returns till the Monday after; and, therefore, no proceedings can be had, or judgment can be given, or ſuppoſed to be given on a Sunday. See DAY.

Hilary term has four ſuch returns; *viz. octabis Hilarii*, eight days after Hilary day; *quindena Hilarii*, fifteen days; *craſtina Purificatione*, the day after the Purification; and *octabis Purificationis*, eight days after, incluſive.

Eaſter term has five returns; *viz. quindena Paſchæ*, fifteen days after Eaſter; *tres Paſchæ*, three weeks after; *menſe Paſchæ*, the day month after Eaſter; *quinque Paſchæ*, the day five weeks from Eaſter; and *craſtino Aſcenſionis Domini*, the day after Aſcenſion-day.

Trinity term has four returns; *viz. craſtino Trinitatis*, the day after Trinity; *octabis Trinitatis*, eight days after, incluſive; *quindena Trinitatis*, fifteen days after; and *tres Trinitatis*, three weeks after.

Michaelmas term has four returns, by ſtat. 24 Geo. II. cap. 48, *viz. craſtino Animarum*, morrow of All-Souls; *craſtino Martini*, the morrow of St. Martin; *octabis Martini*, eight days after, incluſive; and *quindena Martini*, fifteen days after.

The firſt return in every term is, properly ſpeaking, the firſt day in that term; *e. gr.* the octave of St. Hilary, which falling on the thirteenth of January, the octave, or firſt day of Hilary term, is the twentieth of January; and this is called the *eſſoign day of term*. But by reaſon of the *quarto die poſt*, the court does not ſit, at the beginning of each term, for diſpatch of buſineſs, till the fourth day, as in Hilary term on the twenty-third of January; and in Trinity term, by ſtatute 32 Hen. VIII. cap. 21. not till the ſixth day; which is, therefore, uſually called and ſet down in the almanacs as the firſt day of *Term*; which ſee.

RETURN, in the *Military Language*, denotes the liſt of the ſick, given in once a week by the ſurgeon to the commanding officer of a regiment.

Commiſſioned officers are not put in the returns, which, on that account, are but an imperfect liſt of the ſick.

Twelve ſick, in a battalion of 780 private men, is the loweſt return that can be expected, even in the moſt healthy ſeaſon and climate, as well as beſt quarters. Returns are often much higher, but ſeldom exceed ſeventy in a battalion.

It is to be obſerved, that returns include all accidents unfitting a ſoldier for duty; together with a general ſtate of the army, regiment, or company. See Pringle's Obſerv. on the Diſeaſes of the Army, p. 12—36.

In ſection V. of the articles of war, it is expreſſed, that every officer who ſhall knowingly make a falſe return to the king, to the commander-in-chief of the forces, or to any his ſuperior officer authoriſed to call for ſuch returns, ſhall, upon being convicted thereof before a general court-martial, be caſhiered.

Whoever ſhall be convicted of having deſignedly, or through neglect, omitted ſending ſuch returns, ſhall be puniſhed according to the nature of the offence by the judgment of a general court-martial.

Returns are to be made in the ſame manner of the forces in Ireland to the chief governor or governors thereof; likewiſe of the forces in North Britain to the officer there commanding in chief: which returns are from time to time to be tranſmitted to England as it ſhall appear beſt for the ſervice.

Exact returns from Gibraltar, &c. and regiments ſtationed abroad, are by their reſpective governor or commanders *there reſiding*, by all convenient opportunities to be tranſmitted to the ſecretary at war, in order that the ſame may be laid before the king.

The life and foot-guards do not make any returns to the commander-in-chief or ſecretary at war, but to the king direct through their ſeveral field officers. This privilege is attached to them upon the principle of being houſehold troops. Upon the ſame principle they have always, when brigaded, a general of their own attached to each brigade; on which account likewiſe, no other military honours than thoſe done to their own brigade general are to be paid by them, except to a branch of the royal family, or to a commander-in-chief.

RETURN, *To*, in a military ſenſe, to inſert the names of ſuch officers, &c. as are preſent or abſent on the ſtated periods for the identification of their being with their regiments, on detachment, or abſent with or without leave.

Every officer commanding a regiment or detachment, will, on his arrival from abroad, tranſmit to the adjutant-general's office, and to the war-office, a diſembarkation retnrn, a duplicate of which he will alſo deliver to the general, or other officer commanding at the port at which he diſembarks.

Commanding officers of regiments in South Britain, are regularly to tranſmit to the adjutant-general's office the following returns.

A monthly, on the 1ſt of each month.

A return

A return of officers, on the 14th of each month.

A weekly ſtate, to arrive on Mondays.

To the war-office.

A monthly return, on the 1ſt of each month.

A return of abſent officers, on the 14th of each month.

Every officer commanding a regiment, or detachment, on embarking for a foreign ſtation, will tranſmit an embarkation return to the adjutant-general's office, and to the war-office, a duplicate of which he will deliver to the general or officer commanding at the port from which he embarks.

On a regiment embarking, the commanding officer is to tranſmit to the adjutant-general's office, a return of the recruiting parties he purpoſes to leave in Great Britain, or Ireland, ſpecifying their ſtrength, their ſtations, and the officers by whom they are commanded; a duplicate of this return is to be tranſmitted to the inſpector-general of the recruiting ſervice in the Iſle of Wight.

All officers belonging to regiments on foreign ſtations, not actually employed on the recruiting ſervice, are to report their arrival from abroad, and the cauſe of their abſence, at the adjutant-general's office, and are to leave their addreſſes with their reſpective agents, and in caſe of their changing their places of reſidence, are immediately to notice the ſame to their agent: any officer whoſe addreſs is not with his agent, will be conſidered as abſent without leave, and guilty of diſobedience of orders.

Officers upon half pay are, in like manner, to leave their addreſſes at the war-office; particularly ſo if they ſhould leave the united kingdoms; and officers belonging to the militia are to leave their names, &c. with the ſeveral adjutants of regiments.

Commanding officers of regiments are to tranſmit to the quarter-maſter-general an half-yearly return of quarters, on the 1ſt of December, and the 1ſt of May, agreeable to the printed form; likewiſe a report of any march performed by the corps under their orders.

All returns, reports, and papers, purely of a military and public nature, which are to be ſent to the adjutant-general, are to be addreſſed, "To the Adjutant-general of the Forces, Horſe-guards, London," without adjoining his name.

All official letters from general or other officers in command, which are deſigned to be laid before his royal highneſs the commander-in-chief, are to be ſigned by the general or commanding officers themſelves.

All official letters, intended for the deputy adjutant-general, or other officers belonging to the department, are to be tranſmitted, under covers, addreſſed as above, to the adjutant-general.

To prevent an improper expence of poſtage, all official letters and returns ſent to the quarter-maſter-general, or officers in his department, are to be ſent, under covers, addreſſed "To the right honourable the Secretary at War, London;" and on the outſide of the covers is to be written, in legible characters, "Quarter-maſter General's Department."

Return, in *Building*, denotes a ſide, or part, that falls away from the foreſide of any ſtraight work.

Returns *of a Trench*, in *Fortification*, are the turnings and windings which form the lines of a trench.

Returns *of a Mine*, in the *Military Art*, are the turnings and windings of the gallery.

RETURNED *next for Purchaſe*. When vacancies occur in regiments upon foreign or domeſtic ſtations, the names of ſuch officers as intend to purchaſe muſt be inſerted in the muſter rolls; they are then ſaid *to be returned next for purchaſe*. This ſerves as a government to the ſeveral agents, and prevents the introduction of perſons into a corps they have not done duty with, to the diſparagement of thoſe who have always followed the colours. The preſent commander-in-chief is particularly ſcrupulous on this head. Every officer that is returned next for purchaſe, muſt take care to apprize his agent that the money will be lodged for that purpoſe.

RETURNING Stroke, in *Electricity*, is an expreſſion uſed by lord Mahon, (now earl Stanhope,) to denote the effect produced by the return of the electric fire into a body from which, in certain circumſtances, it has been expelled.

In order to underſtand the meaning of theſe terms, it is neceſſary to premiſe that, according to the noble author's experiments, an inſulated ſmooth body, immerged within the electrical atmoſphere, but beyond the ſtriking diſtance, of another body charged poſitively, is at the ſame time in a ſtate of threefold electricity. The end next to the charged body acquires negative electricity; the farther end becomes poſitively electrified; while a certain part of the body, ſomewhere between its two extremities, is in a natural, unelectrified, or neutral ſtate; ſo that the two contrary electricities balance each other. Moreover, it may be added, that if the body be not inſulated, or have a communication with the earth, the whole of it will be in a negative ſtate; a certain portion of its natural quantity of electricity being driven into the common maſs, by the preſſure, repulſion, or other action of the electric matter belonging to the charged prime conductor. Let us then ſuppoſe a braſs ball, which we may call A, to be conſtantly placed at the ſtriking diſtance of a prime conductor; ſo that the conductor, the inſtant when it becomes fully charged, explodes into it. Let another large conductor, which we may call the ſecond conductor, be ſuſpended, in a perfectly inſulated ſtate, farther from the prime conductor than the ſtriking diſtance, but within its electrical atmoſphere: let a perſon ſtanding on an inſulated ſtool touch this ſecond conductor very lightly with a finger of his right hand; while, with a finger of his left hand, he communicates with the earth, by touching very lightly a ſecond braſs ball fixed at the top of a metallic ſtand, on the floor, which we may call B; while the prime conductor is receiving its electricity, ſparks paſs (at leaſt if the diſtance between the two conductors is not too great) from the ſecond conductor to the inſulated perſon's right hand; while ſimilar and ſimultaneous ſparks paſs out from the finger of his left hand into the ſecond metallic ball B, communicating with the earth. Theſe ſparks are part of the natural quantity of electric matter belonging to the ſecond conductor, and to the inſulated perſon, driven from them into the earth, through the ball B, and its ſtand, by the elaſtic preſſure or action of the atmoſphere of the prime conductor; the ſecond conductor, and the inſulated perſon, are hereby reduced to a negative ſtate. At length, however, the prime conductor having acquired its full charge, ſuddenly ſtrikes into the ball B, of the firſt metallic ſtand, placed for that purpoſe at the ſtriking diſtance. The exploſion being made, and the prime conductor ſuddenly robbed of its elaſtic atmoſphere, its preſſure or action on the ſecond conductor, and on the inſulated perſon, as ſuddenly ceaſes; and the latter inſtantly feels a ſmart returning ſtroke, though he has no direct or viſible communication (except by the floor) either with the ſtriking or ſtruck body, and is placed at the diſtance of five or ſix feet from both of them. This returning ſtroke is evidently occaſioned by the ſudden re-entrance of the electric fire naturally belonging to his body and to the ſecond conductor, which

which had before been expelled from them, by the action of the charged prime conductor upon them, and which returns to its former place in the instant when that action or elastic pressure ceases. When the second conductor and the insulated person are placed in the densest part of the electrical atmosphere of the prime conductor, or just beyond the striking distance, the effects are still more considerable; the returning stroke being extremely severe and pungent, and appearing considerably sharper than even the main stroke itself, received directly from the prime conductor. Lord Mahon, in the application of this experiment, and of the doctrine deduced from it, observes, that persons and animals may be destroyed, and particular parts of buildings may be considerably damaged, by an electrical returning stroke, occasioned even by some very distant explosion from a thunder cloud; possibly at the distance of a mile or more. It is certainly easy to conceive (says a very ingenious anonymous writer, in his reflections on this subject) that a charged extensive thunder cloud must be productive of effects similar to those produced by the prime conductor. Like the conductor, while it continues charged, it will, by the superinduced elastic electrical pressure of its atmosphere, drive into the earth a part of the electrical fluid naturally belonging to the bodies which are within the reach of its widely extended atmosphere, and which will, therefore, become negatively electrical. This portion, too, of their electric fire will, on the explosion of the cloud at a distance, and the cessation of its action upon them, suddenly return to them, so as to produce an equilibrium, and restore them to their natural state. But the effects are not so great, nor the danger so terrible, as the noble author seems to apprehend. If the quantity of electric fluid naturally contained, *e. gr.* in the body of a man, were immense or indefinite, his lordship's estimate between the effects producible by a cloud, and those caused by a prime conductor, might be admitted; but surely an electrified cloud, how great soever may be its extent and the height of its charge, when compared with the extent and charge of a prime conductor, cannot expel from a man's body (or any other body) more than the natural quantity of electricity which it contains. On the sudden removal, therefore, of the pressure by which this natural quantity had been expelled in consequence of the explosion of the cloud into the earth, no more (at the utmost) than his whole natural stock of electricity can reenter his body, provided he be so situated, that the returning fire of other bodies must necessarily pass through his body. But we have no reason to suppose that this quantity is so great, as that its sudden re-entrance into his body should destroy or even injure him.

In the experiment above described, the insulated person receives into his body, at the instant of the returning stroke, not only all that portion of his own natural electric fire which had been expelled from it, but likewise transmits through it, at the same instant, in consequence of his peculiar situation, all the electric fire of which the largest second conductor had been robbed, and which must necessarily repass through his body, to arrive at that conductor. To render the case somewhat parallel in natural electricity, the man's body must be so peculiarly circumstanced, supposing him to be in a house, that the electric matter which has been expelled from the house into the earth, by the pressure of an extensive thunder cloud, could not return back into the building, on the explosion of the cloud at a distance, without passing through his body: a case not likely to happen, unless the house were insulated (like the second conductor in the preceding experiment), and his body became the channel through which alone the house could have its electric matter restored to it. It appears much more probable, that the electric matter returns to the house through the same channels by which it before insensibly passed out, and with equal silence, though more suddenly. In the case of a man who is abroad, and in an open field, during the time of an explosion; as he is unconnected with other masses of matter above him, no more than the precise quantity of electric fire, which had been before expelled from his body, will suddenly return into it at the instant of a distant explosion; and that this quantity is not very large, may be inferred from many considerations. Allowing, therefore, the existence of the returning stroke, as sufficiently ascertained, and well illustrated, in a variety of circumstances, by the author's experiments, the magnitude and danger of it are not so alarming as he apprehends. Lord Mahon's Principles of Electricity, &c. 4to. 1779, p. 76—113—131. Monthly Review, vol. lxii. p. 436—442.

RETURNO HABENDO, or *Returnum averiorum*, in *Law*, a writ which lies for him who has avowed a distress made of cattle, and proved his distress to be lawfully taken; for the return of the cattle distrained unto him, which before were replevied by the party distrained, upon surety given to pursue the action.

The same writ is granted when the plaint or action is removed by *recordare* or *accedas ad curiam*, into the court of common pleas; and he whose cattle were distrained makes default, and does not prosecute his action. See REPLEVY.

RETURNUM AVERIORUM, a judicial writ, the same with *retorno habendo*.

RETURNUM *Irreplegiabile*, a judicial writ, sent out of the common pleas to the sheriff, for the final restitution or return of cattle to the owner, unjustly distrained damage feasant, and so found by the jury before justices of assize in the county, or otherwise through default of prosecution.

RETUSAVI, in *Geography*, a name formerly given to a small island of Russia, in the gulf of Finland, on which the town of Cronstadt stands, and now called the isle of Cronstadt; 20 miles W. of Petersburg. This is only remarkable for an excellent haven, strongly fortified, the chief station of the Russian fleet.

RETUSUM FOLIUM, in *Botany*, a retuse, or abrupt, leaf, terminates bluntly, with a broad shallow notch, as in *Rumex digynus*, or Mountain Sorrel. See LEAF.

RETWEYER, in *Geography*, a lake of Bavaria, in the bishopric of Bamberg; 6 miles N.E. of Vilseek.

RETZ, JOHN-FRANCIS-PAUL DE GONDI, *Cardinal de*, in *Biography*, a celebrated political character, was born at Montmirel in 1614. His father, who was general of the gallies, obliged him, against his inclination, to embrace the ecclesiastical profession. He passed through his course of study with distinction, and was made a doctor of the Sorbonne in 1643, in which year he was nominated coadjutor to the archbishop of Paris. In his conduct and character he set at defiance public opinion, and engaged in almost every species of debauchery: he fought several duels, and delighted in political intrigue. According to Voltaire, he was, at the age of twenty-three, eager in carrying on a conspiracy against the life of cardinal Richelieu. The ministry of Mazarin, however, was the period in which he most engaged as a partisan, and he engaged deeply in all the cabals which produced the petty civil war of the Fronde. He imposed upon the people by a feigned devotional seriousness in performing his prelatical functions, and affected the greatest zeal for the privileges of the clergy and the good of the public. He was among the most violent opposers of the court, and once took his seat in the parliament with a poniard in his pocket, the handle of which being seen, it was neatly observed

obſerved, "there is our archbiſhop's breviary." He boaſted that he had a principal ſhare in urging the Pariſians to take up arms on the day of *barricades*. At length, however, he found that the intereſts of his ambition would be better ſerved by making a ſecret accommodation with the court, and he was brought over by a cardinalate, to which he was nominated by the king in 1651. Like other deſerters, he loſt his popularity, and was able only to act a ſecondary part on the political ſtage. Continuing his cabals, Mazarin, who hated and dreaded him, procured his arreſt at the Louvre, and cauſed him to be thrown into priſon. From the dungeon he eſcaped, and went to Rome, where he was received with diſtinction as the enemy of Mazarin. He was preſent at the election of Alexander VII., but finding that pontiff cool to his intereſts, he left Italy, and paſſed ſome years in wandering through Holland, Flanders, and England. Wearied with a life of exile, he returned to France in 1661, after Mazarin's death, and made peace with his court by the renunciation of his archbiſhopric, to which he had ſucceeded at the death of his uncle, obtaining the abbacy of St. Denis by way of recompence. He had hitherto lived in great ſtyle, and had plunged himſelf deeply in debt, but he now reſolved to live on a very limited income, till he had ſatisfied his creditors. This he completely effected, and lived to be in circumſtances that allowed him the gratification of being liberal to his neceſſitous friends. In 1675 he ſent back his cardinal's hat, intending to quit the world, but the pope refuſed to accept his reſignation. His conduct in the latter part of his life obtained for him the eſteem of men of worth: he died at Paris in 1679, at the age of 66. The character of cardinal de Retz has been drawn by almoſt all the French hiſtorians who have written ſince his time. By one he is deſcribed "as a perſon who, with the habit of a prieſt, diſplayed a diſpoſition better ſuited to camps or courts; and licentious in manners and profligate in his morals, he acquired an aſcendancy over the minds of the people, without condeſcending to throw a veil over his vices, or employing the popular pretext of religion." Another writer ſays, he was "daring, turbulent, falſe, intriguing, with deſigns rather romantic than great, and conducted rather with dexterity than ability: he ſeems to have been exactly fitted for the part which he ſuſtained, of a political meteor in troubleſome times, among a frivolous and licentious people." Voltaire, ſpeaking of the memoirs of the cardinal, drawn up by himſelf, ſays, "they are written with an air of greatneſs, an impetuoſity of genius, and an inequality, which are the image of his conduct. He compoſed them in his retreat, with the impartiality of a philoſopher, but of one who had not always been a philoſopher. He neither ſpares himſelf nor others." Other writings of cardinal de Retz have been publiſhed relative to the times and party.

Retz, in *Geography*, a town of Bavaria; 26 miles N.N.E. of Ratiſbon.

RETZBACH, a town of the duchy of Wurzburg; 4 miles S.S.E. of Carlſtadt.

RETZIA, in *Botany*, an elegant Cape ſhrub, ſo named by profeſſor Thunberg, in the Tranſactions of the Academy of Lund, in honour of his friend Andrew John Retzius, member of the Stockholm Academy, and of various other learned ſocieties, Profeſſor of Natural Hiſtory at Lund. This diſtinguiſhed botaniſt and worthy man is beſt known, out of his own country, by his folio volume of *Obſervationes Botanicæ*; and his *Floræ Scandinaviæ Prodromus*, a ſyſtematic octavo work, in the Linnæan manner. He has, beſides, publiſhed many eſſays and diſſertations, relating to various branches of natural knowledge, both in Latin and Swediſh, and is ſtill living.—Thunb. Act. Lund. v. 1. 55. Nov. Gen. 4. Linn. Suppl. 18. Schreb. 115. Willd. Sp. Pl. v. 1. 843. Mart. Mill. Dict. v. 4. Juſſ. 133. Lamarck Illuſtr. t. 103.—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Convolvuli*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, in five rather deep, lanceolate, acute, unequal ſegments. *Cor.* of one petal, tubular, cylindrical, villous both within and without, terminating in five ovate, obtuſe, concave, erect ſegments, very hairy at the ſummit. *Stam.* Filaments five, awl-ſhaped, inſerted into the corolla, ſhorter than its limb; anthers arrow-ſhaped, compreſſed. *Piſt.* Germen ſuperior, oblong; ſtyle thread-ſhaped, longer than the corolla; ſtigma in two ſmall, linear, obtuſe ſegments. *Peric.* Capſule oblong, acute, with two lateral furrows, two cells and two valves. *Seeds* ſeveral, minute.

Eſſ. Ch. Corolla of one petal, cylindrical, externally hairy. Stigma cloven. Capſule of two cells, with many ſmall ſeeds.

1. R. *ſpicata*. "Thunb. Act. Lund. v. 1. 55. t. 1. f. 2." Linn. Suppl. 138. Willd. n. 1. (R. capenſis; Thunb. Nov. Gen. 5.)—Native of high, dry, hilly ſituations, at the Cape of Good Hope. Gathered by Mr. Niven in Hottentot's Holland. The *ſtem* is ſhrubby, erect, from four to ſeven feet high, with round, knotty, hairy, leafy *branches*. *Leaves* denſely imbricated, ſomewhat whorled, ſeſſile, linear-lanceolate, rigid, acute, thick-edged, entire, two inches or more in length; hairy about the lower part. *Flowers* axillary, ſeſſile, ſolitary, plentiful towards the ends of the branches, about as long as the leaves; villous and hoary externally; dark purple within.

The remark of Linnæus the younger, in the Supplement, reſpecting this genus, is very extraordinary. He ſays "it is no natural genus, but agrees ſo much with *Convolvulus*, in habit and character, as to differ in nothing except the tubular corolla, which is externally very hairy." Now in fact, its rigid ſhrubby habit is altogether that of a *Protea*, nor can any thing be leſs like a *Convolvulus*, even of the ſhrubby kind. The character of the *corolla* is alſo moſt diſtinct, being cylindrical, and wanting the five plaits, ſo eſſential to *Convolvulus*. It is true that the *Retzia* requires to be obſerved by ſome botaniſt converſant with natural orders, that we might have clearer ideas of its characters and affinities. The plant is a ſtranger in our gardens.—We have not had an opportunity of conſulting the Lund Tranſactions, to determine whether the ſpecific name is there *capenſis* as Thunberg, or *ſpicata* as Linnæus, cites it. Both are highly exceptionable.

RETZSTADT, in *Geography*, a town of the duchy of Wurzburg; 5 miles S.S.E. of Carlſtadt.

RETZTAT, Ober, or *Upper*, a river of Franconia, which riſes near Weiſſemburg, paſſes by Oettingen, and joins the Unter Retztat, to form the Rednitz.

Retztat, *Unter*, a river of Franconia, which riſes near Burg Bernheim, in the principality of Culmbach, and joins the Upper Retztat, three miles N.E. of Spalt, to form the Rednitz.

REVA, a town of Aſiatic Turkey, in Natolia; 10 miles E. of Conſtantinople.

REUCHLIN, John, in *Biography*, a celebrated German philoſopher, and aſſiduous contributor to the revival of learning in the 15th and 16th centuries, deſcended from a reſpectable family in Swabia, was born in the year 1454. He made a moſt rapid progreſs in ſchool-learning, and when that was completed, he went to Paris with the young marquis of Baden, who had been his claſs-fellow at ſchool. Here he purſued his ſtudies under the moſt celebrated maſ-

ters in Europe, and ſoon became well ſkilled in the Ariſtotelian philoſophy. In this city, and in the diligent purſuit of learning, he remained till he was twenty years of age, when he went to Baſil, where he was admitted a maſter in philoſophy, and taught the Greek language to numerous pupils, with great reputation. Here he alſo proſecuted his ſtudy of the Hebrew, the elements of which he learnt while very young. At the ſame time, judging that the beſt manner of learning is by teaching, he drew up and publiſhed a grammar, a lexicon, and vocabulary, which at that period were highly eſteemed, and thought to be of great uſe in inſtructing young people. Having ſpent four years at Baſil, he went to Orleans for the purpoſe of ſtudying juriſprudence, and he alſo taught the Greek language in that city. From this place he removed to Poictiers, where he was admitted to the degree of doctor. He next accompanied the count of Wittemberg in a tour through Italy, and was introduced at the court of Lorenzo de Medici, at Florence, and contracted an intimacy with Ficinus, Politian, Picus, and other illuſtrious Platonic philoſophers, and was induced to embrace their opinions. In theſe opinions he was confirmed at Rome by the learned Hermolaus Barbarus, who, diſliking the harſhneſs of the German name Reuchlin, prevailed upon him to change it for one more muſical, namely, Capnio, ſignifying, like *Reuchlin*, *ſmoke*, and by this he was afterwards known among foreigners. He conducted himſelf with ſo much ability and addreſs in his tour, that he was, after his return to Germany, deputed as ambaſſador from the count of Wittemberg, to the emperor Frederic III. at Vienna. During his reſidence at this court, he made further progreſs in the Hebrew language, under the inſtructions of one of the emperor's phyſicians, who was a Jew; and it was contrived by the Jew, that among the preſents which, according to cuſtom, he was to receive as ambaſſador, ſhould be included a beautiful and ancient manuſcript Hebrew bible, as a ſpecial compliment paid to him by the emperor, on account of his eminent literary attainments. Frederic dying in 1493, Reuchlin returned to the court of Wirtemberg, and was appointed to be the count's deputy to the diet of Worms, in which his prince was elevated to the ducal dignity. Scarcely had he enjoyed that honour three months, when he died, leaving his dominions to his nephew Ulric. The power of this prince was conteſted by another nephew, who aſſumed the title of Eberhard II., and who carried the point. One of the firſt acts of this prince was to baniſh Reuchlin for his attachment to the intereſts of prince Ulric. He now retired to Worms, and wrote "An Epitome of the Hiſtory of the four Empires," for the uſe of the prince Palatine. He alſo wrote at this time two Latin comedies, abounding with wit and ſatire, which were afterwards publiſhed. In 1498, the elector Palatine, having been involved in a diſpute with pope Alexander VI., fixed upon Reuchlin as the perſon beſt qualified to defend his cauſe, and ſent him for that purpoſe to Rome in the capacity of his ambaſſador. On this occaſion he pronounced an able and eloquent oration before the pope and cardinals, concerning the rights of princes, and the privileges of the churches in Germany, which was printed by Aldus. Before he returned to Germany, a revolution had taken place at Wirtemberg, the uſurper having been expelled, and Ulric reinſtated in his rights. Upon this change, Reuchlin was recalled to the ducal court by the guardians whom the emperor had appointed for Ulric, and very ſoon after he was nominated to the dignity of one of the triumvirs of the league of Swabia for the emperor and the electors. He was next ſent ambaſſador to the emperor Maximilian; and upon his return, finding the plague raging in Swabia, he retired to Stutgard, where he was hoſpitably received into a monaſtery of the Dominicans, and at their requeſt, he drew up a work on the art of preaching. Towards the cloſe of his life he encountered much trouble and danger from the reſentment of the monks and other bigots of Cologne, occaſioned by his oppoſition to their enthuſiaſtic rage for the deſtruction of all Jewiſh books excepting the bible. It is not neceſſary to enter at large into the nature of this controverſy, it will be ſufficient to obſerve, that Reuchlin found himſelf compelled to carry his cauſe to Rome, for the definitive ſentence of the papal ſee. Here he had many friends, and his agent carried with him ſtrong recommendations from princes, prelates, and men of the greateſt eminence in the learned world. Theſe recommendations had great weight in the court of Leo X., and Reuchlin was honourably acquitted of the hereſy with which he was charged, to the great mortification of his bigotted and malignant enemies. Amidſt the troubles which he met with he proſecuted his ſtudies with unabated ardour, and publiſhed ſome very learned and profound works. Although, as we have ſeen, he triumphed over his enemies at the court of Rome, they did not ceaſe to trouble him, by the invention of groundleſs calumnies, and the moſt bitter invectives; ſo that, notwithſtanding his great talents, he was ſcarcely able, by teaching the Greek and Hebrew languages, to keep himſelf from want. He died in the year 1521, at the age of ſixty-eight. His principal works, independently of thoſe already noticed, are, "The Life of Conſtantine the Great," written by Euſebius: a treatiſe "De Verbo Mirifico," in the form of a dialogue between a philoſopher, a Jew, and a Chriſtian; and another treatiſe "De Arte Cabbaliſtica." For his great and ſucceſsful attempts towards the revival of learning, his name is deſerving of being remembered with gratitude by poſterity. His collection of "Letters from illuſtrious Men," of which an edition was publiſhed at Zurich in 1558, is ſaid to be full of valuable information concerning the literary hiſtory of his time. Dupin ſpeaks of him as one of the moſt learned men of that age; and he adds, that notwithſtanding his attachment to his peculiar ſtudies, he had a wonderful genius for the belles lettres; was intimately converſant with the Grecian philoſophers and orators; was a perfect maſter of the Greek language, and ſpoke Latin with an inimitable purity and elegance; and that he was the only perſon of whom Germany at that time could boaſt, who deſerved to be regarded as a competitor for fame with all the learned men in Italy, who was their equal in the delicacy of his ſtyle, while he greatly excelled them in erudition. Moreri. Dupin. Enfield's Hiſt. Phil. vol. ii.

REUDEN, in *Geography*, a town of Saxony; 5 miles N.W. of Bitterfeld.

REUDZEL, a river of European Turkey, which runs into the Reut, 18 miles W. of Florefzti, in Moldavia.

REVE, or Greve, in *Ancient Cuſtoms*, the bailiff of a franchiſe, or manor, thus called; eſpecially in the weſtern parts.

Hence, ſhire-reve, ſheriff, port-greve, church-reve, &c. See Sheriff, Port-greve, &c.

Reve, *Reva*, is alſo uſed for a duty or impoſition on merchandizes imported.

M. Du-Cange derives the word from the Latin *roga*, of *rogare, to aſk*; the word formerly ſignifying a tribute anciently granted princes at their requeſt, as a free gift.

REVEALED Religion. See Religion and Revelation.

Revealed *Theology*. See Theology.

REVEILLE, formed of the verb *reveiller*, *to awake*, a beat of drum in the morning, intended to give notice that it is

is day-break; and that the ſoldiers are to ariſe, and the ſentinels forbear challenging.

REVEL, in *Geography*, a town of France, and principal place of a diſtrict, in the department of the Upper Garonne; 21 miles N.W. of Carcaſſone. N. lat. 43° 28′. E. long. 2° 5′.—Alſo, a town of France, in the department of the Iſere; 15 miles S.E. of Vienne.—Alſo, a ſea-port town of Ruſſia, on the Baltic, and capital of a province; the ſee of a Lutheran biſhop, ſuffragan to the archbiſhop of Riga. Although this place be not large, it is opulent and well fortified; and has conſiderable trade. The town and caſtle were founded, in 1218, by Waldemar II., king of Denmark, on the ſcite of the convent of St. Michael, founded by his anceſtors, and in 1320 included within its walls. Revel, and alſo the whole duchy of Eſthonia, received moſt of its privileges from the Daniſh kings; and the arms of Denmark, with inſcriptions in the Daniſh language, are ſtill ſeen in the churches and other public offices. The houſes are generally built of brick, and the ſtreets are ſomewhat regular. The only congregations here, beſides thoſe of the Ruſſian church, are Lutheran. The tolls, belonging partly to the magiſtracy, and partly to the crown, are conſiderable. This town has its own arſenal, and maintains a number of matroſſes, and a company of ſoldiers. Revel formerly held a diſtinguiſhed rank among the Hanſe towns, and it is ſtill a ſtaple-town, with a flouriſhing trade. Its harbour is ſpacious and convenient, and uſually accommodates a part of the Ruſſian fleet. It is ſurrounded with high walls, ſtrengthened with baſtions, and a deep ditch; and it is alſo fortified with a caſtle, ſeated on a rock, and ornamented with ſeveral towers. Without the walls the citizens have pleaſant gardens. This city was erected into a biſhopric by Waldemar II. It was totally deſtroyed by fire in 1433. In 1710 it was ſurrendered to Peter the Great, who confirmed its ancient privileges, and reſtored others of which it had been deprived by the crown of Sweden; 144 miles N. of Riga. N. lat. 59° 20′. E. long. 24° 34′.

REVEL's *Iſland*, a ſmall iſland near the coaſt of Virginia. N. lat. 37° 35′. E. long. 75° 43′.

REVE-LAND, the land which in Domeſday is ſaid to have been *thane-land*, and afterwards converted into *reve-land*, ſeems to be ſuch land as, being reverted to the king after the death of the thane, who had it for life, was not ſince granted out to any by the king, but reſted in charge upon the account of the *reve*, or bailiff of the manor. Spelm. Feuds, cap. 24.

REVELATION, Revelatio, formed from *revelo*, of *re*, and *velum*, *q. d. to unveil*, the act of revealing, or making a thing public, which before was a ſecret, or unknown.

The revelation of a confeſſion, made by the confeſſor, is adjudged, in the Romiſh church, to deſerve the moſt exemplary puniſhment.

Revelation is uſed, by way of eminence, for the diſcoveries made by God to his prophets, &c. and by them to the world.

Revelation is more particularly uſed for the diſcovery which God has made to the world, by the mouths of his prophets, of certain points of faith and duty, which they could not learn from natural reaſon.

Religion is divided into natural religion and revelation, or revealed religion. See Religion.

By revealed religion, as diſtinguiſhed from that which is uſually called natural, we are to underſtand that knowledge of religion which was originally communicated in an extraordinary and ſupernatural way. A revelation of this kind muſt either be by an immediate infallible inſpiration, or illumination of every particular perſon, for informing and directing him with regard to the knowledge and practice of religion; or by God's making an extraordinary diſcovery of himſelf and of his will to ſome perſon or perſons, who ſhould be commiſſioned to communicate it to others in his name. In the former caſe it could not be properly called extraordinary revelation; for if it were an univerſal infallible light, imparted to every ſingle perſon in every nation and every age, from the beginning of the world, it would be as common and familiar to every one as the common light of reaſon, and by being univerſal would ceaſe to be extraordinary. Whereas, if there be ſuch a thing as revealed religion, or if it hath pleaſed God to make diſcoveries of his will to mankind with reſpect to religious truth and duty, in a way of extraordinary revelation, the moſt natural mode of doing it, and that which is beſt accommodated to the preſent ſtate of mankind, ſeems to be, that the revelation ſhould be communicated to ſome perſon or perſons, to be by them communicated to others in his name; at the ſame time furniſhing them with ſufficient proofs and credentials, to ſhew that they were indeed ſent and inſpired by him, and that the doctrines and laws which are the matter of ſuch revelation, and which they are authoriſed to publiſh to the world in his name, were really and originally communicated by revelation from him. This method admits of ſufficient proof being given to ſatisfy well-diſpoſed minds, and of proviſion being made for inſtructing men, unleſs it be their own fault, in the knowledge of religion, and engaging them to the practice of the duties which it requires; and, at the ſame time, there is room for the exerciſe of reaſon in examining the nature of the evidence, and the trial of men's ſincerity and diligence, of their impartial love of truth, and their openneſs to receive it.

Several queſtions preſent themſelves to our conſideration, with regard to that kind of revelation that has been now ſtated. The *firſt* relates to the poſſibility of it; the *ſecond*, to its uſefulneſs and expediency, and even the neceſſity of it in the preſent ſtate of mankind; the *third* relates to the proofs and evidences, by which it may be ſhewn, that ſuch a revelation hath been actually given.

As to the *firſt* queſtion, the affirmative cannot reaſonably be doubted by any one, much leſs denied, who believes a God and a Providence. Can it be ſuppoſed, that the Author of our being, and of our faculties, hath it not in his power to communicate ideas to our minds, for inſtructing and informing us in what it nearly concerns us to know?

It is acknowledged, even by lord Bolingbroke, a writer of diſtinguiſhed rank among the oppoſers of revelation (Works, vol. ii. p. 468, ed. 4to.), "that an extraordinary action of God upon the human mind, which the word 'inſpiration' is now uſed to denote, is not more inconceivable than the ordinary action of mind upon body, or body on mind;" and "that it is impertinent to deny the exiſtence of any phenomenon, merely becauſe we cannot account for it." Moreover, as God can, if he thinks proper, communicate his will to mankind, he can alſo do it in ſuch a manner, as to give to thoſe to whom it is originally and immediately made, a full and certain aſſurance of its being a true divine revelation. Beſides, God can commiſſion thoſe to whom he has made an extraordinary revelation of his will, to communicate to others what they have received from him; and can furniſh them with ſuch credentials of their divine miſſion as are ſufficient to prove that he ſent them, and that the doctrines and laws which they deliver in his name were indeed received from God. The omnipotent Author of nature, and Lord of the univerſe, can undoubtedly, if he thinks fit, enable ſuch perſons to perform the moſt wonderful works in his

his name, as a proof that he ſent them; works of ſuch a nature, and ſo circumſtanced, as manifeſtly to tranſcend all human power, and bear the evident marks of a divine interpoſition. (See MIRACLE.) He can alſo endue them with ſupernatural gifts, and enable them to deliver expreſs predictions of future contingent events, which no human ſagacity could foreſee, and which yet ſhall be accompliſhed in the proper ſeaſon. (See PROPHECY.) It ſhould alſo be further obſerved upon this ſubject, that not only they who live in the age when the revelation was firſt publiſhed to the world may have ſuch proofs of it as may be ſufficient to convince them of its divine authority and original, but that it may be tranſmitted with ſuch evidence to thoſe who live in ſucceeding ages, as may lay them under an obligation to receive and ſubmit to it as a revelation from God. Although oral tradition is not a very ſure conveyance, yet it is undeniable, that writings may be tranſmitted with ſuch a degree of evidence as to leave no room for reaſonable doubt. This is the moſt ſimple and natural way of propagating the knowledge of revelation to ſucceeding ages. Such is the fact with regard to the revelation contained in the holy ſcriptures: nor is it difficult to prove, that we have greater evidence of the ſafe tranſmiſſion of theſe ſacred writings, without any general and material corruption and alteration, than we have concerning other books, the genuineneſs of which is univerſally acknowledged. To this kind of argument it can only be objected, that moral evidence is uncertain, and hiſtorical human teſtimony fallible; but to the objection the reply is obvious, that this kind of evidence may be, and frequently is, ſo circumſtanced, that the man would ſcarcely be thought in his ſenſes who ſhould ſeriouſly deny or doubt of it. It is by moral evidence, and the teſtimony of fallible men, capable of deceiving and of being deceived, that a man who has never been at Paris or Rome knows that there are ſuch cities, and yet he can no more reaſonably doubt of it, than if he had ſeen them with his own eyes. It is by moral evidence, that we have all our laws and records, and the aſſurance of any paſt facts. And yet is there any man of ſenſe, who does not as certainly believe many facts which were done in former ages, as he believes any event that has happened of late years, and within his own memory? It is by this kind of evidence of teſtimony that we are neceſſarily guided and determined in many caſes of great importance: and why ſhould it be thought abſurd to ſuppoſe, that it ſhould be ſo ordered by the Author of our frame and the great Ruler of the world, that our knowledge of ſome important matters relating to religion ſhould be obtained by this mode of conveyance? He that receives divine revelation upon this kind of evidence acts a wiſe and good part, becoming a reaſonable being and a moral agent.

Having ſhewn that a revelation from God is poſſible, the *ſecond* ſubject of conſideration is the great uſefulneſs and advantage of divine revelation, and the neceſſity of it in the preſent ſtate of mankind, for ſupporting and promoting the intereſts of religion and virtue in the world. Such a revelation may be of great uſe even with regard to thoſe truths and principles which lie at the foundation of all religion; ſuch are the truths which relate to the excellent and unparallelled nature, the perfections and attributes of the one ſupreme God. (See GOD.) A divine revelation may alſo be very uſeful in eſtabliſhing the belief of the providence of God; and further, in communicating inſtruction even to thoſe, who allow that ſome kind of religious worſhip and homage ſhould be rendered to God by his reaſonable creatures. What kind of worſhip will be moſt acceptable to the Supreme Being, and what rites are moſt proper to be uſed in his ſervice, are queſtions which unaſſiſted reaſon cannot poſitively and with certainty determine. The doctrine of the immortality of the ſoul, and of a future ſtate of retribution, is unqueſtionably of very great importance to mankind; and the natural and moral arguments to prove it have certainly great weight; but they are aſſailed by difficulties and objections which weaken the evidence, and may occaſion ſuſpicion and doubt, if natural reaſon be our only guide and umpire. Accordingly ſome of the moſt eminent ancient philoſophers either denied this doctrine, or expreſſed themſelves doubtfully and waveringly concerning it. If then God himſelf ſhould, by a well-atteſted revelation, aſſure us, that death ſhall not put an utter end to our being; that the preſent life is only the firſt ſtage of our exiſtence; that we ſhall be raiſed again from the dead; and that God will call all men to an account, and reward or puniſh them in a future ſtate according to their behaviour in this; and ſhould alſo ſignify to us the nature of thoſe rewards and puniſhments, and the qualifications of the perſons on whom they ſhall be conferred or inflicted: this muſt needs be of high advantage, and tend to give us ſatisfaction in a point of conſiderable importance, for encouraging men in the practice of virtue, and delivering them from vice and wickedneſs. Moreover, we are led by the light of nature and reaſon to entertain ſome hope, that God will ſhew mercy to ſinners upon their repentance and amendment; but how far this mercy ſhall extend, whether he will pardon ſins of every kind, even the moſt heinous, frequently repeated, and long perſiſted in, merely upon repentance and amendment; and whether his pardon in this caſe will be only a mitigation or remiſſion of the threatened penalty, without a full reſtitution to grace and favour, and how far he will reward an obedience attended with failures and defects:—theſe things might create anxious doubts and perplexities to ſerious and thoughtful minds. Eſpecially when it is further conſidered, that reaſon leads us to regard God as juſt as well as merciful, a wiſe and righteous governor, who will therefore exerciſe his pardoning mercy in ſuch a way as ſeemeth moſt fit to his rectoral wiſdom, and will beſt anſwer the ends of moral government; and of this ſuch ſhort-ſighted creatures as we are cannot pretend to be competent judges. A revelation from God ſatisfying mankind, and eſpecially anxious penitents, with regard to theſe intereſting queſtions, and aſſuring them by expreſs promiſe, as well as by its repreſentations of the placability of God, and of the proviſion which he has made for the pardon of repenting tranſgreſſors in perfect conſiſtence with all the attributes of his nature and laws of his government, muſt be a very great benefit to the world. The aſſiſtance promiſed and certified by revelation, to thoſe who uſe their own earneſt endeavours in the performance of their duty, muſt further evince its importance and utility. Beſides, the benefits of a divine revelation further extend to thoſe laws and duties which we owe to God, our neighbours, and ourſelves, and which are comprehended under the claſs of moral obligations. But though revelation is thus eminently uſeful, and even neceſſary, it is not deſigned to ſuperſede the uſe of our own reaſon, or to render the exerciſe of it needleſs, but to guide, improve, and perfect it. Revelation, ſo far from diſcarding or weakening any argument that can be juſtly brought from reaſon, in proof of any truths relating to religion or morality, adds to them the atteſtation of a divine authority or teſtimony, which is of great weight. This both gives us a farther degree of certainty with regard to thoſe things which are in ſome degree diſcoverable by the light of reaſon, and alſo furniſhes us with a ſufficient ground of aſſent, with reſpect to thoſe things which mere unaſſiſted reaſon, if left to itſelf, would not have diſcovered, and which yet it may be of uſe for us to know.

By the common consent of mankind, a competent authority is, in many cases, a good and proper medium to assure us of the truth of things; and to believe upon the credit of such an authority and testimony, is so far from being a renunciation of our reason, as some have pretended, that, on the contrary, it is what reason and good sense require; and to decline it would be to act an absurd and unreasonable part. Admitting that a supposed revelation from God is established upon sufficient evidence, we are bound to receive what is revealed upon the authority of the revealer; insomuch that it would be a contradiction to believe it to be a revelation from God, and yet refuse our assent to it: since it is a most unquestionable principle, that, as God is incapable of deceiving or of being deceived, whatsoever he hath revealed must be true.

This leads us to the *third* subject of inquiry proposed in reference to divine revelation, *viz.* what are the proofs and evidences by which it may be known that such a revelation has been actually communicated to mankind, and that the revelation which we have in our possession is entitled to this character. We may observe in general, that it has been the sense of mankind in all ages and nations, that God hath made a revelation of his will to man; and this prevalent opinion has been probably derived from a tradition of some extraordinary revelation, or revelations, communicated in the earliest times to the first ancestors of the human race, from whom it has been transmitted to their descendants; though, in process of time, it has been in a great measure corrupted and lost. Or at least we may hence conclude, that men have generally thought that a revelation from God to man was both possible and probable; and that this was agreeable to the ideas they had formed of the wisdom and goodness of God, and of his concern for mankind. It would lead us far beyond the limits of this article, particularly to state the proofs that have been alleged for the divine authority of the Jewish and Christian revelation; both of which refer to and confirm the original revelation made to mankind from the beginning. But this is the less necessary, as the subject is discussed in various parts of the Cyclopædia. See BIBLE, CANON, CHRISTIAN *Religion*, RELIGION, RESURRECTION *of Christ*, SCRIPTURE, TESTAMENT, &c.

The Christian revelation is that made by Christ, and his apostles, in the New Testament. The Jewish revelation is that made by Moses and the prophets, in the Old Testament. See CHRISTIAN *Religion*, and JUDAISM.

A late author observes, somewhat invidiously, that it is the common method of all new revelations, to be built on precedent ones. Thus, the mission of Moses to the Israelites supposes a former revelation to Abraham, &c. The mission of Christ supposes that of Moses; and the pretended mission of Mahomet supposes the mission of Christ. The mission of Zoroaster to the Persians supposes the religion of the Magi, &c.

The general foundation of all revelation is this, that God is pleased man should know something relating to himself, his own nature, dispensation, &c. which the natural faculties with which he was pleased to create him could not attain to; and that he requires some duty or service at our hands, more than what necessarily follows from the relation we are under to him as our creator, preserver, &c.

This is also urged by deists, to the discredit of all particular revelations, as derogating from the perfections of God; such supplementary informations and instructions arguing, according to them, a prior deficiency in the established economy of nature, of which he is the author. But many able answers have been given to such cavils.

Particular or occasional revelations have their particular geniuses, characteristics, and designs. That made by Moses and the prophets chiefly related to the nation of the Jews, considered as the descendants of Abraham: its design seems to have been to rescue that people from their slavery; to settle them in a new plantation; to give them a set of laws; to new-form their manners; to support them under difficulties and dangers of their enemies, from an opinion of their being under the immediate direction and appointment of God; to keep them from intermixing again with their neighbours, from an opinion of their being a chosen people, and of a Messiah to be born among them; and thus to preserve and transmit the knowledge of the unity of God, in opposition to idolatry and polytheism, and the hope of the Messiah, till the period of his appearance arrived. To some or other of these ends do all the Old Testament prophecies seem to tend.

The Christian revelation is founded on a part of the Jewish. The Messiah promised in the one is revealed in the other.

All the rest of the Jewish revelation, which related peculiarly to the Jewish people, is here set aside; and only that part of it in which the world in general was interested, and that relating to the advent, offices, and character of the Messiah, are retained.

Indeed, it must be owned, the Jews ever looked on this to be as peculiar to themselves as any of the rest; the Messiah was promised to them; he was to be their deliverer, their restorer, &c. and under this character he actually appeared. But, upon taking place of this new revelation, a new scene was opened, different from what many of them apprehended, because they misinterpreted the prophecies relating to the Messiah. The ceremonial part of their institution, local and temporary in its establishment and use, was abolished; and the Messiah appeared, not, as they erroneously imagined, to be the restorer of their civil sovereignty and liberties, which were now fallen into the hands of the Romans; but to restore and re-establish mankind in general, who had lost their original righteousness, and were become slaves of sin; to preach repentance and remission; and at last to suffer death, that all who believed in him might not die, but have everlasting life.

Such are the tenor and design of the Christian revelation, which, in the event, was so far from being what it had been apprehended to be by the people to whom it was first promised, that it proved the very reverse; and, instead of re-establishing and confirming the other branches of their revelation, it superseded, and set them all aside. The pale was now broken down, and the being of the seed of Abraham ceased to be a privilege, all the world being invited on the same terms with the Jews.

The consequence was, that the Jews, denying this to be the Messiah that had been promised to them, because their pride and prejudice prevented their discerning the accomplishment of their ancient prophecies in him, were generally excluded from the privileges of that mission, which they had vainly supposed to be not only primarily but wholly intended for themselves; and had their ruin completed from the very means whence they expected their redemption: because they expected a redemption, different in its nature from that which their own prophecies, fairly interpreted, proposed.

REVELLO, in *Geography*, a town of France, in the department of the Stura, near the Po, seated on the summit of a very high mountain, fortified both by nature and art. Having formerly served as a place of refuge for the marquises of Saluzzo, and withstood many attacks from their enemies, it was taken by the French; and in 1588 it surrendered to Charles Emanuel I., duke of Savoy. It contains one parochial church, and three other churches, a castle,

caſtle, a palace, and a convent of Dominicans; 3 miles N.W. of Saluzzo.

REVELS, formed from the French *reveiller, to awake*, as alluding to the night ſeaſon, when they were chiefly held; entertainments of dancing, maſking, gaming, acting comedies, farces, &c. anciently very frequent in inns of courts, at certain ſeaſons, and in noblemen's houſes, &c. but now much diſuſed.

The officer who has the direction or ordering of the revels at court, is called the *maſter of the revels*.

REVELSKOI, in *Geography*, a province of Ruſſia, ſo called from *Revel* the capital, bounded on the N. and W. by the Baltic, on the E. by the government of Peterſburg, and on the S. by the government of Riga; about 144 miles in length, and from 16 to 60 in breadth; formerly the duchy of Eſthonia. N. lat. 58° 20′ to 59° 30′. E. long. 23° to 28′. See ESTHONIA and REVEL.

REVENGE, in *Ethics*, is an inſatiable deſire to ſacrifice every conſideration of pity and humanity to the principle of vindictive juſtice. It renders the demands of that terrific giant paramount to every other claim. It is a propenſity to retaliate evil, too fervent to be cooled by time, too deep and inveterate to be obliterated by conceſſions and intreaties. It anticipates joy in the contemplation of ſighs and groans, and the only moment of tranſport is the inſtant of inflicting miſery. This diſpoſition approaches very near to permanent malevolence of the moſt deſpicable character. The abſtract idea of juſtice, however, forms a partition between them; for to this, malevolence has no rightful claim. But its more honourable diſtinction conſiſts in that repentance, which humanity excites in the mind that is not totally obdurate, after the gratification of this dreadful paſſion.

Anger long indulged to exceſs is apt to produce revenge. See ANGER.

REVENUE, the yearly rent or profits ariſing to a man from his lands, poſſeſſions, &c.

The word is French, formed from *revenir, to return*. Whence revenue is ſometimes alſo uſed in ancient authors for a return; as the revenue of Eaſter.

The revenues of the Engliſh clergy were firſt fixed by king Ethelwulph, anno 853, who granted them for ever the tithe of all goods, and the tenth part of all the lands of England, free from all ſecular ſervice, taxes, impoſitions, &c. Though Rapin obſerves, that tithes were ſettled on the clergy by the laws of Ina and Offa. But theſe laws were probably not obſerved, or perhaps Ethelwulph extended the law of tithes all over England. See TITHE.

The certain revenues of the king of England were anciently greater than thoſe of any king in Europe; and till the time of the civil wars they enjoyed, in domains and fee-farm rents, almoſt enough to diſcharge all the ordinary expences of the crown, without any tax or impoſition on the ſubject.

The revenue which the Britiſh conſtitution hath veſted in the royal perſon, in order to ſupport his dignity, and maintain his power, is either *ordinary* or *extraordinary*.

The king's *ordinary* revenue is ſuch as hath either ſubſiſted time out of mind in the crown, though, by reaſon of royal grants, the king be not at preſent in the actual poſſeſſion of the whole of it; or elſe has been granted by parliament, by way of purchaſe or exchange for ſuch of the king's inherent hereditary revenues, as were found inconvenient to the ſubject. Of the king's ordinary revenues there are four, which are of an eccleſiaſtical kind. Such are, 1. The cuſtody of the temporalities of biſhops, or all the lay revenues, lands, and tenements, (in which is included his barony,) which belong to an archbiſhop's or biſhop's ſee, and which, upon the vacancy of the biſhopric, revert immediately to the king, as his right, during the vacancy. This branch of the royal revenue was formerly very conſiderable, but is now, by cuſtomary indulgence, reduced almoſt to nothing; for, at preſent, as ſoon as the new biſhop is conſecrated and confirmed, he uſually receives the reſtitution of his temporalities, entire and untouched, from the king; and then, but not ſooner, he has a fee-ſimple in his biſhopric, and may maintain an action for the profits. (Co. Litt. 67. 341.) 2. A corody out of every biſhopric, or a right of ſending one of his chaplains to be maintained by the biſhop, or to have a penſion allowed him till the biſhop promotes him to a benefice (F. N. B. 230.); which is now fallen into total diſuſe; though ſir Matthew Hale ſays, that it is due of common right, and that no preſcription will diſcharge it. 3. The tithes ariſing in extra-parochial places, which are held, indeed, under an implied truſt, that the king will diſtribute them for the good of the clergy in general. (2 Inſt. 647.) 4. The firſt-fruits and tenths of all ſpiritual preferments in the kingdom. See FIRST-*Fruits* and TENTHS.

The following branches of the king's ordinary revenue are of a lay or temporal nature. 5. The firſt of theſe conſiſts in the rents and profits of the demeſne lands of the crown, which are either the ſhare reſerved to the crown at the original diſtribution of landed property, or ſuch as came to it afterwards by forfeitures or other means, and were formerly very extenſive, but are now contracted within a very narrow compaſs, having been almoſt entirely granted away to private ſubjects. 6. The advantages which uſed to ariſe to the king from the profits of his military tenures, to which moſt lands in the kingdom were ſubject, till they were in a great meaſure aboliſhed by the ſtatute 12 Car. II. cap. 24. to which may be alſo referred the profitable prerogative of purveyance and pre-emption; which branches of the royal revenue and power were reſigned entirely by king Charles at his Reſtoration; in recompence for which, the parliament ſettled on him, his heirs and ſucceſſors for ever, the hereditary exciſe of fifteen pence *per* barrel on all beer and ale ſold in the kingdom, and a proportionable ſum for certain other liquors; ſo that this hereditary exciſe forms the ſixth branch of his majeſty's ordinary revenue. 7. The rents payable to the crown by ſuch perſons as are licenſed to ſell wine by retail throughout England, except in a few privileged places, firſt ſettled on the crown by the ſtatute 12 Car. II. cap. 25. but aboliſhed by the ſtatute 30 Geo. II. cap. 19. when an annual ſum of upwards of 7000*l. per annum*, iſſuing out of the new ſtamp duties impoſed on wine licences, was ſettled on the crown in its ſtead. 8. The profits ariſing from the king's foreſts, conſiſting principally in amercements or fines levied for offences againſt the foreſt-laws, for levying which, few, if any, courts have been held ſince 1632, 8 Car. I. 9. The profits ariſing from the king's ordinary courts of juſtice; conſiſting not only in fines impoſed upon offenders, forfeitures of recognizances, and amercements levied upon defaulters, but alſo in certain fees due to the crown in a variety of legal matters; as for ſetting the great ſeal to charters, original writs, and other forenſic proceedings, and for permitting fines to be levied of lands in order to bar entails, or otherwiſe to inſure their title. Theſe, in proceſs of time, have been almoſt all granted to private perſons, or elſe appropriated to certain particular uſes. All future grants of theſe, by 1 Ann. ſtat. 2. cap. 7. are to endure for no longer time than the prince's life who grants them. 10. The right to royal fiſh. 11. The revenue ariſing from ſhipwrecks, which

is frequently granted out to lords of manors, as a royal franchise. (See WRECK.) 12. The right to mines of silver and gold. (See MINE.) 13. The revenue of treasure-trove. 14. Waifs. 15. Estrays, which the law gives to the king as the general owner and lord paramount of the soil; though they now most commonly belong to the lord of the manor, by special grant from the crown. 16. Forfeitures of lands and goods for offences. (See CONFISCATE and DEODAND.) These are for the most part granted out to the lords of manors, or other liberties. 17. The revenue arising from the escheats of lands, reverting, upon the default of heirs to succeed to the inheritance, to the king, who is esteemed, in the eye of the law, the original proprietor of all the lands in the kingdom. 18. The last branch of the king's ordinary revenue consists in the custody of idiots.

Such is the king's ordinary revenue, or the proper patrimony of the crown, which was formerly very large, and capable of being increased to a magnitude truly formidable: but, fortunately for the liberty of the subject, this hereditary landed revenue is now sunk almost to nothing; and the casual profits, arising from the other branches of the *census regalis*, are likewise almost all of them alienated from the crown. In order to supply the deficiencies of which, we are now obliged to have recourse to new methods of raising money, unknown to our early ancestors; which methods constitute the king's *extraordinary* revenue. See TAX, FUND, and NATIONAL *Debt*.

We shall here observe, that the aggregate fund stood mortgaged by parliament to raise an annual sum for the maintenance of the king's household, and the civil list. For this purpose, in the late reigns, the produce of certain branches of the excise and customs, the post-office, the duty on wine licences, the revenue of the remaining crown lands, the profits arising from courts of justice, (which articles include all the hereditary revenues of the crown,) and also a clear annuity of 120,000*l.* in money, were settled on the king for life, for the support of his majesty's household, and the honour and dignity of the crown. And, as the amount of these several branches was uncertain, (though in the last reign they were computed to have sometimes raised almost a million,) if they did not arise annually to 800,000*l.*, the parliament engaged to make up the deficiency. But his present majesty, soon after his accession, having accepted the limited sum of 800,000*l.* *per annum* for the support of his civil list, (charged also with three life-annuities, to the princess of Wales, the duke of Cumberland, and the princess Amelia, to the amount of 77,000*l.*) the said hereditary and other revenues were made a part of the aggregate fund, which was charged with the payment of the whole annuity to the crown of 800,000*l.* *per annum*. The expences formerly defrayed by the civil list were those that in any shape relate to civil government: as the expences of the household; all salaries to officers of state, to the judges, and each of the king's servants; the appointments to foreign ambassadors; the maintenance of the queen and royal family; the king's private expences, or privy purse; and other very numerous outgoings, as secret service money, pensions, and other bounties; which sometimes have so far exceeded the revenues appointed for that purpose, that application has been made to parliament to discharge the debts contracted on the civil list; as particularly in 1724, when one million was granted for that purpose by the statute 11 Geo. I. cap. 17; and in 1769 and 1777, when half a million and 600,000*l.* were appropriated to the like use, by the statutes 9 Geo. III. cap. 34. and 17 Geo. III. c. 47. Many of these expences are now charged on the consolidated fund, and the civil list comprehends the support of his majesty's household.

The civil list is, indeed, properly the whole of the king's revenue in his own distinct capacity; the rest being rather the revenue of the public, or its creditors, though collected and distributed again in the name and by the officers of the crown.

The whole revenue of queen Elizabeth did not amount to more than 600,000*l.* a-year; that of king Charles I. was 800,000*l.*; and the revenue voted for king Charles II. was 1,200,000*l.*; but under these sums were included all kinds of public expence. The same revenue, subject to the same charges, was settled on king James II. (Stat. 1 Jac. II. c. 1.) But by the increase of trade, and better management, it amounted on an average to a million and a half *per annum*, (beside other additional customs, granted by parliament, (ibid. c. 3. and 4.) which produced an annual revenue of 400,000*l.*), out of which his fleet and army were maintained at the yearly expence of 1,100,000*l.* At this time the revenues of the king of France were computed at seven millions sterling; and those of the states of Holland at three millions. After the Revolution, when the parliament took into its own hands the annual support of the forces, both maritime and military, a civil list revenue was settled on the new king and queen, amounting, with the hereditary duties, to 700,000*l.* *per annum*; and the same was continued to queen Anne and king George I. That of king George II. was nominally augmented to 800,000*l.* (stat. 1 Geo. II. c. 1.); and in fact was considerably more. But that of his present majesty was avowedly increased to the limited sum of 900,000*l.* The clear yearly sum of 100,000*l.*, to commence from the fifth of January 1777, over and above the sum of 800,000*l.* before granted, was granted to his majesty out of the aggregate fund by stat. 17 Geo. III., but is now chargeable on the consolidated fund. Blackst. Com. vol. i. chap. viii. See FUND, and the sequel of this article.

The following particulars, relating to the revenue, are extracted from the Report presented to the house of commons, ending 5th January 1814.

REVENUE.

An Account of the Ordinary Revenues and Extraordinary Resources constituting the Public Income of Great Britain, for the Year ending the 5th of January 1814.

Heads of Revenue.	Gross Receipt within the Year.			Total Sum to be accounted for, deducting outstanding Balances and Bills.			Net Produce applicable to National Objects, and to Payments into the Exchequer, deducting total Payments out of the gross Revenue.			Payments into the Exchequer, deducting total Payments out of the net Produce.		
ORDINARY REVENUES.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Permanent and Annual Taxes.												
Customs - - -	10,325,550	19	10¼	10,938,523	16	7½	8,086,313	2	9½	7,015,968	19	11¼
Excise - - - -	20,805,852	14	1½	21,119,321	9	6	18,526,879	4	9¾	18,039,713	19	2¾
Stamps - - - -	5,638,155	17	10¾	5,873,174	14	7½	5,552,460	1	3¼	5,344,486	13	11
Land and assessed taxes -	7,884,841	3	11¾	8,101,968	7	3¼	7,803,459	3	4¼	7,433,496	18	4¾
Post office - - -	1,938,517	10	6	2,137,437	12	5¼	1,619,136	10	7¼	1,403,000	0	0
One shilling in the pound on pensions and salaries	19,648	16	8	20,803	10	8	20,423	5	2	17,325	1	5½
Sixpence in the pound on pensions and salaries -	11,728	17	0½	13,521	0	5½	12,151	15	11½	10,707	9	1¾
Hackney coaches - -	25,181	10	0	25,551	19	3	22,245	6	1½	21,887	0	0
Hawkers and pedlars -	20,160	3	2½	20,779	14	4½	18,201	3	1	18,120	0	0
Total -	46,669,637	13	3¼	48,251,082	5	2½	41,661,269	13	2	39,304,706	2	1
Small Branches of the Hereditary Revenue.												
										Hanaper 2,000	0	0
Alienation fines - -	6,817	3	4	9,539	12	1	8,392	4	1	4,069	12	0
Post fines - - -	516	13	9½	4,011	17	2	3,953	4	8			
Seizures - - -	22,638	4	7	22,638	4	7	22,638	4	7	22,638	4	7
Compositions and proffers -	586	15	2	586	15	2	586	15	2	586	15	2
Crown lands - - -	84,930	13	7	90,096	18	5½	87,703	4	10	11,016	9	8
EXTRAORDINARY RESOURCES.												
Wartaxes: Customs - - -	3,818,272	14	9¼	3,818,272	14	9¼	3,275,358	5	4¼	3,275,358	5	4¼
Wartaxes: Excise - - -	6,227,240	13	4	6,259,884	14	7¾	6,117,857	0	3¾	6,073,538	4	5¾
Wartaxes: Property tax - -	14,318,816	4	1½	14,889,444	15	3¾	14,583,286	9	6½	13,965,808	7	2
Wartaxes: Arrears of income duty	1,620	13	8	1,620	13	8	1,593	15	4½	1,593	15	4½
Lottery, net profit (of which one-third part is for the service of Ireland) - - -	310,800	0	0	310,800	0	0	278,666	6	6	278,666	6	6
Monies paid on account of the interest of loans raised for the service of Ireland - - -	3,198,475	2	10	3,198,475	2	10	3,198,475	2	10	3,198,475	2	10
On account of balance due by Ireland on joint expenditure of the united kingdom - - -	3,956,276	0	0	3,956,276	0	0	3,956,276	0	0	3,956,276	0	0
On account of the commissioners, appointed by act 35 Geo. III. c. 127. and 37 Geo. III. c. 27. for issuing exchequer bills for Grenada, &c.	54,200	0	0	54,200	0	0	54,200	0	0	54,200	0	0
On account of the commissioners for issuing commercial exchequer bills, by act 51 Geo. III. c. 15. - - -	490,591	18	9	490,591	18	9	490,591	18	9	490,591	18	9
Carried forward -	79,161,420	11	2½	81,357,521	12	7¾	73,740,848	5	2	70,639,525	3	11½

Heads of Revenue.	Grofs Receipt within the Year.			Total Sum to be accounted for, deducting outftanding Balances and Bills.			Net Produce applicable to National Objects, and to Payments into the Exchequer, deducting total Payments out of the grofs Revenue.			Payments into the Exchequer, deducting total Payments out of the net Produce.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Brought forward -	79,161,420	11	2½	81,357,521	12	7¾	73,740,848	5	2	70,639,525	3	11½
On account of the interefl, &c. of a loan granted to the prince regent of Portugal -	57,170	3	0	57,170	3	0	57,170	3	0	57,170	3	0
Surplus fees of regulated public offices - -	107,355	18	3	107,355	18	3	107,355	18	3	107,355	18	3
Impreft money repaid by fundry public accountants, &c. including interefl - - -	56,504	1	10¾	56,504	1	10¾	56,504	1	10¾	56,504	1	10¾
Other monies paid to the public - - -	65,660	9	5	65,660	9	5	65,660	9	5	65,660	9	5
Total { independent of loans }	79,448,111	3	9¼	81,644,212	5	2½	74,027,538	17	8¾	70,926,215	16	6¼
Loans paid into the exchequer, including 6,000,000*l.* for the fervice of Ireland - -	35,050,574	17	9	35,050,574	17	9	35,050,574	17	9	35,050,574	17	9
Grand total -	114,498,686	1	6¼	116,694,787	2	11½	109,078,113	15	5¾	105,976,790	14	3¼

A General Statement of the Revenue of Cuftoms of Great Britain.

	England.			Scotland.			Great Britain.		
Grofs receipt within the year, *viz.*	£	s.	d.	£	s.	d.	£	s.	d.
Permanent and annual duties - -	9,367,542	3	8½	713,392	0	9¼	10,080,934	4	5¾
War taxes - - - -	3,523,205	9	8	295,067	5	1¼	3,818,272	14	9¼
	12,890,747	13	4½	1,008,459	5	10½	13,899,206	19	3

An Account of the Grofs Actual Receipt in Money, &c. of the Excife Confolidated Duties, Unconfolidated Duties, Temporary War Taxes, and Tobacco and Malts, annual in England.

Articles.	Grofs Actual Receipt in Money.			Net Produce of each Article.			Net Payments into the Exchequer.		
	£	s.	d.	£	s.	d.	£	s.	d.
Auctions - - - - -	343,530	16	8¾	335,184	4	1¼	335,184	0	0
Beer - - - - - -	2,888,298	13	10¼	2,569,272	3	3½	2,569,272	0	0
Bricks and tiles - - - -	300,184	8	10½	293,249	9	2¼	293,249	0	0
Candles - - - - -	311,305	15	6½	250,637	6	10¾	250,638	0	0
Cocoa nuts and coffee - - -	124,049	7	2¼	115,655	12	1¼	115,656	0	0
Cyder, perry, and verjuice - - -	25,197	17	8	20,996	4	10½	20,921	0	0
Glafs - - - - -	614,054	14	8¼	383,531	6	5½	383,531	0	0
Hides and fkins - - - -	674,751	3	8¼	592,669	0	3	592,669	0	0
Hops - - - - -	53,537	2	1	36,051	19	2¾	36,052	0	0
Carried forward -	5,334,910	0	3¾	4,597,247	6	4¾	4,597,172	0	0

Articles.	Gross Actual Receipt in Money.			Net Produce of each Article.			Net Payments into the Exchequer.		
	£	s.	d.	£	s.	d.	£	s.	d.
Brought forward -	5,334,910	0	3¾	4,597,247	6	4¾	4,597,172	0	0
Licences - - - - - -	439,892	15	0½	433,750	5	4¼	433,751	0	0
Malt - - - - - -	1,120,558	12	10	1,119,461	11	9¾	1,119,462	0	0
Paper - - - - - -	419,570	17	3¼	372,976	10	11¾	372,976	0	0
Printed goods - - - -	947,029	1	3	322,145	19	0	322,146	0	0
Salt - - - - - -	1,548,092	14	5¾	1,394,253	10	10	1,394,254	0	0
Soap - - - - - -	643,039	16	7¼	551,468	12	9¼	551,468	0	0
Spirits { British - - - - -	1,636,503	17	1¼	1,620,883	6	3	1,620,883	0	0
Spirits { Foreign - - - - -	1,499,110	8	8¼	1,423,359	11	5½	1,423,488	0	0
Starch - - - - - -	37,422	6	0¼	29,178	8	5	29,179	0	0
Stone bottles - - - - -	2,538	3	5¾	2,279	18	2½	2,280	0	0
Sweets and mead - - - -	25,453	6	9	25,337	10	3	25,275	0	0
Tea - - - - - -	2,048,096	0	0½	1,914,739	17	7½	1,914,739	4	5¾
Tobacco and snuff - - - -	383,870	9	6	382,001	5	5¼	382,002	0	0
Vinegar - - - - - -	42,593	16	2¾	42,155	2	6	42,154	0	0
Wine - - - - - -	1,100,583	12	3¾	980,652	17	11½	980,653	0	0
Wire - - - - - -	12,887	18	4½	11,537	10	4½	11,532	0	0
Total consolidated duties -	17,242,153	16	3½	15,223,429	5	7½	15,223,414	4	5¾
Spirits { British, *per* 51 Geo. III. c. 59. -	5,202	3	3	5,129	4	9	5,129	0	0
Spirits { Foreign, do. - - -	28,182	7	0¼	28,174	14	7¼	28,175	0	0
Total unconsolidated duties -	33,384	10	3¼	33,303	19	4¼	33,304	0	0
Temporary War Taxes.									
Malt, *per* 43 Geo. III. c. 81. - -	2,205,229	10	7	2,187,270	1	2½	2,187,270	0	0
Sweets - do. - - -	4,220	2	4¾	4,219	11	4¾	4,236	0	0
Spirits { British do. - - -	580,612	6	4	580,465	11	10	580,466	0	0
Spirits { Foreign do. - - -	742,262	2	3¼	742,111	10	1¾	742,111	0	0
Tea - - - - - -	2,055,263	18	8	1,960,299	17	11¾	1,960,300	4	5¾
Tobacco and snuff, *per* 46 Geo. III. c. 39. -	312,534	3	6	310,566	17	6¾	310,567	0	0
Brandy, &c. { *per* 47 Geo. III. c. 27. - -	58,166	14	2¾	58,050	16	11¾	58,051	0	0
Brandy, &c. { 52 Geo. III. c. 3. - - -	7,821	7	3¼	7,820	1	4¾	7,777	0	0
Total temporary war taxes -	5,966,110	5	3	5,850,804	8	6	5,850,778	4	5¾
Annual Duties.									
Tobacco and snuff, com. 26 March - -	483,081	9	1	453,262	6	3¼	453,263	0	0
Malt, additional do. - - -	893,592	8	9¾	893,158	16	7¼	893,196	0	0
Malt, old, com. 24 June - - -	552,951	11	2¾	423,808	15	8¾	423,782	0	0
Total annual duties -	1,929,625	9	1½	1,770,229	18	7¼	1,770,241	0	0
Totals collected.									
Consolidated duties - - - -	17,242,153	16	3½	15,223,429	5	7½	15,223,414	4	5¾
Unconsolidated duties - - -	33,384	10	3¼	33,303	19	4¼	33,304	0	0
Temporary war taxes - - -	5,966,110	5	3	5,850,804	8	6	5,850,778	4	5¾
Annual duties - - - -	1,929,625	9	1½	1,770,229	18	7¼	1,770,241	0	0
Grand total - -	25,171,274	0	11¼	22,877,767	12	1	22,877,737	8	11½

An Account of the Grofs Actual Receipt, &c. of the Excife in Scotland.

	Duties.	Grofs Actual Receipt. £	s.	d.	Net Produce. £	s.	d.
Confolidated.	Auctions	18,190	7	5¾	15,712	12	11¼
	Beer	80,810	2	6	56,188	15	7¾
	Bricks and tiles	5,745	13	5	5,433	2	3½
	Candles	19,051	17	9	15,803	2	2
	Cocoa nuts and coffee	7,543	17	5½	7,343	17	5½
	Cyder and perry	2	7	3¾	2	7	3¾
	Glafs	136,912	5	10¾	40,852	10	5¼
	Hides and fkins	76,966	0	8½	66,323	18	6½
	Hops	25	14	2	25	14	2
	Licences	56,259	8	0½	47,981	1	5½
	Malt	36,828	10	1¼	29,399	1	3½
	Paper	43,368	3	0½	27,075	11	10
	Printed goods	263,827	8	4¾	72,446	12	4¼
	Salt	117,112	9	5¼	96,234	2	9½
	Soap	108,702	13	9½	90,099	6	1
	Britifh fpirits	288,879	15	4½	268,157	3	1¾
	Foreign fpirits	125,669	8	1¼	120,178	8	7¼
	Starch	3,160	2	2½	1,478	9	9
	Stone bottles	6	9	4½	6	9	4½
	Sweets	257	2	0	257	2	0
	Tobacco and fnuff	45,815	19	5½	42,299	5	6¼
	Vinegar	794	18	5¼	794	18	5¼
	Wine	67,291	15	0½	58,213	7	11¼
Temporary. Additional.	Britifh fpirits, 51 Geo. III. c. 59.	82	13	3½	82	13	3½
	Do. do. 52 Geo. III. c. 3.	86,327	12	9	83,027	12	9
	Foreign fpirits, 51 Geo. III. c. 59.	494	4	6	494	4	6
	Do. do. 52 Geo. III. c. 3.	140	2	11¾	140	2	11¾
	Malt, 1803	65,148	14	3	50,523	5	2¼
	Britifh fpirits, 1806	9,460	8	10¼	7,610	9	6¼
	Foreign fpirits, 1803	62,002	15	11½	57,819	14	5½
	Do. do. 1807	899	3	3½	899	3	3½
	Sweets, 1803	42	17	0	42	17	0
	Tobacco, 1806	37,108	13	0	34,345	5	3¾
	Fines and forfeitures	16,709	5	4¾	15,392	13	11¾
	Total, Excife	1,781,639	0	9¼	1,312,685	3	10
Annual.	Malt, 23d June: furplus	—			—		
	Do. deficient	29	7	5	Minus 584	19	6
	Do. 1813	8,507	18	10	6,510	0	5
	Do. 1814	583	7	7	583	7	7
	Do. 25th March 1812, and preceding	110	12	5	87	6	2
	Do. 1813	13,795	8	11	11,393	3	11
	Do. 1814	923	8	2	923	8	11
	Tobacco, ending 25th March 1813, and preceding	30,214	7	9	29,645	18	1
	Do. 1814	25,887	12	4	25,787	10	10
	Total, annual duties	80,052	3	5	74,345	15	8
	Grand total	1,861,691	4	2¼	1,387,030	19	6

An Account of the Grofs and Net Produce, &c. of the Duties arifing from Stamps in England.

	Grofs Produce.			Net Produce.		
	£	s.	d.	£	s.	d.
Deeds, law proceedings, and other written inftruments, (except legacy receipts, probates and adminiftrations, bills of exchange, and promiffory notes and receipts,) and on licences to pawnbrokers and dealers in thread lace	2,010,598	13	5¾	1,901,235	0	9
Legacies	545,115	6	3	525,134	17	2
Probates and adminiftrations	417,263	5	2	402,576	0	3¼
Bills of exchange and promiffory notes	624,353	17	5	602,542	9	5
Receipts	161,080	9	3	148,827	0	2¾
Newfpapers and almanacs	394,041	0	4	329,069	17	1
Medicine and medicine licences	41,578	11	3½	36,188	11	7½
Fire infurances	437,380	18	6	405,844	2	1½
Cards	24,462	5	0	23,788	9	1
Gold and filver plate	66,198	9	4½	60,030	15	6¾
Dice	723	0	0	712	18	6
Pamphlets	415	13	8	410	0	10
Advertifements	114,111	12	10	110,348	9	9½
Stage coaches	167,239	17	0¾	163,010	6	11¾
Poft horfes	247,467	10	0	244,322	12	2
Race horfes	868	7	0	786	16	10½
	5,252,898	16	7½	4,954,828	8	5½
Lottery	4,469	4	8	3,774	3	7

An Account of the Grofs and Net Produce, &c. of the Duties arifing from Stamps in Scotland.

	Grofs Produce.			Net Produce.		
	£	s.	d.	£	s.	d.
Deeds, law proceedings, and other written inftruments, (except legacy receipts, teftamentary inventories, bills of exchange, and promiffory notes and receipts,) and on licences to pawnbrokers and dealers in thread lace; alfo newfpapers and almanacs	184,800	9	5½	172,864	9	0½
Legacies	26,186	0	2	24,800	0	0
Bills of exchange and promiffory notes	95,543	4	1	91,069	13	10
Teftamentary inventories	16,697	7	11	15,341	7	11
Receipts	11,569	9	11½	10,872	9	11
Fire infurance	15,918	19	4	15,118	6	6
Gold and filver plate	3,425	17	5¼	3,139	11	4½
Medicine and medicine licences	210	17	0	178	15	6
Advertifements	14,623	7	0	13,950	11	4
Stage coaches	11,732	10	3	11,427	2	9
Pamphlets	6	4	0	6	4	0
Race horfes	73	10	0	69	16	8
	380,787	16	7¼	358,838	12	6

An Account of the Grofs and Net Produce, and Payments into the Exchequer, of the Revenue, under the Management of the Commiffioners of Taxes in England and Wales, including the Property Tax.

Taxes.	Grofs Produce, 1813.			Net Produce.		
	£	s.	d.	£	s.	d.
Land tax	1,272,256	16	3¼	1,127,078	8	3½
Affeffed taxes	6,155,867	0	6	5,903,818	10	1¼
Property tax	13,016,041	17	3¾	12,750,408	7	2
Aid and contribution tax	—			—		
Income tax	1,020	13	8	993	15	4½
	20,445,186	7	9	19,782,299	0	11¼

An Account of the Grofs and Net Produce, and Payments into the Exchequer, of the Revenue, under the Management of the Commiffioners of Taxes in Scotland.

Taxes.	Grofs Produce, 1813.			Net Produce.		
	£	s.	d.	£	s.	d.
Land tax	31,143	1	1¾	18,700	0	0
Affeffed taxes	414,593	19	1½	383,900	0	0
Property tax	1,255,924	15	7½	1,215,400	0	0
Aid and contribution tax	—			—		
Income tax	600	0	0	600	0	0
	1,702,261	15	10¾	1,618,600	0	0

An Account of the Grofs and Net Produce, and Payments into the Exchequer, of the Revenue arifing from the Poft-office in England and Scotland refpectively.

	Grofs Produce.			Net Produce.		
	£	s.	d.	£	s.	d.
Inland	1,532,980	12	11	1,136,027	2	3
Foreign	128,647	14	10	42,456	18	5
Twopenny poft	93,299	15	5	57,675	19	3
Scotland	191,884	15	6	154,094	5	11
Ireland	59,236	18	8	29,962	2	10
Total	2,006,049	17	4	1,420,216	8	8

An Account of the Grofs Receipt and Net Payments into the Exchequer, on the Duty of One Shilling in the Pound on Salaries and Penfions in England and Scotland refpectively.

		Grofs Receipt, 1813.			Net Produce.		
		£	s.	d.	£	s.	d.
England	London, Middlefex and Weftminfter	4,849	6	10	4,393	8	5½
	Exchequer	11,828	17	8	12,331	13	0
		16,678	4	6	16,725	1	5½
Scotland		2,970	12	2	600	0	0
		19,648	16	8	17,325	1	5½

An Account of the Grofs Receipt and Net Payments into the Exchequer, of the Duty of Sixpence in the Pound on Salaries and Penfions in England and Scotland refpectively.

		Grofs Receipt, 1813.	Net Produce.
		£ s. d.	£ s. d.
England	London, Middlefex and Weftminfter - -	3,750 8 10½	3,941 17 10¾
	Exchequer - - - - - -	5,928 11 0	6,365 11 3
		9,678 19 10½	10,307 9 1¾
Scotland - - - - - -		2,049 17 2	400 0 0
		11,728 17 0	10,707 9 1¾

An Account of the Grofs Receipts, &c. of the Revenues arifing from Hackney Coaches and Chairs.

Grofs amount	in the year ending Jan. 5th, 1813	£ 25,181 10 0
Net produce		21,874 16 10½

An Account of the Grofs Receipts, &c. of the Revenues arifing from the Department of the Hawkers and Pedlars.

Grofs amount - - - - -	£ 20,160 3 2½
Net produce - - - - -	17,581 11 11

An Account of the Grofs and Net Produce, on account of Prefines.

Grofs produce - - - - -	£ 6,817 3 4
Net produce - - - - -	3,669 15 4

An Account of the Grofs and Net Produce arifing from Poft-Fines.

Grofs produce - - - - -	£ 516 13 9½
Net produce - - - - -	458 1 3½

An Account of the Sums received by way of Lottery.

On account of Lotteries in 1812 - - -	£ 840,926 16 5
Do. do. 1813 - - -	95,000 0 0

An Account of the Total Sums of Money paid into the Exchequer, on account of Public Loans.

	£ s. d.
Contributions to annuities in 1812, for raifing 22,500,000*l.* - - - -	651,367 4 2
Contributions by debentures in 1813, for raifing 6,000,000*l.* - - - -	540,773 11 11
Contributions by debentures in 1813, for raifing a further fum - - - -	245,924 7 0
Contributions to annuities in 1813, for raifing 27,000,000*l.* - - - -	25,900,000 7 0
Contributions to annuties in 1814, for raifing 22,000,000*l.* - - - -	7,712,509 14 8

An Account of the Amount of Exchequer Bills, iffued for the Public Service.

Under what Acts iffued.	On what Funds charged, and the total Amount to be iffued under each Act.			Amount iffued and not redeemed within the Year.
			£	£
52 Geo. III. c. 114. - - -	Supplies -	1812 -	- - -	1,289,900
53 Geo. III. c. 16. - - -	Supplies -	1814 -	10,500,000 -	4,248,300
53 Geo. III. c. 26. - - -	Supplies -	1814 -	5,000,000 -	5,000,000
53 Geo. III. c. 27. - - -	Supplies -	1814 -	1,500,000 -	1,500,000
53 Geo. III. c. 42. - - -	Supplies -	1813 -	- - -	15,879,900
53 Geo. III. c. 118. - - -	Supplies -	1814 -	5,670,700 -	5,670,700
53 Geo. III. c. 119. - - -	Supplies -	1814 -	1,000,000 -	545,200
53 Geo. III. c. 161. - - -	Supplies -	1814 -	5,000,000 -	4,358,000
54 Geo. III. c. 2. - - -	Malt, &c. -	1814 -	3,000,000 -	2,862,000
				41,354,000

An Account of the Amount of Navy, Victualling, and Transport Bills.

	£	s.	d.
Navy - - - - - -	1,535,380	0	3
Victualling - - - - -	1,250,947	1	11
Transport - - - - -	913,413	6	0
	3,699,740	8	2

An Account of the Charge upon the Consolidated Fund, distinguished under several Heads.

	£	s.	d.
Civil list. For the support of his majesty's household, *per* 17 G. III. -	898,000	0	0
Civil list. Ditto - 44 G. III. -	60,000	0	0
Civil list. Ditto - 52 G. III. -	70,000	0	0
Courts of justice - - -	69,692	3	0
Mint - - - - - -	17,333	17	0
Salaries, Allowances, &c. - -	12,833	13	4
Commissioners of public accounts -	45,465	14	4½
Commissioners of West India accounts - - - -	9,656	6	11
Miscellaneous - - - -	79,956	5	0
His royal highness the duke of Clarence, *per* 31 Geo. III. -	12,000	0	0
His royal highness the duke of York, *per* 32 Geo. III. -	14,000	0	0
Her royal highness the duchess of York, *per* 32 Geo. III. -	4,000	0	0
His royal highness the prince of Wales, *per* 35 Geo. III. -	65,000	0	0
His royal highness the duke of Kent, *per* 39 Geo. III. -	12,000	0	0
His royal highness the duke of Cumberland, *per* 39 Geo. III.	12,000	0	0
His royal highness the duke of Sussex, *per* 42 Geo. III. -	12,000	0	0
His royal highness the duke of Cambridge, *per* 42 Geo. III.	12,000	0	0
His royal highness the duke of Clarence, *per* 46 Geo. III. -	6,000	0	0
His royal highness the duke of Kent, *per* 46 Geo. III. -	6,000	0	0
His royal highness the duke of Cumberland, *per* 46 Geo. III.	6,000	0	0
His royal highness the duke of Sussex, *per* 46 Geo. III. -	6,000	0	0
His royal highness the duke of Cambridge, *per* 46 Geo. III.	6,000	0	0
Her royal highness the princess Charlotte of Wales, 46 G. III.	7,000	0	0
His highness the duke of Gloucester, *per* 46 Geo. III. -	14,000	0	0
Her highness the princess Sophia of Gloucester, *per* 46 Geo. III.	7,000	0	0
Her royal highness the princess Elizabeth, *per* 52 Geo. III. -	9,000	0	0
Her royal highness the princess Augusta Sophia, 52 G. III.	9,000	0	0
Her royal highness the princess Mary, *per* 52 Geo. III. -	9,000	0	0
Her royal highness the princess Sophia, *per* 52 Geo. III. -	9,000	0	0
These, with other pensions, amount in the whole to -	1,595,350	6	11¾

For more particulars of this kind, see POLITICAL *Arithmetic*, *Public* DEBTS, *Public* FUNDS, and TAX.

REVENUE, *Auditors of the*. See AUDITOR.

REVENUE, *Court of*. See COURT *of Exchequer*.

REVENUE, *Officers of*, are excluded from voting in elections for members of parliament by 22 Geo. III.

REVENUE, *Revenu*, in *Hunting*, a fleshy mass or lump, formed chiefly of a cluster of whitish worms on the heads of deer, and supposed to occasion them to cast their horns, by those worms gnawing the roots of them.

The revenue distilled, is said to help women in travail.

REVENUE is also used for a new tail of a partridge, growing out after the loss of a former. The revenue is measured by fingers; thus they say, a partridge of two, three, and four fingers revenue.

REVERA, in *Geography*, a small island in the Adriatic, near the coast of Istria. N. lat. 45° 15′. E. long. 13°.

REVERBERATION, REVERBERATIO, formed from *re*, and *verbero*, q. d. *I beat again*, in *Physics*, the act of a body repelling or reflecting another, after impinging on it. In the glass-men's furnace, the flame reverberates or bends back again to burn the matter on all sides. Echoes are occasioned by the reverberation of sounds from arched obstacles.

Reverberation and *resilition* refer to the same action; only the one to the agent, the other to the patient. A polished body reverberates the rays all around; the resilition of the rays does not arise from their striking against the solid parts of bodies. See REFLECTION.

REVERBERATION, in *Chemistry*, denotes a kind of circulation of the flame, by means of a reverberatory; or the return of the flame from the top of the furnace back to the bottom, chiefly used in calcination.

Reverberation is of two kinds. The first with a *close fire*; that is, in a reverberatory furnace, where the flame has no vent at top; being covered with a dome, or capital, which repels its action back on the matter, or the vessel that contains it, with increased vehemence.

After this manner are refining, the distillation of acid spirits, &c. performed.

Reverberation with an *open fire*, is that performed in a furnace, or reverberatory, whose registers are all open; used in calcination, &c.

REVERBERATORY, or REVERBERATING *Furnace*, is a chemical furnace built close all round, and covered at the top with a capital of brick or tiles, so as not to give any vent to the heat or flame, but to determine it to reverberate or turn back from the brick-work with new force, upon the matters placed at bottom.

When the fire has no vent or passage at top, it is a *whole* reverberatory; when the middle of the capital is open, and only the sides close, so that there is only a half circulation of the flame, it is called a *half* reverberatory.

The reverberating furnace is chiefly used in the fusion and calcination of metals and minerals, and on other occasions, where the most intense heat is required, as in assaying, &c. Whence it is also called the *melting-furnace*, and *assaying furnace*. See *Reverberating* FURNACE.

REVERENCE, in *Ethics*, is the veneration, or high degree of respect, which is paid to superior sanctity, intermixed with a certain degree of awe. It is the high respect paid to the sacred character of its object, attended with a conscious inferiority in moral worth.

REVEREND, REVERENDUS, a title of respect given to ecclesiastics.

The religious abroad are called reverend fathers; and abbesses, prioresses, &c. are called reverend mothers.

With us, bishops are *right reverend;* and archbishops *most reverend.* In France, their bishops, archbishops, and abbots, are all alike *reverendissimes, most reverend.*

REVERIE, a term purely French, frequently used of late in English, to signify a delirium, raving, or distraction. It is an ill sign in fevers when the patient falls into a reverie.

Hence also reverie comes to be used for any ridiculous, extravagant imagination, action, or proposition, a chimera or vision. Thus we say, authors obtrude abundance of their reveries upon us for solid truths.

But the most ordinary use of the word reverie, among English writers, is for a deep, disorderly musing or meditation, equivalent to what we popularly call a *brown study.* Thus, a little distraction I would allow; but for that continued series of reveries some people are guilty of who are ever absent from the place where you see them, and are never present any where, it is inexcusable.

REVERO, in *Geography*, a town of Italy, in the department of the Mincio, on the S. side of the Po, opposite to Ostiglio.

REVERS, Battery de. See Battery.

REVERSAL, in *Law.* See Reverse.

REVERSATA Arma. See Arma.

REVERSE, in the *Military Art*, signifies on the back, or behind. Thus we say, a reverse view, a reverse commanding ground, a reverse battery, &c.

Reverse, formed of *re, again*, and *versus, turned*, in *Law*, &c. To reverse, signifies to undo, repeal, or make void.

A judgment may be reversed or voided for matters foreign to or *debôrs* the record, that is, not apparent upon the face of it, by writ of error, and by act of parliament. The effect of falsifying or reversing an outlawry is, that the party shall be in the same plight as if he had appeared upon the capias; and if it be before plea pleaded, he shall be put to plead to the indictment; if after conviction, he shall receive the sentence of the law; for all the other proceedings, except only the process of outlawry for his non-appearance, remain good and effectual as before. But when judgment, pronounced upon conviction, is falsified or reversed, all former proceedings are absolutely set aside, and the party stands as if he had never been at all accused; restored in his credit, his capacity, his blood, and his estates. But he still remains liable to another prosecution for the same offence. See Attainder, Judgment, and Outlawry.

Reverse of a medal, coin, &c. denotes the second, or back side; in opposition to the head or principal figure, called the face, or obverse.

F. Chamillart, a Jesuit, has an express dissertation on this point, whether or no the reverses of medals have always a regard to the emperors or empresses whose heads are represented on the front side of the medal? He says, that till of late the antiquaries have made no doubt of it; but that there are now several authors of another opinion.

The knowledge of the reverses of medals constitutes a distinguishing part of this science. In the early Greek coins, the reverse seldom affords much fancy of symbol; and in the imperial Greek coins it is chiefly impressed with temples of their deities. To Greek artists we are indebted for the beauty of the Roman imperial coins; and these are so highly finished, that on some reverses, as that of Nero's decursion, the "Adventus" and "Progressio" of various emperors, the "Fundator pacis" of Severus, the features of the emperor riding, or walking, are as exact as on the obverse. No Roman or Etruscan coins have been found of the globular form, or indented on the reverse, like the early Greek. The first Greek are small pieces of silver, while the Roman are large masses of copper: the former are struck, the latter are cast in moulds. The reverses of Roman coins are very uniform, the prow of a ship, a car, or the like, till about 100 years before our era, when various reverses appear on their consular coins in all metals. See Medal.

With respect to the consular medals, it is observed, that the same reverse is common to many of them; as Castor and Pollux on horseback, first used; then a victory, or one of the gods; or the person to whose honour the medal was struck, driving a chariot with two or four horses; whence the denomination of the denarius *bigatus*, and *quadrigatus*. The ratis or ship, or prow of a ship, as an emblem of naval power, was no uncommon reverse on the consular coins; which were, on this account, called *ratiti*. Some of the consular medals, that bore on the face the impress of their ancient kings, preserved on the reverse the record of some worthy action which they had performed, as the famous aqueduct on the reverse of Ancus, in honour of his having begun it. Medals, struck on occasion of founding colonies, have sometimes on the reverse a priest following a yoke of oxen, with a plough; designed to denote the manner in which the boundaries of colonies were marked out, or that they were planted by the common people; and those trophies that are sometimes seen on medals of this kind, signify that they were planted by the veteran soldiers.

The reverses of imperial medals are very various; but the chief of them may be reduced to three classes, *viz.* figures or personages; public monuments or buildings; and inscriptions. The figures are sometimes those of princes in miniature, whose portraits are exhibited more at large on the face; as on the reverses of the emperors of the family of Constantine, we often see the emperor standing with a labarum in his right hand, and a globe, surmounted with a victory, in his left. Sometimes the emperor is disguised under the figure of some god; as on the reverse of a Diocleslan, who had assumed the name Jovius, he appears in the figure of Jupiter, sitting in a chair, with a globe in his hand, surmounted with a Victory; the legend being IOVI. H. U. C. C. *i. e. Hoc voluerunt consules.* The Greek coins of cities present us with exquisite heads of deities, apparently copied from statues or paintings. The majesty of Jupiter, the modesty of Diana, the beauty of Venus, the ferocity of Mars, and other ideal characters, appear in the Grecian civic coins with a perfection not to be surpassed by human art. Sometimes the figure on the reverse is some relation of that on the face; as Augustus on the reverse of Julius, and Claudius on the reverse of his mother Antonia. Such medals are highly esteemed by antiquarians, not only because it is a rule with them that every coin stamped with portraits on either side is very valuable, but because they identify the personage on the reverse to have been the wife, the son, or the daughter of such a particular prince, and thus help in the adjustment of a series. The figure of some deity is sometimes seen on the reverse; as Minerva on the reverse of a Domitian; and the goddess Salus, with a patera in her hand, sacrificing to Esculapius, on the reverse of a Marcus Aurelius. (See Medal.) The virtues for which the emperors were, or wished to be, celebrated, are also frequently expressed by the figures on the reverses; and thus the fine personifications and symbols to be found on the reverses of the Roman coins render them entertaining, as well as instructive, to a person of poetical imagination. Virtue or Courage is represented by a bold armed woman with a spear in her right hand, and a parazonium in her left, on the reverse of a Domitian; Liberty, carrying in her right hand the cap of liberty, and in her left the wand called rudis or

vindicta, appears on the reverſe of a Commodus; and Equity, with a ſpear in her right hand, and a balance in her left, on the reverſe of a Veſpaſian. The virtues of the ladies are alſo celebrated on the reverſes of their medals; as Piety, in the habit of a Veſtal virgin, ſtrewing frankincenſe on an altar, on the reverſe of a Fauſtina; Fœcunditas on another medal of the ſame, and SPES REIPUBLICÆ, expreſſed by a female figure, wearing a helmet to repreſent the republic, and two children at her breaſts, on the reverſe of a Maximiana Fauſta, ſecond wife of Conſtantine the Great. Happineſs has ſometimes the caduceus, or wand of Mercury, which Cicero (1 Offic.) tells us was thought to procure every wiſh. She has, in a gold coin of Severus, heads of poppy, to expreſs that our chief bliſs ariſes from oblivion of misfortune. Hope is repreſented as a ſprightly damſel, walking quickly, and looking ſtraight forwards. With her left hand ſhe holds up her garments, that they may not impede the rapidity of her pace; while, in her right hand, ſhe holds forth the bud of a flower, an emblem infinitely more fine than the trite one of an anchor, which is the ſymbol of patience, not of hope. This perſonification, with ſome others, muſt have been very familiar to the ancients, for often in this, and a few more inſtances, no name, as SPES AUG. or the like, is inſerted in the legend. Abundance is imaged as a ſedate matron, with a cornucopia in her hands, of which ſhe ſcatters the fruits over the ground, nor does ſhe hold up her cornucopia, and keep its contents to herſelf, as many modern poets and painters make her do. The emperor Titus, having cauſe to import a great ſupply of corn, during a ſcarcity at Rome, that ſupply, or the ANNONA, is finely repreſented as a ſedate lady, with a full cornucopia in her left hand, which ſhe holds upright, to indicate that ſhe does not, however, mean to ſcatter it, as Abundance has a title to do, but to give it to Equity to deal out. This laſt circumſtance is ſhewn by her holding a little image of Equity, known by her ſcales, and *haſta pura*, or pointleſs ſpear, in her right hand, over a baſket filled with wheat. Behind the ANNONA is the prow of a ſhip, decked with flowers, to imply that the corn was brought by ſea, (from Africa,) and that the ſhips had had a proſperous voyage. The beſt poet in the world could not have given us a finer train of imagery; and the beſt painter would be puzzled to expreſs ſo much matter in ſo ſmall a compaſs. Security ſtands leaning on a pillar, indicative of her being free from all deſigns and purſuits; and the poſture itſelf correſponds to her name. Horace, in deſcribing the wiſe man, mentions his being "teres atque rotundus," round and poliſhed againſt all the rubs of chance;—an image ſeemingly derived from the column upon which this ideal lady reclines. The happineſs of the ſtate is pictured by a ſhip, ſailing before a proſperous breeze;—an image, than which the ſuperlative genius of Gray could not have found one more exquiſite; and he has accordingly uſed it in his moſt capital production, "The Bard," with due ſucceſs.

Provinces are alſo repreſented by figures or perſonages, denoting either the emperor's conqueſt or care of them; as Judæa ſitting in a melancholy poſture at the bottom of a pillar adorned with trophies, to ſignify her captive ſtate, on the reverſe of a Veſpaſian; and Italia with a cornucopia in her right hand, to denote her fruitfulneſs; a crown of towers on her head, to repreſent her many cities; a ſceptre in her left hand, and ſitting on a globe, to ſhew that ſhe was ſovereign of nations, on the reverſe of a Commodus. Britain is often repreſented, upon the earlieſt imperial coins, ſitting on a globe, with a ſymbol of military power, the *labarum*, in her hand, and the ocean rolling under her feet;—an emblem almoſt prophetic of the vaſt power which her dominion over the ſea will always give her, provided that ſhe aſſerts her element of empire with due vigour and perſeverance, blending moderation and juſtice with her mighty power. On coins alſo we are preſented with Achaia, Africa, Alamannia, Alexandria, Arabia, Armenia, Aſia, Bithynia, Cappadocia, Dacia, Dardania, Egypt, Gallia, Hiſpania, Italia, Judæa, Macedonia, Mauritania, Pannonia, Parthia, Phrygia, Sarmatia, Sicily, Scythia, Syria, and the rivers Danube, Nile, Rhine, and Tiber. This perſonification of provinces, ſo intereſting to the imagination, ſeems to have ariſen from the figures of provinces carried in triumphs; as the perſonification of our old poets ſprung from the ideal perſons, actually repreſented in the myſterial plays. Whilſt we are on the ſubject of the poetical imagery of ancient coins, we muſt not omit the mention, even, of a colonial one and of rude execution, of Auguſtus and Agrippa, inſcribed IMP. and DIVI F. which has a high claim to merit in this way. On the reverſe the conqueſt of Egypt is repreſented by the appoſite metaphor of the crocodile, an animal almoſt peculiar to that country, and at that period eſteemed altogether ſo, which is chained to a palm-tree, at once a native of the country and ſymbolic of victory. Moreover, the figure on the reverſe is ſometimes deſigned to immortalize ſome worthy action of the emperor; as the goddeſs Moneta, with a cornucopia in her left hand, and a balance in her right, on the reverſe of a Domitian, to denote his care about the public coin. There are ſometimes two, three, or more figures, on the ſame reverſe; as Honos and Virtus on the reverſe of Galba; and three kings, with the emperor crowning them, on a medal of Trajan. (See MEDAL.) There are alſo the figures of animals on the reverſes of ſome medals; as the eagle and peacock, to denote the apotheoſis of princes and princeſſes; the crocodile, as the ſymbol of Egypt; a ſerpent, of Eſculapius; a camel, of Arabia, &c.; and elephants in trappings on the reverſe of an Antoninus Pius and a Severus, importing that theſe emperors procured theſe beaſts to entertain the people at the public ſhows. We meet alſo with fabulous animals, as the griffin on the reverſe of one medal of Gallienus, a centaur on another, and a phœnix on ſome medals of Conſtantine and his ſons, denoting the perpetuity of the empire.

The ſecond ſort of reverſes comprehends public monuments and buildings; as the temple of Janus ſhut, on the reverſe of a Nero, to ſignify the univerſal peace he gave to the empire; the Macellum, or ſhambles, which he cauſed to be erected, on another; the ſumptuous bridge built by Trajan over the Tiber, on the reverſe of one of his medals; and the Amphitheatre and Naval Column, on thoſe of Titus.

The third ſort of reverſes includes inſcriptions on the table or field of the medal. On ſeveral Latin and Greek imperial medals, we find nothing on the reverſe but S. C. or Δ. Ε. for δημαρχικης εξουσιας, incloſed in a crown. Others repreſent ſignal occurrences; as VICTORIA GERMANICA IMP. VI. COS. III. on the reverſe of M. Aurelius. Others have titles of honour granted to the princes; as S. P. Q. R. OPTIMO PRINCIPI, on the reverſe of a Trajan, and alſo of an Antoninus Pius. Other inſcriptions again have reſpect to public vows, which were made for the emperor every ten years, or ſometimes, in the lower empire, every five years. Thus we have on the reverſe of a Conſtantius VOTIS XXX. MULTIS XXXX. importing probably their engagement to make new vows at the expiration of thirty years, that he might reign forty years.

Beſides the reverſes already enumerated, there are others, called by Addiſon riddles, which cannot be referred to any of the above claſſes. Thus, Mercury in the form of a Terminus, ſtanding on a thunder-bolt, on the reverſe of an

an Auguſtus, was probably intended for a rebus, to expreſs the ſenſe of that emperor's motto, *feſtina lente*. Inſtruments of religion were ſymbols of the pontifex maximus, and ſignified the piety of the prince, on whoſe coin they appear; as the lituus, the ſimpulum, the aſperſorium, and the capula, on the reverſe of a Nerva. Two hands joined, holding two ears of corn, and a caduceus betwixt them, on the reverſe of a Titus, import the good harmony and union ſubſiſting betwixt the prince and the public, the peace ariſing from ſuch an union, and the plenty, which is the fruit of ſuch a peace. Pinkerton on Medals, 2 vols. Addiſon's Three Series of Medals, in his Works, vol. i. p. 522, &c. See MEDALS.

REVERSE, in *Fencing*, a back-ſtroke.

REVERSED, in *Heraldry*, a thing turned backwards, or upſide down.

REVERSED *Arms*, in *Military Language*, denote thoſe whoſe butts are ſlung or held upwards.

REVERSED *Talon*, in *Architecture*. See TALON.

REVERSING, or RENVERSING, in *Muſic*, the inverting of the order of the parts; that is, placing the higher part, or treble, in the room of the lower part or baſs.

Reverſing is frequently practiſed in figurative counterpoint, where the baſs ſerves as treble, and the treble at the ſame time as baſs; and all this in ſuch manner, as that the harmony, though very different, is yet as correct as before the reverſing, when the parts were in their natural order.

A reverſed fugue, or counter-fugue, called by the Italians *per contrarii movementi*, is when the guida falls, and the other, inſtead of imitating by falling, imitates by riſing; or, it is a figure *per arſin et theſin*. See RENVERSÉ.

REVERSION, REVERSIO, in *Law*, is defined by Coke, a returning of lands, &c. into the poſſeſſion of the donor or his heirs, after the expiration of the term for which they were given or granted to another. Or, an eſtate in reverſion, is the reſidue of an eſtate left in the grantor, to commence in poſſeſſion after the determination of ſome particular eſtate granted out by him.

The word has a double acceptation. The firſt is, *jus revertendi, cum ſtatus poſſeſſionis defecerit*; which is no more than an intereſt in the land, when the occupation or poſſeſſion of it ſhall fall.

The ſecond is, when the poſſeſſion and eſtate, which was parted with for a time, ceaſeth, and is determined in the perſon of the alienees, aſſignees, grantees, or their heirs, or effectually returns to the donor, his heirs or aſſigns, whence it was derived.

This is the moſt proper ſignification of the word, which is derived from *revertor*: "Et apte dici non poteſt reverſio, antequam revertatur in facto." Littlet.

The difference between a reverſion and a remainder conſiſts in this, that a remainder is general, and may remain or belong to any man but him that granteth or conveyeth the land, &c.

Whereas a reverſion is to himſelf, from whom the conveyance of the land, &c. proceeded, and is commonly perpetual as to his heirs alſo. And yet ſometimes reverſion is confounded with remainder.

A reverſion is never created by deed or writing, but ariſes from conſtruction of law; a remainder can never be limited, unleſs by either deed or deviſe. But both are equally transferrable, when actually veſted, being both eſtates *in præſenti*, though taking effect *in futuro*. The uſual incidents to reverſions, the doctrine of which is derived from the feudal conſtitution, are ſaid to be fealty and rent. When no rent is reſerved on the particular eſtate, fealty however reſults of courſe, as an incident quite inſeparable, and may be demanded as a badge of tenure, or acknowledgment of ſuperiority, being frequently the only evidence that the lands are holden at all. Where rent is reſerved, it is alſo incident, though not inſeparably ſo, to the reverſion. (Co. Litt. 143.) The rent may be granted away, reſerving the reverſion; and the reverſion may be granted away, reverſing the rent, by ſpecial words; but by a general grant of the reverſion, the rent will paſs with it, as incident to it; though by the grant of the rent generally, the reverſion will not paſs. The incident paſſes by the grant of the principal, but not *e converſo*; for the maxim of law is, *acceſſorium non ducit, ſed ſequitur, ſuum principale*. Co. Litt. 151, 152.

The law has carefully diſtinguiſhed remainders from reverſions. Thus, if one ſeized of a paternal eſtate in fee makes a leaſe for life, with remainder to himſelf and his heirs, this is properly a mere reverſion (Cro. Eliz. 321.), to which rent and fealty ſhall be incident; and which ſhall only deſcend to the heirs of his father's blood, and not to his heirs general, as a remainder limited to him by a third perſon would have done (3 Lev. 407.); for it is the old eſtate, which was originally in him, and never yet was out of him. And ſo, likewiſe, if a man grants a leaſe for life to A, reſerving rent with reverſion to B and his heirs, B hath a remainder deſcendible to his heirs general, and not a reverſion to which the rent is incident; but the grantor ſhall be entitled to the rent during the continuance of A's eſtate. 1 And. 23.

For the aſſiſtance of thoſe who have an eſtate in remainder, reverſion, or expectancy, after the death of others, againſt fraudulent concealments of their deaths, it is enacted by 6 Ann. c. 18. that all perſons, on whoſe lives any lands or tenements are holden, ſhall (upon application to the court of chancery and order made thereupon) once in every year, if required, be produced to the court or its commiſſioners; or, upon neglect or refuſal, they ſhall be taken to be actually dead, and the perſon entitled to ſuch expectant eſtate may enter upon and hold the lands and tenements, till the party ſhall appear to be living.

It may further be obſerved, that whenever a greater eſtate and a leſs coincide and meet in one and the ſame perſon, without any intermediate eſtate, the leſs is immediately annihilated; or, in the law phraſe, is ſaid to be *merged*, that is, ſunk or drowned in the greater. Thus, if there be tenant for years, and the reverſion in fee-ſimple deſcends to or is purchaſed by him, the term of years is merged in the inheritance, and ſhall never exiſt any more. But they muſt come to one and the ſame perſon in one and the ſame right; elſe, if the freehold be in his own right, and he has a term in right of another (*en auter droit*), there is no merger. Therefore, if tenant for years dies, and makes him who hath the reverſion in fee his executor, whereby the term of years veſts alſo in him, the term ſhall not merge; for he hath the fee in his own right, and the term of years in the right of the teſtator, and ſubject to his debts and legacies. So alſo, if he who hath the reverſion in fee marries the tenant for years, there is no merger; for he hath the inheritance in his own right, the leaſe in the right of his wife. An eſtate-tail is an exception to this rule: for a man may have in his own right both an eſtate-tail and a reverſion in the fee; and the eſtate-tail, though a leſs eſtate, ſhall not merge in the fee. For eſtates-tail are protected and preſerved from merger by the operation and conſtruction, though not by the expreſs words, of the ſtatute *de donis*: which operation and conſtruction have probably ariſen upon this conſideration; that, in the common caſes of merger of eſtates for life or years by uniting with the inheritance, the particular tenant hath the ſole intereſt in them, and hath full power at any time

to

to defeat, deſtroy, or ſurrender them to him that hath the reverſion; therefore, when ſuch an eſtate unites with the reverſion in fee, the law conſiders it in the light of a virtual ſurrender of the inferior eſtate. But in an eſtate-tail the caſe is otherwiſe: the tenant for a long time had no power at all over it, ſo as to bar or to deſtroy it; and now can only do it by certain ſpecial modes, by a fine, a recovery, and the like: it would, therefore, have been ſtrangely improvident, to have permitted the tenant in tail, by purchaſing the reverſion in fee, to merge his particular eſtate, and defeat the inheritance of his iſſue: and hence it has become a maxim, that a tenancy in tail, which cannot be ſurrendered, cannot alſo be merged in the fee. Blackſt. Comm. b. ii.

Reversion *of Series*, in *Algebra*, is the method of finding the value of an unknown quantity, whoſe powers enter the terms of a finite or infinite ſeries, by means of another ſeries, in which it does not enter. Thus, if we have

$$y = ax + bx^2 + cx^3 + dx^4 + \&c. \text{ or}$$
$$y = ax^m + bx^{m+p} + cx^{m+2p} + dx^{m+3p} + \&c.$$

or if we have

$$\alpha y + \beta y^2 + \gamma y^3 + \delta y^4 + \&c. =$$
$$ax + bx^2 + cx^3 + dx^4 + \&c.$$

and we can find in theſe, and other ſimilar caſes,

$$x = Ay + By^2 + Cy^3 + Dy^4 + \&c.$$

the original ſeries is ſaid to be reverted. The reverſion of ſeries was firſt propoſed by Newton, in a letter to Mr. Oldenbourgh, at that time ſecretary to the Royal Society, with directions to have it communicated to Leibnitz, and in which the author gave one of the earlieſt proofs of his great analytical powers. It was afterwards publiſhed in his "Analyſis per Equationes Numero terminorum Infinitas," and has ſince engaged the attention of many of the moſt profound analyſts; and accordingly different methods have been ſuggeſted for this purpoſe; but that of M. Arbogaſt, in his "Calcul des Derivations," is the moſt complete. We have already, under the article *Calculus of* Derivations, explained, as far as was conſiſtent with the plan of this work, the nature of the ſymbols, notation, and principles of this doctrine; and we may, therefore, under the preſent article, give that author's formulæ for reverſion, referring the reader for the firſt principles to the article above-mentioned. Still, however, as many of our readers would probably wiſh to ſee the ſame in its plainer Engliſh dreſs, we propoſe, in the firſt inſtance, to ſhew the methods commonly employed for this purpoſe by our own algebraiſts. This conſiſts in aſſuming a ſeries of a *proper form* for the required unknown quantity, and then ſubſtituting the powers of this ſeries, inſtead of the powers of that quantity, in the propoſed ſeries, and finally equating the co-efficients, whereby the values of the indeterminate or unknown co-efficients, above repreſented by A, B, C, D, &c. will be obtained.

Let $y = ax + bx^2 + cx^3 + dx^4 + ex^5 + \&c.$ be the propoſed ſeries, and

$$x = Ay + By^2 + Cy^3 + Dy^4 + Ey^5 + \&c.$$

the aſſumed reverted ſeries; then, by ſubſtituting the ſeveral powers of this ſeries, inſtead of the powers of x in that propoſed, we have

$$y = \left\{ \begin{array}{l} \left.\begin{array}{r} aAy + aB \\ + bA^2 \end{array}\right\} y^2 \quad \left.\begin{array}{r} + aC \\ + 2bAB \\ + CA^3 \end{array}\right\} y^3 \\ \left.\begin{array}{r} + aD \\ + 2bAC \\ + bB^2 \\ + 3cA^2B \\ dA^2 \end{array}\right\} y^4 \quad \left.\begin{array}{r} + aE \\ + 2bad \\ + 2bBC \\ + 3cA^2C \\ + 3cAB^2 \\ + 4dA^3B \\ + eA^5 \end{array}\right\} y^5 + \&c. \end{array} \right.$$

Conſequently we have $aA = 1$, and each of the other co-efficients equal to zero, it being a known property of two identical functions, that the co-efficients of the like powers of the indeterminate quantity are equal to each other; and ſince, on the firſt ſide of the above expreſſion, y enters only ſimply, it follows, that all the powers of y on the other ſide muſt have their co-efficients equal to zero. Whence we have

$$aA = 1$$
$$aB + bA^2 = 0$$
$$aC + 2bAB + CA^3 = 0$$
$$aD + 2bAC + bB^2 + 3cA^2B + dA^4 = 0$$
$$\&c. \qquad \&c.$$

and hence, again, we have

$$A = \frac{1}{a}$$
$$B = -\frac{b}{a^3}$$
$$C = \frac{2b^2 - ac}{a^5}$$
$$D = -\frac{5b^3 - 5abc + a^2d}{a^7}$$
$$E = \frac{14b^4 - 21ab^2c + 3a^2c^2 + ba^2bd - a^3e}{a^9}$$
$$\&c. \qquad \&c.$$

And ſince a, b, c, d, &c. are known in the original ſeries, the numeral values of A, B, C, D, &c. in the reverted ſeries are thus determined.

With regard to the *proper form* of the aſſumed ſeries, we may obſerve, generally, that in order to find the firſt term of the reverted ſeries, the rule is, to ſubſtitute y^n inſtead of x in the propoſed ſeries, and to equate the leaſt power of y ariſing from this ſubſtitution with unity, which will give the required value of n; and as for the indices of the other powers they will be the ſame multiples of the above value of n, as they are (in the original ſeries) of *unity*.

Let there be propoſed, for example,

$$z = x^m + bx^{m+p} + cx^{m+2p} + dx^{m+3p}, \&c.$$

Here, in order to determine the form of the ſeries to be aſſumed, let z^n be wrote for x in the given equation, according to the uſual method; and then the exponents, ſuppoſing z tranſpoſed, will be 1, nm, $nm + np$, $nm + 2np$, $nm + 3np$, &c. reſpectively; of which, the two leaſt (1 and nm) being made equal to each other, n is found $= \frac{1}{m}$; and the differences are $\frac{p}{m}$, $\frac{2p}{m}$, $\frac{3p}{m}$, &c. Whence the ſeries to be aſſumed is

$$x = z^{\frac{1}{m}} + Bz^{\frac{1+p}{m}} + Cz^{\frac{1+2p}{m}} + Dz^{\frac{1+3p}{m}} + \&c.$$

(for

(for it is evident, by inſpection, that the co-efficient (A) of the firſt term muſt here be an unit).

This ſeries being therefore raiſed to the ſeveral powers of x, in the given equation, and the co-efficients of the homologous terms in the new equation compared together, it will be found that,

$$B = -\frac{b}{m}$$

$$C = -\frac{(1 + m + 2p)\,b^2 - 2mc}{2m^2}$$

$$D = -\frac{(2m^2 + 9mp + 9p^2 + 3m + 6p + 1)\,b^3}{6m^3} + \frac{(1 + m + 3p)\,bc}{m^2} - \frac{d}{m}, \text{ \&c.}$$

From the general value of x, found above, innumerable theorems, for reverſing particular forms of ſerieſes, may be deduced.

Thus, if $x + bx^2 + cx^3 + dx^4$ &c. $= z$; then (m being $= 1$, and $p = 1$) x is $= z - bz + (2bb - c)z^3 - (5b^3 - 5bc + d)z^4$ &c.

And, if $x + bx^3 + cx^5 + dz^7 +$ &c. $= z$; (m being $= 1$, and $p = 2$) $x = z - bz^3 + (3bb - c)z^5 - (12b^3 - 8cb + d)z^7$ &c.

Alſo, if $x^{\frac{1}{2}} + bx^{\frac{3}{2}} + cx^{\frac{5}{2}} + dx^{\frac{8}{2}}$, &c. $= z$; then (m being $= \frac{1}{2}$, and $p = 1$) $x = z^2 - 2bz^4 + (7bb - 2b)z^6 - (30b^3 - 18bc + 2d)z^8$ &c. &c.

It may be obſerved, that in all theſe forms of ſerieſes, the firſt term is without a co-efficient (which renders the concluſion much more ſimple). Therefore, when the ſeries to be reverted has a co-efficient in its firſt term, the whole equation muſt be firſt divided thereby. Thus, if the equation was $3x - 6x^2 + 8x^3 - 13x^4$ &c. $= y$; by dividing the whole by 3 it will become $x - 2x^2 + \frac{8x}{3} - \frac{13x^4}{3}$ &c. $= \frac{1}{3}y$; where, putting $z = \frac{1}{3}y$, we have, by For. 1. $x = z + 2z^2 + \frac{16}{3}z^3$ &c. $= \frac{y}{3} + \frac{2y^2}{9} + \frac{16y^3}{81}$ &c.

When there are two ſeries, conſiſting of like powers of x and y, as

$$ax + bx^2 + cx^3 + \text{ \&c.} = \alpha y + \beta y^2 + \gamma y^3 + \text{ \&c.}$$

aſſume, as in the preceding caſes,

$$x = Ay + By^2 + Cy^3 + Dy^4 + \text{ \&c.}$$

and let his, and its powers, be ſubſtituted for x, and the powers of x, and we ſhall have

$$\alpha y + \beta y^2 + \gamma y^3 + \delta y^4 + \text{ \&c.} =$$

$$\left.\begin{matrix} aA \\ bA^2 \end{matrix}\right\} y^2 + \left.\begin{matrix} aC \\ 2bAB \\ cA^3 \end{matrix}\right\} y^3 + \left.\begin{matrix} aD \\ 2bAC \\ bB^2 \\ 3cA^2B \\ dA^4 \end{matrix}\right\} y^4 + \text{ \&c.}$$

in which, inſtead of equating all our co-efficients to zero, they muſt now be equated to $\alpha, \beta, \gamma, \delta, \epsilon$, &c.; that is

$$aA = \alpha$$
$$aB + bA^2 = \beta$$
$$aC + 2bAB + cA^3 = \gamma$$
$$aD + 2bAC + bB^2 + 3cA^2B + dA^4 = \delta$$
&c. &c.

Whence we have the following values of A, B, C, D, &c. *viz.*

$$A = \frac{\alpha}{a}$$

$$B = \frac{\beta - bA^2}{a}$$

$$C = \frac{\gamma - 2bAB - cA^3}{a}$$

$$D = \frac{\delta - bB^2 - 2bAC - 3cA^2B - dA^4}{a}$$

$$E = \frac{-2bBC - 2bAD - 3cAB^2 - 3cA^2C - 4dA^3B - eA^5}{a}$$

whence the values of A, B, C, D, &c. become determined as before.

In all the above caſes, the ſeveral co-efficients a, b, c, d, &c. are conceived to be totally independent of each other, and when this is the caſe, that is, when no ſpecific law obtains between them, it is obvious, that we can proceed no farther in the practical ſolution than we have derived terms in the theoretical inveſtigation; but if, as moſt commonly happens, the ſeries we are deſirous of reverting ariſe from the expanſion of any function, ſo that an uniform law is obſerved between its ſeveral co-efficients; a ſimilar law may frequently be diſcovered in the reverted ſeries, though this generally depends rather upon an induction than from any peculiar form under which the reverted co-efficients ariſe, which is indeed the great imperfection of this method of reverſion.

Let us take, for example, the ſeries

$$x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \frac{x^5}{5} \text{ \&c.} = z,$$

to find the value of x in terms of z.

This agrees with our firſt form; where $a = 1$, $b = \frac{1}{2}$, $c = \frac{1}{3}$, $d = \frac{1}{4}$, &c. and we have

$$\frac{1}{a} = 1$$

$$-b = -\frac{1}{2}$$

$$+(2b^2 - ac) = \frac{1}{2} = \frac{1}{3} = \frac{1}{6} = \frac{1}{2 \cdot 3}$$

$$-(5b^3 - 5abc + a^2d) = \frac{1}{24} = \frac{1}{2 \cdot 3 \cdot 4}$$

$$+(14b^4 - 21ab^2c + 3a^2c^2 + 6a^2bd - a^3e) = \frac{1}{120} = \frac{1}{2 \cdot 3 \cdot 4 \cdot 5}.$$

And hence, inferring the ſame law to have place throughout, we have

$$x = z - \frac{1}{2}z^2 + \frac{1}{2 \cdot 3}z^3 - \frac{1}{2 \cdot 3 \cdot 4}z^4 + \frac{1}{2 \cdot 3 \cdot 4 \cdot 5}z^5 - \text{ \&c.}$$

We muſt not, however, look for the like uniformity of reſult in all caſes. As an example of the contrary, let there be propoſed the ſeries

$$x - \frac{1}{2}x^2 + \frac{1}{2 \cdot 3}x^3 - \frac{1}{2 \cdot 3 \cdot 4}x^4 + \frac{1}{2 \cdot 3 \cdot 4 \cdot 5}x^5 - \text{ \&c.}$$
$$= \frac{1}{2}y + \frac{1}{3}y^2 + \frac{1}{4}y^3 + \frac{1}{5}y^4 + \frac{1}{6}y^5 + \text{ \&c.}$$

to find x in terms of y.

Here

Here $a = 1$, $b = \frac{1}{2}$, $c = \frac{1}{2 \cdot 3}$, $d = \frac{1}{2 \cdot 3 \cdot 4}$, &c.

$$\alpha = \frac{1}{2},\ \beta = \frac{1}{3},\ \gamma = \frac{1}{4},\ \delta = \frac{1}{5},\ \&c.$$

whence

$$\frac{\alpha}{a} = \frac{1}{2} = A$$

$$\frac{\beta - b A^2}{a} = \frac{11}{24} = B$$

$$\frac{\gamma - 2 b A B - c A^3}{a} = \frac{11}{24} = C$$

$$\frac{\delta - b B^2 - 2 b A C - 3 c A^2 B - d A^4}{a} = \frac{1381}{2880} = D$$

$$\frac{\varepsilon - 2 b B C - 2 b A D - 3 c A B^2 - \&c.}{a} = \frac{1543}{3840} = E$$

whence the propoſed ſeries is

$$x = \frac{1}{2} y + \frac{11}{24} y^2 + \frac{11}{24} y^3 + \frac{1381}{2880} y^4 + \frac{1543}{3840} y^5 + \&c.$$

in which no law of continuation can be diſcovered, either by induction, or otherwiſe.

In this reſpect the ſymbols and notation of Arbogaſt have a decided advantage, as by theſe means the law of formation in the reverted ſeries is exhibited in the clereſt poſſible point of view. Taking for example our firſt ſeries, under the form

$$y = \beta x + \gamma x^2 + \delta x^3 + \varepsilon x^4 + \&c.$$

to find $x = b y + c y^2 + d y^3 + e y^4 + \&c.$

Here the general reſult is expreſſed by

$$x = \beta^{-1} y + \frac{1}{2} \cdot D \cdot \beta^{-2} \cdot y^2 + \frac{1}{3} \frac{D^2}{C} \cdot \beta^{-3} \cdot y^3 + \frac{1}{4} \frac{D^3}{C} \cdot \beta^{-4} \cdot y^4 + \&c.$$

where the law is clearly expreſſed by means of the ſymbol D; and if it be requiſite, the co-efficients may be eaſily expreſſed in terms of β, γ, δ, &c. thus $\beta^{-1} = \beta^{-1}$.

$$\frac{1}{2} D \cdot \beta^{-2} = -\beta^{-3} \gamma = \frac{-\gamma}{\beta^3}$$

$$\frac{1}{3} \cdot \frac{D^2}{C} \cdot \beta^{-3} = \frac{1}{3 \cdot 2} \cdot D(-3 \beta^{-4} \cdot \gamma)$$

$$= \frac{1}{3 \cdot 2} (-3 \cdot -4 \beta^{-5} \cdot \gamma^2 - 3 \beta^{-4} \cdot 2 \delta)$$

$$= 2 \beta^{-5} \cdot \gamma^2 - \beta^{-4} \cdot \delta = \frac{2 \gamma^2 - \beta \delta}{\beta^5}$$

$$\frac{1}{4} \cdot \frac{D^3}{C} \cdot \beta^{-4} = \frac{1}{4} \left(D \beta^{-4} \cdot \frac{D^2}{C} \cdot \gamma + \frac{D^2}{C} \cdot \beta^{-4} \cdot D \cdot \gamma^2 + \frac{D^3}{C} \cdot \beta^{-5} \cdot \gamma^3\right)$$

$$= \frac{1}{4} \left(4 \beta^{-5} \cdot \varepsilon + \frac{4 \cdot 5}{1 \cdot 2} \beta^{-6} \cdot 2 \gamma \delta - \frac{4 \cdot 5 \cdot 6}{1 \cdot 2 \cdot 3} \beta^{-7} \cdot \gamma^3\right)$$

$$= \frac{5 \beta \gamma \delta - 5 \gamma^3 - \beta^2 \varepsilon}{\beta^7}$$

which will be found to agree with our former reſult.

We refer the reader who may not be acquainted with the uſe and ſignification of the above ſymbols and notation, to our article DERIVATIONS.

In theſe formulæ the quantities β, γ, δ, &c. although totally independent, are yet apparently connected by means of the ſymbol of derivation D; but the application is generally made to ſeries which expreſs the evolution of ſome function, and the co-efficients of which ſeries are conſequently formed after a certain law: for inſtance

$$1 + x + \frac{x^2}{1 \cdot 2} + \frac{x^3}{1 \cdot 2 \cdot 3} + \&c.$$

is the evolution of e^x, and if y be put

$$= 1 + x + \frac{x^2}{1 \cdot 2} + \frac{x^3}{1 \cdot 2 \cdot 3} + \&c.$$

then, by the theorem for reverſion,

$$x = \beta^{-1} (y - 1) + \frac{1}{2} D \cdot \beta^{-2} \cdot (y - 1)^2 + \frac{1}{3} \frac{D^2}{C} \cdot \beta^{-3} \cdot (y - 1)^3 \&c.$$

but in the propoſed form

$$\beta = 1 \cdot D \cdot \beta = \frac{1}{1 \cdot 2} \cdot \frac{D^2}{C} \cdot \beta = \frac{1}{1 \cdot 2 \cdot 3},\ \&c.$$

therefore $x = (y - 1) - \frac{1}{2} (y - 1)^2 + \frac{1}{3} (y - 1)^3 - \&c.$

And in the ſame way from reverſion, if

$$z = x + \frac{x^3}{2 \cdot 3} + \frac{3 x^5}{5 \cdot 8} + \&c.$$

by reverſion $x = z - \frac{z^3}{1 \cdot 2 \cdot 3} + \frac{z^5}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5} - \&c.$

We refer the reader for more on this ſubject to Woodhouſe's "Principles of Analytical Calculation," and Arbogaſt's "Calcul des Derivations;" and for the principles of the method ſtated in the former part of this article, to Simpſon's "Fluxions," vol. ii. p. 302; Maclaurin's Algebra, p. 263. See alſo Newton's "Analyſis per Equationes," aad Bonnycaſtle's Algebra, vols. i. and ii.

REVERSIONS, in the *Doctrine of Annuities*, are either contingent or abſolute. (For the former ſee the article SURVIVORSHIPS.) Of abſolute reverſions, the caſes are very few, and the ſolutions ſimple and eaſy. An *abſolute* reverſion, whether it is to take place after the extinction of a ſingle life, or of any number of lives, or after the expiration of a given number of years, muſt neceſſarily be more valuable, in general, than a *contingent* reverſion; which, depending on events altogether uncertain, will be of leſs value in proportion as thoſe events are leſs probable. The following problems include the principal caſes of abſolute reverſions, and their ſolutions being almoſt ſelf-evident, require no explanation.

PROBLEM I.

To find the value of the reverſion in fee of an annuity after a given number of years.

Solution.—Deduct the value of an annuity for the given term from the perpetuity; multiply the remainder into the annuity, and the product will be the value required.

Example.—Let the annuity be 15*l.* the term 15 years, and the rate of intereſt 4*l. per cent.* By Tab. III. (ſee ANNUITIES) the value of an annuity for 15 years is 11.118, which being deducted from 25 (the perpetuity), the remainder, or 13.882, multiplied into 15 (the given annuity),

nuity), produces 208.23*l.* or 208*l.* 4*s.* 7*d.* nearly for the value required.

Corollary.—In like manner, the value of an annuity for a given term of years, after the expiration of another term, may be obtained by subtracting the value for the present term from the value during the present and reversionary terms: thus, the value of an annuity of 10*l.* during 15 years, after the expiration of 12 years, is found by subtracting 9.385 (the value for 12 years at 4*l. per cent.* by Tab. III. ANNUITIES) from 16.329 (the value by the same table for 27 years), and multiplying 6.944, the difference, into 10; which produces 69.440*l.* or 69*l.* 8*s.* 10*d.* nearly for the value required.

PROB. II.

To find the value of the reversion in fee of an estate, or annuity, after the extinction of a given life.

Solution.—Deduct the value of an annuity on the given life from the perpetuity; multiply the remainder into the annual produce of the estate, or into the annuity, and the product will give the value sought.

Example.—Let the annual produce of the estate or annuity be 18*l.* the age of the possessor of such estate or annuity 35, and the rate of interest 3*l. per cent.* By Tab. VI. (LIFE-*Annuities*), the value of an annuity on a life of 35, at 3*l. per cent.* is 15.938. The perpetuity, at the same rate, is 33.333; the difference between these two values, or 17.395, multiplied into 18, produces 313.110*l.* or 313*l.* 2*s.* 2*d.* for the answer.

Corollary.—The reversion in fee after two or three joint lives, or after the longest of two or three lives, is found in the same manner, by deducting the values of those lives from the perpetuity. Thus the value of two joint lives, aged 30 and 35, by Tab. VIII. (LIFE-*Annuities*), at 3*l. per cent.* is 12.131, which being deducted from 33.333, and multiplied into 5, will give 106.01*l.* or 106*l.* 0*s.* 2*d.* for the value of the reversion in fee of an estate of 5*l. per annum* after the extinction of those *joint* lives. In like manner, the value of the reversion in fee of an estate of 10*l. per annum*, after three joint lives, aged 30, 35, and 40 years, and computing at 4 *per cent.* may be found by Prob. IV. (LIFE-*Annuities*) to be 163.81*l.* or 163*l.* 16*s.* 2*d.*; and after the longest of those three lives, it may be found by Prob. V. (LIFE *Annuities*) to be 59.980*l.* or 59*l.* 19*s.* 7*d.* nearly.

PROB. III.

To find the value of a given *sum*, payable on the extinction of a given life.

Solution.—Deduct, as in the preceding problem, the value of an annuity on the given life from the perpetuity; multiply the remainder by the given sum, and divide the product by the perpetuity increased by unity; the quotient will be the answer.

Example.—Let the sum be 1000*l.* the age of the given life 45 years, and the rate of interest 5*l. per cent.* By Tab. VI. (LIFE-*Annuities*), the value of an annuity, on a life of 45, at 5 *per cent.* is 11.105, which being deducted from 20, the perpetuity, leaves 8.895. This remainder, multiplied into 1000, and divided by 21, gives 423.571*l.* or 423*l.* 11*s.* 5*d.* for the value required.

In the same manner may be found the value of a given sum, payable on the extinction of two or three joint lives, or of the longest of two or three lives. Thus, the value of two joint lives, of 40 and 50, at 4 *per cent.* by Tab. IX. (LIFE-*Annuities*), being 8.834; the difference between this value and 25, the perpetuity, will be 16.166; which being multiplied into 1000, and the product divided by 26, will give 621.77*l.* or 621*l.* 15*s.* 5*d.* for the present value of 1000*l.* payable on the extinction of those joint lives. Again, by the rule in the article on LIFE-*Annuities*, and Tables VI. and IX. the value of an annuity on the longest of two lives, aged 40 and 50, at 4 *per cent.* may be found equal to 15.627, which being deducted from 25, and the remainder multiplied into 1000, will produce 9373, and this, divided by 26, will give 360.5*l.* or 360*l.* 10*s.* for the value of 1000*l.* payable on the decease of the survivor of those two lives.

Remark.—It will be observed, that the value of the reversion of an *annuity* is greater than the value of the reversion of a *sum*, in the proportion of 1*l.* increased by its interest for a year to 1*l.*; or, which is the same thing, in the proportion of the perpetuity increased by unity to the perpetuity. In the one case, the payment of the annuity becomes due at the end of the year, in which the life or lives become extinct; in the other case, the sum only becoming payable at the end of that year, the annual interest upon it cannot be received till the end of the succeeding year. See Dr. Price's Treatise on Reversionary Payments. Note E, Appendix.

PROB. IV.

To find the value of an annuity for a given term of years after the extinction of any number of lives.

Solution.—Subtract the value of an annuity on the life or lives from the perpetuity; multiply the remainder into the present value of an annuity for the given term, and divide the product by the perpetuity; the quotient multiplied into the annuity will be the value sought.

Example.—Let it be required to determine the value of an annuity of 10*l.* for 20 years, which is not to commence till the extinction of a life of 25, reckoning interest of money at 5 *per cent.* By Tab. VI. (LIFE-*Annuities*) the value of an annuity on a life of 25, is 13.567; this value, subtracted from 20, and multiplied into 12.4622, the value of an annuity for 20 years, by Tab. III. (ANNUITIES) produces 80.1693; which being divided by 20, and the quotient multiplied into 10, gives 40.085*l.* or 40*l.* 1*s.* 9*d.* nearly for the answer. By proceeding in the same manner, the value of an annuity of 15*l.* for 25 years, after the extinction of two *joint* lives, aged 30 and 40, and after the longest of those lives, computing at 4 *per cent.* may be respectively found to be equal to 136*l.* and 70*l.* 8*s.* 2*d.* by Tab. VI. and IX. (LIFE-*Annuities*), and Tab. III. (ANNUITIES).

PROB. V.

To find the value of an annuity after the decease of a given life, or of any number of lives, during the continuance of another life, or of any number of lives, to be nominated at the time of such decease.

Solution.—This differs very little from the preceding problem, and is answered much in the same manner. Subtract the value of an annuity, on the life or lives, from the perpetuity; multiply the remainder into the value of the life or lives at the time of their nomination, and also into the given annuity; divide the product by the perpetuity, and the quotient will be the answer.

Example.—Required the value of an annuity of 100*l.* after the decease of a person aged 30, during the continuance of the life of a person to be nominated at the time of such decease, whose age may be supposed to be then about 15 years, reckoning interest of money at 4*l. per cent.*

By Tab. VI. the value of a life of 30 is 14.781, which being subtracted from 25, and the remainder multiplied into 16.791 (the value by the same table of an annuity on

a life of 15), and alſo into 100, the given annuity produces 17.158.7. This ſum, divided by 25, gives 686.3*l.* or 636*l.* 6*s.* for the value ſought.

If, inſtead of a ſingle life of 30, the annuity had been to commence after the longeſt of two lives, aged 30 and 35, to continue during the longeſt of two lives, ſuppoſed to be 10 and 15 years of age at the time of the deceaſe of the former lives, the preſent value in that caſe, at the ſame rate of intereſt, would be, according to the values in Tab. VI. and VIII. (LIFE-*Annuities*), equal to 583.234*l.* or 583*l.* 4*s.* 8*d.* nearly. See Simpſon's Select Exerciſes; Dr. Price's Treatiſe on Reverſionary Payments; and Mr. Morgan's Doctrine of Life Annuities.

REVERT, in *Law*. A thing is ſaid to revert when it returns or falls back to its firſt owner.

All honours and royal fees alienated revert to the crown, or are revertible. Apanages, or portions of younger ſons of kings, are granted on condition of reverſion.

REVERTENS, Lat. returning or deſcending: as, *Ductus revertens, conducimento, ritornante*, all imply a regular deſcent of ſound; which the Italians likewiſe call *deſcendente di grado*.

REVERTER, *Formedon in the*, in *Law*. See FORMEDON.

REVES, JAMES DE, in *Biography*, a learned Dutch Proteſtant divine and profeſſor, the ſon of a Dutch burgomaſter of Deventer, was born in 1586. While he was very young he was taken to Amſterdam, where he was inſtructed in the Latin, Greek, and French languages, and then ſent to purſue his ſtudies at the univerſity of Leyden. From this place he removed to the univerſity of Franeker, where he learned the Hebrew under the two Druſiuſes. In 1610 he travelled into France for farther improvement, where he reſided two years, chiefly at Saumur, Rochelle, and Orleans. He next entered upon the duties of the Chriſtian miniſtry, and was, in 1641, choſen principal and firſt profeſſor of the theological college of the ſtates of Holland and Weſt Frieſland at Leyden. He died at Leyden in 1658, at the age of 72. His works are very numerous, of which the titles are given in the General Biography: among theſe may be mentioned, "Belgicarum Eccleſiaſticarum Doctrina et Ordo," &c.; "Hiſtoria Pontificum Romanorum contracta, et ad Annum 1632 contracta;" "Daventriæ illuſtratæ, ſive Hiſtoriæ Urbis Daventrienſis, Lib. vi." 1651, 4to. De Reves publiſhed an improved edition of "The Book of Pſalms," in Dutch verſe, by Peter Dathænus, and he was concerned in reviſing the Dutch verſion of the Old Teſtament, which was printed at Leyden in 1637.

REVETEMENT, in *Fortification*, is a ſtrong wall built on the outſide of the rampart and parapet, to ſupport the earth, and prevent its rolling into the ditch. See CORDON.

REVEZ, in *Geography*, a town of Portugal, in the province of Tras os Montes; 10 miles N.E. of Lamego.—Alſo, a town of France, in the department of the Sambre and Meuſe; 20 miles S. of Bruſſels.

REUGNY, a town of France, in the department of the Indre and Loire; 9 miles N.E. of Tours.

REVIERS, a town of France, in the department of the Calvados; 8 miles N. of Caen.

REVIEW, in *Chancery*. A *bill of review* is where the cauſe has been heard, and a decree therein ſigned and enrolled; but ſome error in law appears in the body of the decree, or ſome new matter is diſcovered in time, after the decree made. A bill of review is not exhibited but by leave of the court.

A *commiſſion of review* is a commiſſion ſometimes granted, in extraordinary caſes, to reviſe the ſentence of the court of delegates; when it is apprehended they have been led into a material error. This commiſſion the king may grant, although the ſtatutes 24 and 25 Hen. VIII. declare the ſentence of the delegates definitive; becauſe the pope, as ſupreme head by the canon law, uſed to grant ſuch commiſſions of review; and ſuch authority, as the pope heretofore exerted, is now annexed to the crown by ſtats. 26 Hen. VIII. cap. 1. and 1 Eliz. cap. 1. But this is not matter of right, which the ſubject may demand *ex debito juſtitiæ*, but merely a matter of favour, and which, therefore, is often denied. See APPEAL.

REVIEW, in *Literary Hiſtory*. See JOURNAL and MAGAZINE.

REVIEW, in *Military Language*, is the appearance of an army, or part of an army, arranged in form of battle, and exerciſed, in preſence of the king or of a general. The firings in reviews are generally thirty-ſix rounds, *viz.* by companies; by grand diviſions; by ſub-diviſions; obliquely, advancing, retreating; by files; in the ſquare; ſtreet-firings, advancing and retreating; and, laſtly, a volley.

The intention of a review is to know the condition of the troops, and to ſee that they are complete, and that they perform their exerciſe and evolutions well.

REVIGNY, in *Geography*, a town of France, in the department of the Meuſe, and chief place of a canton, in the diſtrict of Bar-ſur-Ornain; 15 miles S. of St. Menehould. The place contains 1800, and the canton 9087 inhabitants, on a territory of $162\frac{1}{2}$ kiliometres, in 17 communes.

REVILING *the Ordinances of the Church*, in *Law*, is an offence puniſhable by ſtatute. Thus it is provided by 1 Edw. VI. cap. 1 and 1 Eliz. cap. 1. that whoever reviles the ſacrament of the Lord's ſupper ſhall be puniſhed by fine and impriſonment, See COMMON *Prayer*.

REVILLA GIGEDO, in *Geography*, an iſland in the North Pacific ocean, nearly of an oval form, 50 miles long from N. to S., and 23 in breadth. Capt. Vancouver called it by this name from reſpect to Conde de Revilla Gigedo, viceroy of New Spain. N. lat. 55° 6′ to 55° 55′. E. long. 228° 27′ to 229° 15′.

REVILLA *Gigedo, Canal of*, a ſtrait of the North Pacific ocean, between the forementioned iſland and that of Gravina.

REVILLY, a town of France, in the department of the Indre; 9 miles N. of Iſſoudun.

REVIN, a town of France, in the department of the Ardennes, on the Meuſe; 6 miles N.E. of Rocroy.

REVINGHEIM, a town of France, in the department of the North; 5 miles N. of Bailleul.

REVISE, among *Printers*, a ſecond proof of a ſheet to be printed, taken off after correcting the firſt.

REVIVAL *of perſons hanged*. See EXECUTION.

REVIVER. See REVIVOR.

REVIVIFICATION, RESUSCITATION, or *Reduction*, in *Chemiſtry*, the art of reſtoring a mixed body to its firſt ſtate, after it had been altered and diſguiſed by diſſolution, calcination, and the like. See REDUCTION, and the ſeveral metals.

REVIVIFIED ANTIMONY. See ANTIMONY.

REVIVING, in *Law*, a renewing of rents and actions after they had been extinguiſhed.

REVIVOR, or REVIVER, *Bill of*, is where a bill has been exhibited in chancery againſt one who anſwers: but, before the cauſe is heard, or at leaſt before the decree is enrolled, one of the parties dies.

In this caſe, a bill of revivor muſt be brought, praying the

the former proceedings may ſtand revived, and be put in the ſame condition as at the time of the abatement.

REUNION, *Iſle de la*, in *Geography*. See BOURBON.

REVOCATION, REVOCATIO, in *Law*, the act of revoking, calling back, or annulling, a power, grant, &c. made before.

The revocation of an offer, after it is accepted of, is invalid. All preceding wills or teſtaments are revoked by the laſt; but the republication of a former will revokes one of a later date, and eſtabliſhes the firſt again.

The cancelling or revoking of a teſtament is one of the three ways of avoiding it. For, though I make a laſt will and teſtament irrevocable in the ſtrongeſt words, yet I am at liberty to revoke it, becauſe my own act or words cannot alter the diſpoſition of law, ſo as to make that irrevocable which is in its own nature revocable. (8 Rep. 82.) For this, ſays lord Bacon (Elem. c. 19.) would be for a man to deprive himſelf of that which of all other things is moſt incident to human condition; and that is, alteration or repentance. It hath alſo been held, that without an expreſs revocation, if a man, who hath made his will, afterwards marries and hath a child, this is a preſumptive or implied revocation of his former will, which he made in his ſtate of celibacy. (Ld. Raym. 441. 1 P. Wms. 204.) The Romans were alſo wont to ſet aſide teſtaments as being "inofficioſa," deficient in natural duty, if they diſinherited or totally paſſed by (without aſſigning a true and ſufficient reaſon) any of the children of the teſtator. (Inſt. 2. 18. 1.) But if the child had any legacy, however ſmall, it was a proof that the teſtator had not loſt his memory or his reaſon, which otherwiſe the law preſumed; but was then ſuppoſed to have acted thus for ſome ſubſtantial cauſe; and, in ſuch caſe, no "querela inofficioſi teſtamenti" was allowed. Hence probably has ariſen that groundleſs vulgar error of the neceſſity of leaving the heir a ſhilling, or ſome other expreſs legacy, in order to diſinherit him effectually: whereas the law of England makes no ſuch conſtrained ſuppoſition of forgetfulneſs or inſanity; and, therefore, though the heir or next of kin be totally omitted, it admits no "querela inofficioſi" to ſet aſide ſuch a teſtament.

The revocation of a deviſe of lands and tenements muſt be in writing, ſigned by the teſtator, or ſome other perſon in his preſence, and by his expreſs direction; and be ſubſcribed, in his preſence, by three or four credible witneſſes.

A prior clauſtral is revocable at pleaſure. The revocation of the edict of Nantes was fatal to the French Proteſtants.

REVOCATION *of Uſes*. See USE.

REVOLAX, in *Geography*, a town of Sweden, in the government of Ulea; 13 miles E. of Braheſtad.

REVOLSKOI, a town of Ruſſia, in the government of Viborg; 128 miles N.W. of Povenetz.

REVOLUTION, formed from *revolvo, to roll backwards*, in *Politics*, denotes a grand turn or change of government.

There are no ſtates in the world but have undergone frequent revolutions. The abbot de Vertot has furniſhed us with two or three good hiſtories of the revolutions of Sweden, the revolutions of Rome, &c.

The REVOLUTION, uſed with us by way of eminence, denotes the great turn of affairs in England in 1688, when king James II. abdicating, the prince and princeſs of Orange were declared king and queen of England, &c. See *Right of* CROWN.

The declaration of the prince of Orange, which was diſperſed over the kingdom previouſly to his arrival, and which was received with univerſal approbation, contained an enumeration of the grievances of the nation, and the ſtatement of which evinced the abſolute neceſſity of a change in the government. Theſe grievances were the diſpenſing and ſuſpending power exerciſed by the king; the court of eccleſiaſtical commiſſion; the filling of all offices with Catholics, and the raiſing of a Jeſuit to be privy-counſellor; the open encouragement given to popery, by building every where churches, colleges, and ſeminaries for that ſect; the diſplacing of judges, if they refuſed to give ſentence according to orders received from court; the cancelling of the charters of all the corporations, and the ſubjecting of elections to arbitrary will and pleaſure; the treating of petitions, even the moſt modeſt, and from perſons of the higheſt rank, as criminal and ſeditious; the committing of the whole authority of Ireland, civil and military, into the hands of papiſts; the aſſuming of an abſolute power over the religion and laws of Scotland, and openly exacting in that kingdom an obedience without reſerve; and the violent preſumptions againſt the legitimacy of the prince of Wales. The redreſs of theſe grievances was the prince's profeſſed object; and for this purpoſe he propoſed to have a loyal and free parliament aſſembled, in order to provide for the ſafety and liberty of the nation, as well as to examine the proofs of the prince of Wales's legitimacy. The prince, at the ſame time avowed, that he had no other deſign than to procure the full and laſting ſettlement of religion, liberty, and property. On the moment of alarm the Engliſh miniſters redreſſed ſome of the grievances of which complaint had been made; but there ſtill remained the foundation of all grievances upon which they could again in an inſtant be erected, an arbitrary and deſpotic power in the crown. For this uſurpation there was no poſſible remedy, but by a full declaration of all the rights of the ſubject, in a free parliament. On the 21ſt of October 1688, the prince ſet ſail from Helvoetſluys, with a fleet of near 500 veſſels, and an army of above 14,000 men. A ſtorm drove him back, but he ſoon repaired his loſs, and made ſail with a fair wind towards the weſt of England. The ſame wind detained the king's fleet in its ſtation near Harwich, and enabled the Dutch to paſs the ſtraits of Dover without oppoſition. Both ſhores were covered with multitudes of people, who, beſides admiring the grandeur of the ſpectacle, were held in anxious ſuſpenſe by the proſpect of an enterprize, the moſt importtant, which, during ſome ages, had been undertaken in Europe. The prince had a proſperous voyage, and landed his army ſafely in Torbay, on the 5th of November, (1688,) the anniverſary of the gunpowder treaſon. The firſt perſon who joined the prince was major Buerington; and he was quickly followed by the gentry of the counties of Devon and Somerſet. Sir Edward Seymour made propoſals for an aſſociation, which every one ſigned. By degrees, the earl of Abingdon, Mr. Ruſſel, ſon of the earl of Bedford, Mr. Wharton, Godfrey, Howe, came to Exeter. All England was in commotion. Lord Delamere took arms in Cheſhire, the earl of Danby ſeized York, the earl of Bath, governor of Plymouth, declared for the prince, and the earl of Devonſhire made a like declaration in Derby. The nobility and gentry of Nottinghamſhire embraced the ſame cauſe; and every day there appeared ſome effect of that univerſal combination into which the nation had entered againſt the meaſures of the king. Even thoſe who took not the field againſt him, were able to embarraſs and confound his counſels. A petition for a new parliament was ſigned by 24 biſhops and peers of the greateſt diſtinction, and was preſented to the king. No one thought of oppoſing or reſiſting the invader. The army deſerted him; and ſeveral officers of diſtinction informed Feverſham, the general, that they could not in conſcience fight

fight againſt the prince of Orange. Prince George of Denmark and the princeſs Anne abandoned the king: an event which, concurring with ſeveral other incidents that had occurred, and which threatened the overthrow of his royal authority, occaſioned an alarm approaching to conſternation, and a grief that cauſed him to ſhed tears. In this ſtate of diſtreſs, deſerted by his friends and family, and deſpiſed by his enemies, he was as much depreſſed, as he had before been vainly elated by proſperity. He iſſued writs for a new parliament, and deputed commiſſioners to treat with the prince of Orange. The king every day more and more alarmed by accounts of the general diſaffection that prevailed, and miſled by imprudent counſel operating upon his fears, precipitately embraced the reſolution of eſcaping into France, having ſent before him the queen and the infant prince. Nor before his departure did he provide for the exerciſe of the adminiſtration; he threw the great ſeal into the river, and recalled all the writs that had been iſſued for the election of the new parliament. During this temporary diſſolution of government, the populace became maſters, roſe in a tumult, deſtroyed the maſs-houſes, and even attacked and rifled the houſes of the Florentine envoy and Spaniſh ambaſſador, where many Catholics had lodged their valuable effects. Having diſcovered Jefferies, the chancellor, notwithſtanding the diſguiſe he had aſſumed in order to fly the kingdom, they ſo abuſed him that he died ſoon after. Feverſham diſbanded the troops, and without either diſarming or paying them, let them looſe to prey upon the country. In this extremity, the biſhops and peers, who were in town, aſſembled, and having choſen the marquis of Halifax ſpeaker, gave directions to the mayor and aldermen for keeping the peace of the city, and iſſued orders, which were readily obeyed, to the fleet, the army, and all the garriſons; and they made applications to the prince of Orange, whoſe enterprize they highly applauded, and whoſe ſucceſs they joyfully congratulated. The prince, availing himſelf of the popularity of his cauſe, approached nearer and nearer to London. In the mean while the king, though diſguiſed, was diſcovered and ſeized by the populace at Feverſham, where he was attempting to make his eſcape, and ſoon after arrived in London. Whilſt he remained at Whitehall he received few marks of attention and reſpect; and whilſt he remained there the Dutch guards took poſſeſſion of the palace. In conſequence of a meſſage conveyed to him from the prince by Halifax, Shrewſbury, and Delamere, which commanded him to leave the palace, he removed to Ham, a ſeat of the ducheſs of Lauderdale's. Having obtained permiſſion he retired to Rocheſter, where he remained for ſome days. But finding that the church, the nobility, the city, the country, all concurred in neglecting him, and leaving him to his own counſels, he ſubmitted to his melancholy fate; and being urged by earneſt letters from the queen, he privately embarked on board a frigate which waited for him; and he arrived ſafely at Ambleteuſe in Picardy, whence he haſtened to St. Germains. The prince, in compliance with an addreſs from about 90 peers and biſhops, ſummoned a convention, which completed the revolution.

The true ground and principle upon which that memorable event proceeded, was an entirely new caſe in politics, which had never before happened in our hiſtory; the abdication of the reigning monarch, and the vacancy of the throne thereupon. Accordingly, in a full aſſembly of the lords and commons, met in *Convention* (which ſee) on occaſion of this vacancy, both houſes came to this reſolution (Jan. 22, 1689): "That king James the Second, having endeavoured to ſubvert the conſtitution of the kingdom, by breaking the original contract between king and people; and, by the advice of Jeſuits, and other wicked perſons, having violated the fundamental laws; and having withdrawn himſelf out of this kingdom, has abdicated the government, and that the throne is thereby vacant."

The facts themſelves thus appealed to, *viz.* the king's endeavour to ſubvert the conſtitution, by breaking the original contract, his violation of the fundamental laws, and his withdrawing himſelf out of the kingdom, were evident and notorious: and the conſequences drawn from theſe facts (namely, that they amounted to an abdication of the government (ſee ABDICATION); which abdication did not affect only the perſon of the king himſelf, but alſo all his heirs, and rendered the throne abſolutely and completely vacant) it belonged to our anceſtors to determine. For, whenever a queſtion ariſes between the ſociety at large and any magiſtrate veſted with powers originally delegated by that ſociety, it muſt be decided by the voice of the ſociety itſelf: there not being upon earth any other tribunal to which to reſort. And that theſe conſequences were fairly deduced from theſe facts, our anceſtors have ſolemnly determined, in a full parliamentary convention repreſenting the whole ſociety. The reaſons upon which they decided may be found at large in the parliamentary proceedings of the times, our anceſtors having moſt indiſputably a competent juriſdiction to decide this great and important queſtion, and having in fact decided it, it is now become our duty at this diſtance of time to acquieſce in their determination; being born under that eſtabliſhment which was built upon this foundation, and obliged, by every tie, religious as well as civil, to maintain it.

The lords and commons having determined this fundamental article, that there was a vacancy of the throne, proceeded to fill up that vacancy in ſuch manner as they judged the moſt proper. And this was done by their declaration of the 12th of February, 1689, in the following manner: "That William and Mary, prince and princeſs of Orange, be, and be declared king and queen, to hold the crown and royal dignity during their lives, and the life of the ſurvivor of them; and that the ſole and full exerciſe of the regal power be only in, and executed by, the ſaid prince of Orange, in the names of the ſaid prince and princeſs, during their joint lives; and after their deceaſes the ſaid crown and royal dignity to be to the heirs of the body of the ſaid princeſs; and for default of ſuch iſſue, to the princeſs Anne of Denmark, and the heirs of her body; and for default of ſuch iſſue, to the heir of the body of the ſaid prince of Orange." This tranſaction, founded in equity, and ſtrictly agreeable to the ſpirit of our conſtitution, and the rights of human nature, formed a new era in the hiſtory of our country, in which the bounds of prerogative and liberty have been better defined, the principles of government more thoroughly examined and underſtood, and the rights of the ſubject more explicitly guarded by legal proviſions, than in any other period of the Engliſh hiſtory.

To the ſettlement of the crown was annexed a declaration of rights, in which all the points that had, of late years, been diſputed between the king and people were finally determined; and the powers of royal prerogative were more narrowly circumſcribed and more exactly defined than in any former period of the Engliſh government. It is worthy of obſervation, ſays judge Blackſtone, that the convention avoided with great wiſdom the wild extremes into which the viſionary theories of ſome zealous republicans would have led them. They held that this miſconduct of king James amounted to an *endeavour* to ſubvert the conſtitution; and not to an actual ſubverſion, or total diſſolution of the government, according to the principles of Mr. Locke

Locke (Gov. p. 2. c. 19.); which would have reduced the ſociety almoſt to a ſtate of nature; would have levelled all diſtinctions of honour, rank, offices, and property; would have annihilated the ſovereign power, and in conſequence have repealed all poſitive laws; and would have left the people at liberty to have erected a new ſyſtem of ſtate upon a new foundation of polity. They therefore very prudently voted it to amount to no more than an abdication of the government, and a conſequent vacancy of the throne; by which the government was allowed to ſubſiſt, though the executive magiſtrate was gone, and the kingly office to remain, though king James was no longer king. Thus the conſtitution was kept entire; which, upon every ſound principle of government, muſt otherwiſe have fallen to pieces, if ſo principal and conſtituent a part as the royal authority had been aboliſhed, or even ſuſpended. Blackſt. Comm. book i, &c. book iv. Hume's Hiſt. vol. viii.

Revolution, *French*, in its moſt popular ſenſe, was for ſeveral years, after 1789, underſtood in England to conſiſt of thoſe events which at the outſet deſtroyed the uſual order of things, *viz.* the Pariſians' revolt, the capture and deſtruction of the Baſtile, and the ſubmiſſion of the monarch. But theſe events, ſingular and important as they were, could not conſtitute a political revolution: this muſt have required a change in the government. It is capable, ſays Mr. (now ſir James) Mackintoſh, of three ſenſes. The king's recognition of the rights of the ſtates-general to a ſhare in the legiſlation, was a change in the actual government of France, where the whole legiſlative and executive power had, without the ſhadow of interruption, for nearly two centuries, been enjoyed by the crown; in that ſenſe, the meeting of the ſtates-general was the revolution, and the 5th of May 1789 was its epoch. The union of the three orders in one aſſembly was a moſt important change in the forms and ſpirit of the legiſlature. This, too, may be called the revolution: and the 23d of June of the ſame year will be its epoch. This body, thus united, formed the new conſtitution, which may be called a revolution; becauſe, of all the early political changes, it was the moſt important, and its epoch was determined by the concluſion of the labours of the National Aſſembly, on the 30th of September 1791, when the king, Louis XVI., came to the aſſembly, and having addreſſed the members, the preſident proclaimed in his own name, and in the name of the whole body, that "the conſtituent aſſembly declares that its power is at an end, and that it will ſit no longer." In whatever ſenſe the phraſe be taken, the effects have been ſo momentous, as to claim the attention, and excite the awe of the whole civilized world. In a work of this kind it is impoſſible to enter into the detail of the various events connected with the French revolution: theſe muſt require the pen of the hiſtorian, who can devote years to the inveſtigation of facts, and to the developement of the motives by which the great actors have been impelled to engage in the ſeveral parts connected with their names. The hiſtory of the French revolution will afford ample ſcope and abundant materials for the moſt intereſting narrative of modern times. The New Cyclopædia, embracing every topic connected with human knowledge, cannot devote much ſpace to the hiſtory of any country, and ſtill leſs to a ſingle event connected with an individual ſtate. In the articles France and Lewis XVI. we have given a pretty full account of the cauſes which led to the French revolution, and of the changes which took place previouſly to the deſtruction of the Baſtile: of the confederacy of the crowned heads againſt the popular governments, which were eſtabliſhed, one after another, on the ruins of the old conſtitution: of the proſcriptions and maſſacres which were perpetrated in Paris; and finally, of the decapitation of the king, queen, and the king's ſiſter. We have then traced the progreſs of Bonaparte, from his conſulſhip to the high dignity of emperor, and noticed the vaſt and unprecedented power to which he attained over almoſt the whole continent of Europe, mentioning the kings that had been created by his fiat, and the ſtates that had been ſubject to his controul, or that ſtood in awe of his power. This mighty conqueror we followed, in the article France, to his divorcement of Joſephine, and marriage with the daughter of the emperor of Germany.

In addition to the above-named articles, to which the reader is referred, we have now to trace the ſteps of this man from the year 1810, to his expulſion from the throne and empire of France, and ſhew by what means his obſtinacy and ambition cauſed him to fall from the higheſt dignities, to which perhaps mortal man ever arrived, to a ſtate of mortification and almoſt inſignificance as the exile to Elba, which may be regarded as the end of the revolution.

For ſome time the very nature of commerce muſt have operated as much to the prejudice of his own merchants, as they could do to the prejudice of the merchants of this country; he ſtruck more directly and fatally at the liberty of his ſubjects by his decrees reſpecting priſons, domeſtic ſervants, and the preſs.

In the decree reſpecting priſons, to which we referred in the article France, it was explicitly declared, that there were many perſons, in that country, accuſed of crimes againſt the ſtate, whom it was neither ſafe to liberate nor to bring to trial: for the purpoſe of keeping theſe priſoners in ſafe cuſtody, a number of ſtrong priſons were reared in the heart of the country, in which it was determined they ſhould be confined. There might have been ſome plea for this mode of conduct during the convulſions of the revolution:—then it might not have been ſafe nor prudent either to have brought to trial, or to have liberated men whoſe popular character, or cauſe, probably would, in the one caſe, have excited freſh diſturbances; and in the other have aſſured their acquittal, however ſtrong and full the proofs of their guilt might have been. But under the exiſting order of things it was impoſſible for the emperor of France to pronounce a ſtronger libel on his own government, than could be inferred from ſuch a decree. At this time, indeed, he reigned with the moſt deſpotic ſway over the French, and he ſeemed reſolved to eſtabliſh, in the heart of Europe, and over a people enlightened by ſcience, a deſpotiſm unknown even to the ignorant and enſlaved nations of the Eaſt. By his decree reſpecting ſervants it was evident, that its object was not to be confined to perſons in that condition of life, but that it was meant, by putting them under ſuch ſtrict and harſh regulations, to have always at command ſpies in every family, and thus to eſtabliſh a more regular and perfect ſyſtem of eſpionage. To theſe acts he iſſued his mandate, which went to deſtroy every advantage which attaches to a free preſs: this, indeed, was not calculated to excite aſtoniſhment, for in all deſpotic countries the liberty of the preſs has been the object of the tyrant's fear and hatred. At no period did France ever enjoy a free preſs; but Bonaparte, who ſeems to have examined and compared all the tyrannical proceedings and meaſures of deſpotic governments, both ancient and modern, with a view to improve upon them, and from them to eſtabliſh a perfect ſyſtem in France, which ſhould cruſh the powers of the human mind, had gone beyond all former precedent. By his decrees in the year 1810, of which we are ſpeaking, only a certain number of printers were allowed to carry on their buſineſs within the French territories, and theſe were to be under the moſt ſtrict and watch-

ful

ful superintendance of the police; so that nothing could be printed, but what government thought proper to allow and sanction. This has always been the object in despotic countries; but it was obtained with great difficulty, and never with such perfect success as was desired. By diminishing the number of printers, Bonaparte removed the chief difficulty towards destroying the liberty of the press, and succeeded in placing France in a state of mental bondage, perhaps without a parallel in the history of the world.

During this period the emperor of France was employing his troops in Spain, with a view of subjugating that country and Portugal, and uniting the whole peninsula to his already too vast empire. By the exertions chiefly of Great Britain his plans were frustrated. Bonaparte seems, indeed, to have been completely thrown out of his expectations and calculations with respect to the resistance, which he met with in his designs on the independence of Spain; and the protracted and obstinate nature of the contest proved that for a considerable length of time he carried on the war there in a desultory manner, by armies apparently unconnected with each other, and by means not acting in concert and co-operation. About the beginning of 1811, however, a regular plan appears to have been formed by Bonaparte for conducting the war in Spain. The principal feature in this plan was the occupancy of the chief cities in the peninsula: and at the end of the year the French had made considerable progress, they had taken possession of most of the chief towns in Spain; their progress had been slow, attended with great difficulty, interrupted with many reverses, and purchased at heavy expences; still they had made progress, and the emperor, if he could accomplish his objects, never regarded the cost.

In the domestic history of France, the only thing that occurred worthy of notice was the birth of a son to the emperor, who was immediately designated as king of Rome, and in that character received the servile homage of the legislators of the empire. It was the subject of frequent remark, that after the second marriage of Bonaparte, he for many months seemed to abandon his restless and ambitious projects (with the exception of his attempts on Spain), or that he took much longer time for their execution. During the year 1811, rumours of war between France and Russia frequently arose, and as frequently subsided without any act of hostility on either side. It was not till the spring of 1812 that the war commenced, which was ultimately the cause of the overthrow of the French emperor.

On the 9th of May, 1812, Bonaparte set out from St. Cloud, on the 6th of June he crossed the Vistula, and on the 22d of that month he formally declared war against Russia; two days after this he crossed the Niemen, entered the Russian territories, and immediately commenced hostilities by the capture of Kowno, and on the 28th he entered Wilna, the capital of Russian Poland. In this war he expected considerable assistance from the Poles; he knew their rooted enmity to Russia, and though he had already deceived them, in the expectations which he had led them to form of his erecting Poland again into a kingdom, yet he well knew how to inspire them again with confidence in him: as soon, therefore, as he had entered Poland, his first public act was to proclaim it anew. A diet was immediately assembled, a constitution framed, and the name and form of liberty were restored to the Poles.

Bonaparte had not been long in Russia before he began to experience the disasters of the climate. In the month of July, and when his army was not much farther north than Wilna, a tremendous tempest arose; torrents of rain fell; thousands of his horses perished, and many pieces of artillery were buried in the mud. His disappointment and chagrin began to manifest themselves; he broke out into invectives on the barbarity of the Russians for laying waste their country in their retreat. Although many severe battles were fought, still the Russians refused to hazard a general engagement. Their perseverance in the plan of retreating astonished the world, and mortified, beyond conception, their enemies, who had no means of preventing this kind of warfare. It was imagined, that for a short time only they would follow up this system, and that their steadiness, passive courage, and patriotism would give way, when they perceived the enemy advancing, notwithstanding their obstinate perseverance, the advanced state of the season, and the desolation of the country. But Russia was animated with one soul, the dread and detestation of the French rose superior to every feeling: considerations of personal interest or comfort, even the sight of their families driven from their homes, and those homes abandoned to the enemy or the flames, had no room in the breast of the Russians: there dwelt only the determination to expel the French, and to obey every command of their sovereign, issued by him or his generals for that purpose. The proclamations of Alexander encouraged the enthusiasm and animated the patient and heroic sufferings of the people; they said, that the emperor was determined to make no peace with Bonaparte, while his legions polluted the soil of Russia: that he would sacrifice all, even Petersburg and Moscow, rather than they should fall into the hands of the enemy. In all the proclamations of Alexander there was no irresolution, no despondence, no expression, that could lead Bonaparte to indulge the hope, that he would propose, or even listen to terms of peace; or his subjects to apprehend, that he would not persevere in what he had begun. New levies were ordered to be raised; the Russian people were invoked by all those powerful feelings and prejudices, which ignorance and superstition create; and when a Russian is told, that what he has to do, or to suffer, is for the sake of his sovereign or his religion, he is made insensible to danger and misery.

Kutusoff continued his retreat, at the head of the main Russian army, till he arrived at Borodino, within a short distance of Moscow. The position here was extremely favourable for defence; though it did not cover the capital, as there were other roads leading to it. On the 7th of September the famous battle of Borodino was fought; it continued from six in the morning till night, when the French, though masters of one part of the field, retreated. The loss on this occasion was immense; not less than 60,000 men are supposed to have fallen on both sides. Both sides claimed the victory; and at Petersburg it was imagined, that Moscow was rendered perfectly secure by the defeat of the enemy. The French, however, retreated, only for the purpose of meeting a strong reinforcement which was advancing, and which actually arrived within a day or two of this tremendous engagement. At the head of these he put himself, and prepared to march by another road for Moscow. As soon as the Russian general was informed that Bonaparte had been reinforced, and that he was manœuvring to get to Moscow by turning the Russians, he resolved to abandon that capital to its fate. Bonaparte therefore advanced to Moscow unmolested, but on his entrance into the city, on the 11th of September, he found its governor and inhabitants animated with the true Russian spirit. They made every resistance in their power to the entrance of the enemy: a great part of the effective population was armed, and as soon as the

advanced guard of the enemy appeared they attacked them in the ſtreets, and from the houſes, impeding their progreſs, and cauſing great deſtruction; and, when it was no longer practicable to prevent the entrance of the enemy, the city was ſet on fire, and, as it was built principally of wood, the fire ſpread rapidly in all directions; and before the French could ſtop the progreſs of the flames, only a tenth part of it remained unconſumed. It is impoſſible to deſcribe or even imagine the diſappointment, mortification, and wrath of Bonaparte when he beheld Moſcow in flames. He had promiſed his ſoldiers reſt from their fatigues, refreſhments, proviſions in abundance, and comfortable winter-quarters in it. Theſe were now all at an end: amidſt the ruins of Moſcow his army would in vain ſeek for ſhelter from the inclemencies of the approaching winter, or for a ſupply of proviſions. His indignation ſoon broke out in conduct at once tyrannical, cruel, and mean: he ſeized on the men who had ſet fire to the city, and cauſed them to be executed.

The ſituation of the French army in Moſcow was now moſt critical: they were ſurrounded with armies almoſt as numerous as themſelves, and which were daily increaſing. Winter was already making its appearance: the troops had been completely worn down by their long march, and at the end of it, they had met with a reception which neither their leader nor they could have anticipated. The former was certain in his own mind that a complete victory muſt be the reſult of the battle of Borodino, and that, as a price of peace, Alexander would find a ſupply for all their wants, at the expence of his own ſubjects. Inſtead of this, the victory was not at all deciſive, and Bonaparte advanced with the moſt cautious ſteps into Moſcow, well knowing, by a fatal experience, that he beheld an enemy in every Ruſſian he met. He ſoon ſaw that he could not remain in the ruins of the city till ſpring ſhould open to him a communication with the ſouthern provinces; and if they retreated, how were they to obtain proviſions, and endure a march of 500 miles in a ſevere and deſolating winter, through deep ſnows, and by the hidden and almoſt impaſſable roads of Ruſſia? The Ruſſian generals, true to the cauſe of their country, and inſpired by the animating proclamations of their emperor, took the moſt active meaſures to force Bonaparte from Moſcow, by cutting off his ſupplies; and when they had compelled him to retreat, to haraſs him in every inch of his journey. For this purpoſe a great number of Coſſacks, beſides thoſe who had been already employed, were collected, and this was the ſeaſon of their utility and triumph.

Bonaparte was now ſenſible of the dreadful error he had committed: unleſs he actually expected to dictate terms of peace at Moſcow, it was the extreme of madneſs to have proceeded thither at the beginning of a Ruſſian winter; and if he did expect either to dictate terms of peace, or to have his own offers accepted, he muſt have been ignorant of the determined hatred which all ranks in Ruſſia bore towards him. The apology he offers in his bulletins, for his military career in Ruſſia, is a paltry one; according to him, the Ruſſian winter this year commenced earlier than uſual; as if the circumſtance of the froſt ſetting in a very few days ſooner or later could have ſaved or deſtroyed his army! What muſt be the military prudence of that man, who calculates for the ſafety of his army, and the ſucceſs of his meaſures, on ſo uncertain a thing as climate! The fact is, Bonaparte, in all his former campaigns, had been indebted for his ſucceſs to the boldneſs of his advances into the very heart of the enemy's country; that this boldneſs did not aſſume the character, deſerve the name, and produce the conſequences of raſhneſs, was leſs owing to his own foreſight and circumſpection than to the puſillanimity, treachery, and want of talents of his opponents: without adverting to the different circumſtances in which he was placed in Ruſſia, from a difference of climate and national character, he followed his uſual plan, thus proving that he was defective in one great feature of a man of abilities, the adaptation of general principles and plans to particular circumſtances.

Perceiving that, though he was in the heart of the Ruſſian empire, and amidſt the ruins of its ancient capital, no terms of peace were propoſed, and that the Ruſſians were gathering round him on all ſides, he ſent to Kutuſoff to propoſe terms of accommodation, or, at leaſt, an armiſtice. The Ruſſian commander received the French negociator in the midſt of his generals, and replied to him with the utmoſt frankneſs: he told him, that he was not authoriſed to receive any propoſals either for peace, or an armiſtice; that he would not even ſend to Alexander nor receive the letter which Bonaparte had ſent; and that, with reſpect to an armiſtice, the Ruſſian army had no occaſion for it, and they were in poſſeſſion of too many advantages to throw them away by accepting it. The negociator then began to complain of the ſavage manner in which the war had been conducted; to this Kutuſoff replied in language which ought always to be had in remembrance by invaders: "The French (he ſaid) had introduced the barbarities of which they complained; they had commenced hoſtilities without reaſon; had invaded Ruſſia; had inflicted as much miſery on its inhabitants as they could; and now, when vengeance and retaliation were at hand, they wiſhed for peace; peace muſt not even be mentioned till the invaders had retraced their ſteps, and had again croſſed the Viſtula; Bonaparte had nothing to do but get out of Moſcow how he could, ſince he came thither without being invited; the Ruſſians, he might depend upon it, would do their duty,—and the duty which they owed their ſovereign, their country, their murdered or deſolate wives and helpleſs children, demanded that they ſhould make their invaders ſuffer as much miſery as poſſible: Bonaparte had proclaimed the campaign at an end at Moſcow, but with the Ruſſians it was only beginning." At another time, when the French complained of the exceſſes of the Coſſacks, who had even fired upon their flags of truce, they were told by the Ruſſian general that the Coſſacks acted according to orders: "we want," ſaid he, "not to hear of parleys; our object is to fight, not to negociate; take your meaſures accordingly." Perceiving that there was no chance of peace, or an armiſtice, and that the Ruſſians were fully ſenſible of their own power, and of the reduced and miſerable ſtate of the French army, and had formed their plans in ſuch a manner, as to take the utmoſt advantage of their own good fortune, Bonaparte, after having been upwards of a month in Moſcow, prepared for his retreat. A retreat of greater difficulty, and accompanied with more miſery, has never been recorded in the annals of hiſtory. On the firſt days of it, the ſufferings of the ſoldiers were feelingly and accurately deſcribed in an intercepted letter from the viceroy of Italy. "Three days of ſuffering have ſo broken down the ſpirits of the ſoldiers, that I look upon them, at the preſent moment, as ſcarcely capable of making any effort whatever. Many of them have died of hunger or of cold; many others have gone and ſurrendered themſelves to the enemy." The ſufferings of the French, however, were greatly to be increaſed by hunger, and the ſeverity of the climate.

Early in November the Ruſſian winter ſet in with more than its accuſtomed rigour: hitherto the roads had been only deep and heavy, now they became ſo exceſſively ſlippery, that the men could ſcarcely keep their feet: hitherto the horſes, neceſſary both for the artillery and for the ſuſtenance of

of the ſoldiers, for they were compelled and glad to feed on horſe fleſh, had proceeded feebly and ſlowly on, or dropped dead only, a few hundreds every day; but the firſt day of the froſt, nearly 30,000 periſhed. All poſſibility of carrying forward their artillery was now at an end; the ſpirits of the ſoldiers completely deſerted them: they crawled on, expoſed to the moſt dreadful cold, exhauſted with fatigue and hunger, emaciated, and almoſt naked. The road was literally blocked up with the dead and the dying: they had no power to defend themſelves againſt the Coſſacks, who conſtantly hovered round them: they had no inclination to do it: death to them would have been a bleſſing: at the ſight of the Coſſacks they hoped their miſeries would ſoon be terminated: but their enemies were not ſo merciful as to put them to death; piercing them with wounds, ſtripping off the little covering they had, they left them on the ſnow, there bleeding and naked, expoſed to the rigours of a Ruſſian winter. Whenever the French entered any village where there was the leaſt chance of repoſe or food, they exerted their little remaining ſtrength, and crawled on their hands and feet to ſeek it. Frequently, juſt as they had ſtretched out their hands to ſeize a little food, or reached the threſhold of a wretched hut, under which they looked for ſhelter from the weather, perhaps for a few minutes ſleep, the remnant of their ſtrength failed them, and they expired.

With what feelings and ſentiments did they now regard Bonaparte! No longer the adored general, who ſeemed to have chained victory to his car, to be more than mortal, and to be deſtined to render all Europe ſubſervient to the intereſts and glory of France; they curſed him as the author of all the miſery under which they were writhing; on his perſon they willingly would have inflicted vengeance; but ſenſible of their indignation, he had gathered round his perſon his principal officers, mounted on almoſt the only horſes that remained. For ſome time he rode in a coach, till the dreadful voice of his ſoldiers commanded him to walk as they did, and to ſhare their fatigue; he ſtill, however, defended himſelf from the inclemency of the weather with a cloak; "off with your cloak" was another ſtern command, that he durſt not diſobey. Such was the ſituation,—ſuch the feelings of the French army during their dreadful retreat, in which every thing that could accumulate or ſharpen miſery beſet them. It ſcarcely needed the preſence of an enemy to complete the work of deſtruction; the climate of Ruſſia, aided by hunger, was amply ſufficient.

In fact, the French ſoldiers could no longer be ſaid to compoſe an army; they were ſtraggling in all directions, anxious indeed to avoid the Coſſacks, ſince from them they experienced only an aggravation of their miſery, but not unwilling to fall in with the regular Ruſſian troops, in the hope of being taken priſoners, or falling in battle. Their ignorance of the country, and the ſtate of the roads, were ſuch, that the different diviſions of the French army could not ſupport one another; and frequently when expecting to fall in with the main body, they encountered the enemy and were taken priſoners. On the 10th of November, before they reached Smolenſk, general Augereau, with 2000 men and 60 officers, ſurrendered themſelves; this was the firſt inſtance, during the preſent war, of a whole corps laying down their arms. It is computed that in three days time, prior to that date, they loſt 20,000 men, beſides nearly 20,000 more that fell in the previous engagements; nearly 300 pieces of cannon had alſo either fallen into the hands of the Ruſſians, or had been ſpiked and buried by the French. But theſe loſſes, enormous as they were, were only preludes to greater ones.

It is extremely difficult to form an eſtimate of the loſs of the French in this dreadful campaign. The Ruſſian official accounts ſtate that they took upwards of 150,000 men; and it was calculated that the number of killed, and of thoſe who periſhed by hunger, fatigue, and cold, amounted nearly to 100,000; ſo that reckoning that the French army when it croſſed the Niemen, and began the campaign, amounted to 300,000 men, ſcarcely more than 50,000 eſcaped out of Ruſſia; and of thoſe, a large proportion muſt have ſuffered ſo dreadfully as to be abſolutely unfit for future ſervice. Such is a bare outline of this diſaſtrous campaign, the conſequences of which have proved ſo important to the liberties of Europe. In it we have ſeen the firſt general of his age, at the head of one of the fineſt armies that was ever raiſed, and which placed in him the moſt unbounded confidence, flying, beaten, diſgraced, bereft of the greateſt part of his troops, and the object of deteſtation to the remainder. This is an event which, taken under all its circumſtances, cannot be parallelled in hiſtory. No war, ancient or modern, exhibits ſuch deſtruction and miſery; more, no doubt, have fallen in the field, in the courſe of a campaign; but no army ever periſhed with ſuch lingering and varied miſery. The cauſe of the failure of the Ruſſian campaign under the auſpices of that ſame general, who had on almoſt all great occaſions been ſucceſsful before, is the buſineſs of the hiſtorian to inveſtigate, and will long afford matter for ſpeculation and curious diſcuſſion. "It has ſcarcely ever fallen to the lot of the hiſtorian or annaliſt," ſays the intelligent writer in the New Annual Regiſter, "to narrate ſuch diſaſters; and when we conſider that theſe diſaſters befel a man who, from a low ſtation in ſociety, had raiſed himſelf to the very ſummit of power, to an extent of dominion and influence never before witneſſed in Europe; that this man, for the purpoſe of a mad, bloody, and deſperate ambition, had trampled on all the laws and uſages of juſtice and civilized ſociety; and that he conſidered himſelf, and called upon the world to acknowledge and fear him, as abſolutely beyond the reach of fate, as ſomething more than mortal; when we moreover reflect on the peculiar intereſt which this country felt in all that befel him, ſince againſt this country was his moſt implacable and deadly hatred directed; and from that hatred, his ruin indirectly originated; when we take all theſe things into our account, we muſt acknowledge that we cannot examine too cloſely, or ſcrutinize too minutely, the cauſes of his failure in the Ruſſian campaign."

It appears, then, that theſe cauſes may be claſſed under two general heads, *viz.* thoſe which proceeded from the nature of the country which he invaded, and the characteriſtic qualities of its inhabitants; and thoſe which originated from the peculiar character of the invader.

In the firſt place, the conſtitution of the Ruſſian army, and the character of the Ruſſian ſoldiers, contributed in no ſmall degree to the fate of Bonaparte. The Ruſſians, from their infancy, are moſt devoutedly attached to their emperor, and to their nobility. Philoſophers may ridicule the idea, or diſbelieve the aſſertion, that the common people of Ruſſia are attached to thoſe who act towards them, in too many inſtances, as tyrants. But hiſtory is converſant with facts, not with theories and ſpeculations; and the fact is, that the Ruſſian common people, even before they enter the army, are moſt devoutly attached to their emperor and nobility. This attachment becomes ſtill more ſtrong and influencing when they enter the army:—they then regard themſelves, in a more ſpecial manner, as entirely at the ſervice of their ſovereign; and look upon it as the higheſt honour which can befall them, to ſuffer any privation or miſery, or even death itſelf, at his command, and for his

ſake.

ſake. Military diſcipline, with the troops of moſt other nations, is a habit acquired late in life, irkſome and abhorrent to former habits, and broken through whenever it can be done with ſafety. But it is far otherwiſe with the Ruſſian ſoldier: he knows no habits; he has no feeling or ſentiments incompatible with the ſtricteſt military diſcipline: on the contrary, all his other habits, feelings, and ſentiments, work to the accompliſhment of the ſame end: all ſerve and contribute to render him an excellent ſoldier, ſo far as ſtrictneſs of diſcipline is concerned. Knowing no diſgrace ſo great as diſobedience to the orders of his officers, and eſpecially to the commands or even wiſhes of his ſovereign, he never ſtirs from his poſt till he is expreſsly directed ſo to do: the idea of flight never enters his mind. But his ſteadineſs is not merely paſſive; endowed with great bodily ſtrength, and with a robuſtneſs of conſtitution ſuperior to every fatigue or privation, he wearies out his more ſkilful and experienced opponent, by whom he may be outmanœuvred or ſlain, but cannot be forced to fly.

Hence Bonaparte never met with more obſtinate reſiſtance than he did from the Ruſſians at the battle of Eylau: his troops were weary with ſlaughter, but ſtill they could not defeat the Ruſſians; and had the French emperor been a man who could be taught mortifying or diſagreeable truths by experience, after his firſt campaign againſt the Ruſſians, on the borders of their own country, he never would have attempted to conquer them, in the very heart of their empire, and in the midſt of a Ruſſian winter.

In the ſecond place, the character of the Ruſſian generals contributed not a little to the defeat of Bonaparte: his avowed object in the invaſion of Ruſſia, was to compel the emperor Alexander to adhere to the continental ſyſtem, that was, to forbid all trade between Ruſſia and England; but this would have been the ruin of the Ruſſian nobility, whoſe incomes were almoſt excluſively derived from this commerce. Bonaparte, therefore, was making war upon them, and they muſt have regarded his invaſion as peculiarly directed againſt them. This feeling would contribute to render them faithful and ſteady to the cauſe of their country, and at the ſame time ſtimulate them to put forth all their activity and talents in the conteſt. Beſides, the Ruſſian nobility partake with the common people in that phyſical attachment to the ſoil and inſtitutions of their country, which excites their hatred moſt ſtrongly againſt all invaders. Hence they were above the influence of Bonaparte's promiſes and bribes.

In the third place, the plan of the campaign which the Ruſſian government had laid down, contributed very eſſentially to the overthrow of Bonaparte's hopes and projects. This plan was, on every occaſion, where they could oppoſe Bonaparte, there to oppoſe him, but never in ſuch a manner as might bring on a general action, or an action that could be deciſive againſt themſelves. Thus, the farther he advanced the weaker he became; and after every engagement, though he apparently ſucceeded in driving back the enemy, the real ſtate of his affairs was rendered worſe: he was led further from his reſources, deeper into the heart of a country utterly incapable of ſupporting a large army, and more completely ſurrounded by the Ruſſians.

In the fourth place, the character of the Ruſſian peaſantry contributed much to the defeat of Bonaparte: theſe could not be ſeduced from their allegiance; they uniformly, and to a man, refuſed to hold any communication with the enemy: while Moſcow was in the hands of the French, they brought no goods in for ſale: they regarded it as a polluted city, and would have ſhuddered to have entered it. To theſe cauſes muſt be added the firmneſs of Alexander; and the nature and climate of the country.

The next claſs of cauſes which contributed to Bonaparte's diſcomfiture and ultimate ruin, muſt be ſought for in his own peculiar character, in which the moſt predominant and influential is his obſtinacy. Accuſtomed to ſee all his plans ſucceed, all his predictions, however extravagant, verified, he could ill-brook diſappointment: he could not even ſuffer himſelf to admit that he had acted an imprudent and raſh part, and preferred perſeverance in error, to the acknowledgment and rectification of it. His obſtinacy operated in giving riſe to the invaſion of Ruſſia, as well as influencing his conduct during that invaſion. He probably puſhed forward into Ruſſia notwithſtanding the loſſes which he ſuſtained, and afterwards continued in Moſcow till winter had rendered his retreat almoſt impoſſible, under expectation, or at leaſt the hope, that Alexander would be induced to propoſe terms of conciliation. This certainly influenced his conduct; "but," ſays a good writer, "whoever has ſtudied the character of obſtinate people, muſt be convinced that at laſt, when their obſtinacy is got to its greateſt height, they perſevere in the courſe which muſt infallibly conduct to ruin, without even the moſt groundleſs hope of extricating themſelves. The impulſe in this ſtate of mental diſorder, for ſo it may be denominated, is blind, and almoſt mechanical. So it probably was with Bonaparte, when he determined to remain ſo long at Moſcow."

How different were the affairs of this man at the commencement of 1812, from what they were at the ſame period in the following year. At the *former* every thing was proſperous, except perhaps the war in the peninſula; and that, it was generally believed, he could, at any time, turn in his favour by ſending a larger army there. Ruſſia, though uneaſy under the operation of the hard terms to which ſhe ſubmitted at the peace of Tilſit, would ſcarcely have ventured to commence a new war; while the ſubſerviency of Pruſſia to his will, his abſolute command of her fortreſſes which are on the confines of Ruſſia, and his alliance and family connexion with Auſtria, ſeemed to promiſe him the eaſy conqueſt of Ruſſia whenever he ſhould think proper to attack her. At the latter period he no longer appeared as the invincible conqueror, but as the fallen general, who had fled to his capital with unexampled celerity, to avoid the indignation of the fragments of that army which had been ſacrificed to the madneſs of his ambition. He who had always detailed victories the moſt ſplendid, who had, in direct language, held himſelf out as ſuperior to all the caſualties of war, was now obliged, in his own bulletins, to confeſs that his army was broken, and it was returning towards France defeated and haraſſed by the Tartars of Aſia.

Thus changed in power, in feelings, and in proſpects, the Pariſians ſaw their emperor at the beginning of the year 1813, and they, as well as Europe in general, were extremely anxious for the meeting of the legiſlative body, in order that they might be able to develope his future plans. At this meeting, on the 14th of February, he declared it to be his determination ſtill to carry on the war, and to ſacrifice nothing for the ſake of obtaining peace: "The French dynaſty," ſays he, "reigns, and will reign, in Spain. I am ſatisfied with all my allies; I will abandon none of them; I will maintain the integrity of their ſtates; the Ruſſians ſhall return to their frightful climate. I deſire peace, but I will never make any but an honourable peace, and one conformable to the intereſts and grandeur of my empire." The whole tone of his addreſs was warlike, and he immediately ſet on foot a new conſcription, which, by means of his gens d'armes,

d'armes, he readily carried into effect, at least to a certain point. By means of uncommon exertion and activity, joined to the most tyrannical despotism, he succeeded, by the beginning of April, in collecting a large force on the banks of the Elbe, though that force was of a very different description from the veteran army which he had lost in Russia. His cavalry and artillery were particularly inferior; and it was on these two branches, especially the artillery, that the French used to depend for their victories; it is even said that, in consequence of his having lost upwards of 1000 pieces of cannon in Russia, he was under the necessity of supplying his army, in a great measure, with cannon from the ships at Antwerp, which were, of course, of a description by no means suited for military purposes.

Before Bonaparte left Paris, to take the command of his army, he judged it expedient to settle the form of a provisional government during his absence: he had so narrowly escaped destruction in his Russian campaign, at a time when he had taken no measures respecting the government of France while the king of Rome was a minor, that he resolved to guard against all accidents for the future. Accordingly his empress was regularly declared regent during his absence; and the king of Rome was nominated, in a more solemn manner than heretofore, his successor. It is probable that the appointment of the empress as regent had other objects in view; Bonaparte knew well the temper and disposition of the Parisians; he knew that the best mode of drawing off their thoughts and speculations from the disasters that had occurred, or might occur, was by keeping up the splendour, bustle, and pageantry, of a court; and this could be done with the best effect by investing his empress with the name and dignity of regent. Having thus taken what he conceived to be all due precautions, and sent on before him immense bodies of troops, he closed the session of the legislative body in a speech full of his usual confidence and haughtiness, in which he led them and the French nation to expect, that on the banks of the Elbe he should regain all those laurels which he had lost amidst the snows of Russia.

Having thus detailed the preparations which Bonaparte made for the commencement of what has been denominated the German campaign, we must notice briefly the preparations of those powers who were to oppose him. Alexander, at the head of his army, advanced with great rapidity into the north of Germany. As soon as he crossed his own boundaries into those of Prussia, he ordered a declaration to be issued, explanatory of his motives and views. The Russian emperor was every where hailed as a deliverer, and upon his entrance into Berlin he was received with the utmost enthusiasm by all ranks of the people, and in the end Prussia became a noble ally to the northern potentate. She was indeed destined to act a conspicuous part in avenging her own wrongs and those of Germany. Her armies were put on the best footing. Blucher, who had already immortalized himself by his conduct, had a leading and extensive command; and it seems to have been the wise policy of the continental sovereigns, in this last struggle for their independence, to select those generals against whom Bonaparte had displayed the greatest rancour; they thus secured themselves from treachery, while they called forth all the talents of their commanders. Besides the regular army of Prussia, the landwehr or militia were called out; all were anxious to be enrolled to co-operate in the deliverance and defence of their country.

In the mean time the Russian army continued to advance, and having liberated great part of Prussia, directed their efforts towards the emancipation of Saxony. Count Wittgenstein, who commanded the Russian army, addressed to the Saxons a most noble and inspiriting proclamation, which, though it probably made a deep impression, did not, at the time, produce the consequences which the Russian general anticipated. The king of Saxony was with the French, and no small part of their country was occupied by those people, circumstances which naturally prevented many from joining the allies whose wishes were cordially with them; when, however, an opportunity did occur, it will be seen that the Saxons proved themselves worthy of the name of Germans, and of their ancestors. A hope was now excited that Bernadotte, the crown prince of Sweden, and his numerous army, would be brought to act in favour of the allies; this expectation was considerably strengthened by treaties which were concluded between the courts of Sweden, Russia, and Great Britain. By these treaties, the army under the crown prince was immediately to be employed in the common cause, and in return for his accession of force, Great Britain, besides granting a subsidy to Sweden, agreed to give up to her the island of Guadaloupe, and to guarantee the kingdom of Norway when it should be conquered from the Danes.

Thus it was known that early in the year 1813, Great Britain, Russia, Prussia, and Sweden, were decidedly against France. Hostilities commenced, and in many parts the French were decidedly victorious; Hamburgh, and many other places in the north of Germany, fell into their hands. The first great battle in which Bonaparte was himself engaged, was at Lutzen, on the 1st of May; the Prussians, having partially succeeded in breaking into the squares of the enemy, committed great carnage, and the conflict on all sides was most desperate and sanguinary. For a considerable time the allies were the assailants, but towards evening, Bonaparte called in that division of his army which was near Leipsic, and collecting all his reserves, made a most furious attack, for which the allies were not prepared; night however put an end to the combat. The allies remained masters of the field that evening, but judged it prudent, early on the next day, to commence a retreat, in consequence of which Bonaparte claimed the victory in the battle of Lutzen. But it was not such a victory as he used formerly to boast of; and on the 21st of May another bloody battle was fought at Bautzen, which was still in favour of the French, and the allies again found it expedient to retreat. The loss of the enemy in this obstinate battle was very severe; though Bonaparte gained ground by it, he gained it at such an expence of men, and with such a conviction of the bravery and skill of the allies, that he must have been very unwilling to have obtained many such victories. But the most alarming circumstance which occurred during the battle of Bautzen, was the desertion of a whole battalion of Wurtemburghers, as well as a body of Saxon troops, which must have convinced Bonaparte how little dependence he could place on the German troops. The allies continued their retreat, and on the 24th of May their head quarters were within 18 leagues of Berlin. On the 4th of June, through the mediation of the emperor of Austria, an armistice was agreed on, which was to continue till the 20th of July. It was a matter of great difficulty to determine on which side the advantage of this armistice lay; both parties were probably desirous of it, and as the emperor of Austria pressed it most earnestly, each party readily agreed to it, in the hope of gaining his assistance, or avoiding his hostility. It was, however, extremely unpopular throughout Germany, and especially in the Prussian states; so much so, that the king deemed it necessary to issue a proclamation, in which he declared that the armistice had not been sought for by the allied powers, and that they would only

only uſe it to re-inforce their armies, and attack the common enemy, at its expiration, with more vigour. Bonaparte, on his own part, complained that the terms of the armiſtice were not faithfully kept by the allies; this complaint, which was well founded, aroſe from a circumſtance which augured fatally for his future ſucceſs; for the landwehr of Pruſſia, and even all the inhabitants who could procure any kind of arms, notwithſtanding the ſuſpenſion of hoſtilities, were continually attacking and haraſſing the French, and in many caſes they captured their ſupplies of ſtores and proviſions, and rendered precarious and difficult their communication with France.

It was ſoon evident that the armiſtice would not lead to peace, each party was exerting itſelf to the utmoſt to recruit and re-inforce their army. The emperor Alexander ordered freſh troops to be brought acroſs the Viſtula, and in a ſhort time the re-inforcements that joined the allied army from Ruſſia alone, amounted to 75,000 men. The king of Pruſſia contributed as much to the common cauſe as the exhauſted ſtate of his country, and of its finances, would allow. Bonaparte was equally active; oppoſite to the main army of the allies he had collected nearly 130,000 men.

The armiſtice was prolonged till the middle of Auguſt, during which a congreſs was held at Prague, at which little or nothing was done, or perhaps even attempted. The mediation of the emperor of Auſtria was of no avail; the terms which he propoſed as juſt and equitable to all parties, were peremptorily rejected by Bonaparte. No alternative, therefore, he ſaid, remained for him to adopt, but to unite his forces with thoſe of the emperor of Ruſſia and the king of Pruſſia. Still, however, he, as well as they, were going to fight, not for the purpoſes of ambition or conqueſt, but ſolely for the attainment of a juſt, honourable, and laſting peace. As ſoon as this could be brought about, they would moſt cheerfully lay down their arms; but till it was brought about, they would continue united in hoſtilities, and exert themſelves to the utmoſt.

Ruſſia, Auſtria, Pruſſia, and Sweden, were now to try their ſtrength againſt France; the jealouſies and ſelfiſhneſs of the allied ſovereigns, which had rendered former coalitions of no value, were abſorbed in the deep and awful conviction that now they were fighting for their own exiſtence; beſides, in the former conteſts, they were averſe from, or indifferent to, the cauſe of their ſovereign; now they were cordial and zealous in their co-operation. The allied powers alſo very wiſely made uſe of other weapons than thoſe of warfare; the moſt eloquent and popular writers in Germany were employed to rouſe the people, to hold out Bonaparte as no longer formidable; as having been conquered; but ſtill as the implacable enemy of the happineſs and peace of Germany, as the common deſtroyer of the liberty of the ſovereign and the peaſant.

Beſides the crown prince of Sweden, another Frenchman entered into the liſts againſt Bonaparte, *viz.* general Moreau, who, after he had been liberated by him, had gone over to America, where, in peace, quiet, and retirement, he had ſpent ſome years of his life. It is not known by what particular motives he was induced to enter again into public ſervice; but it appears that the emperor Alexander, as ſoon as he found that war with Bonaparte was inevitable, ſent over a confidential perſon to America, with whom general Moreau returned to Europe. He joined the allied army ſoon after the congreſs at the Prague was diſſolved.

On the 17th of Auguſt hoſtilities recommenced, and a moſt ſevere battle was, a few days after, fought at Dreſden, in which, after a terrible ſlaughter on both ſides, the French ſucceeded in repulſing the allied armies, but the moſt diſaſtrous event in the courſe of this battle was, the death of Moreau, who had both his legs ſhot off by a cannon ball.

Bonaparte repreſented the battle of Dreſden as moſt decidedly favourable to him, and he probably conſidered the loſs and diſcomfiture of the allies as much more ſerious than they really were, as in order to intercept their retreat into Bohemia, he diſpatched Vandamme, one of his generals, with a force which it would have been madneſs to have ſent againſt them, had he not believed their army to have been not only much reduced in numbers, but retreating in great diſorder. In the attack, Vandamme, and ſix other generals, were taken priſoners, beſides 10,000 men, 60 pieces of artillery, and 6 ſtandards.

In Sileſia the campaign opened on the 18th of Auguſt, the allies in this quarter moving on towards Dreſden; they firſt attacked and defeated a corps under marſhal Ney, which induced Bonaparte to ſet out to re-inforce his general; the French having now greatly the ſuperiority, general Blucher retreated, and took up a ſtrong poſition behind the Katzbach. The plan of the allies being to diſtract and divide Bonaparte's forces, they fell farther back, while the grand army from Bohemia, as we have ſeen, marched on to Dreſden, and drew off Bonaparte to that quarter. On the 25th and 26th the French advanced againſt Blucher, but on the latter of thoſe days the Pruſſian general attacked them. The battle was fought near the Katzbach, and from that takes its name; in it Blucher and the Pruſſians proved their determination to avenge the diſgrace which their country had ſo long ſuffered by having been under the tyranny of France. They fought with the moſt unparalleled bravery, and gained a complete victory. Among the fruits of their ſpoil were 18,000 priſoners, 103 pieces of cannon, and 280 ammunition waggons. In another quarter the crown prince was likewiſe victorious over the French; and in a ſecond battle, *viz.* that of Juterbock, it was calculated that the vanquiſhed French had loſt from 16 to 18,000 men, more than 50 pieces of cannon, and 400 ammunition waggons.

After theſe defeats the ſituation of Bonaparte became more critical, yet he ſtill remained at Dreſden, and continued there till the 7th of October, when he quitted it, taking with him the royal family of Saxony. Hitherto the allies of Bonaparte had remained more faithful to him than might have been expected, but about this period the king of Bavaria deſerted him, and concluded a treaty of alliance and concert with Auſtria, by which 35,000 Bavarian troops were immediately to co-operate with thoſe of Auſtria.

On the 14th of October Bonaparte collected his whole force in and round Leipſic, and on the 18th the famous battle of Leipſic was fought, in the courſe of which two Saxon battalions, and two Weſtphalian regiments of huſſars, quitted the ranks of the enemy and joined the allies; the artillery which they brought over with them, they immediately turned againſt the French, and the crown prince headed the men in a charge againſt their former oppreſſors. In the battle of this day the French loſt at leaſt 50,000 men in killed, wounded, and priſoners, beſides 65 pieces of artillery. Bonaparte now left Leipſic, and in two hours afterwards the allied armies entered that town.

The retreat of Bonaparte from Leipſic with the wreck of his army, to the amount of 80,000 men, was ſcarcely ſurpaſſed in diſorder and miſery by his retreat from Moſcow. As ſoon as he reached the Rhine he left his army, haſtened to Paris, and on his arrival, another conſcription of 300,000 men was ordered, but France was now too much exhauſted to anſwer the demand; the Ruſſian and German campaigns had almoſt entirely ſtript her of the efficient military population; beſides, there was wanting that enthuſiaſm which had,

twenty years before, been characteriſtic of the country, ſo that it was almoſt deaf to this new demand.

In the mean time the mighty edifice which Bonaparte had erected out of the ruins of the independence and liberties of the continent, and which had been cemented by the blood of hundreds of thouſands, was falling to pieces; the victory of Leipſic, by freeing the minds of the princes of Germany from all apprehenſions of his power, proved how eager they were to reſume their legitimate character and authority. Wurtemburgh deſerted him, and made her peace with the allies; and the confederation of the Rhine was diſſolved; ſo that, to uſe his own words, no ſovereigns remained attached to him except the king of Denmark and the king of Naples.

Holland, which had long groaned under French tyranny, early in the month of November broke her ſhackles, diſmiſſed the conſtituted authorities, eſtabliſhed a proviſional form of government, and by the aſſiſtance of Great Britain ſhe was at length enabled to hold up her head as a free and independent nation, recalling her hereditary prince, and inveſting him with new powers, and higher titles than the members of the houſe of Orange had formerly exerciſed and claimed. Rather before this period the allied troops, under the command of the crown prince, had entered Hanover, which they liberated from French thraldom, much to the ſatisfaction of the inhabitants, and by the end of November almoſt all the ſtrong places between the Elbe and the Rhine were in poſſeſſion of the allies, and ſuch as were not, were cloſely inveſted. On the 1ſt of December they iſſued their famous proclamation, which, from its juſtice and moderation, probably did them as much, or more, ſervice, than any of their victories. "The allied powers," ſay they, "do not make war upon France, but againſt that preponderance which, to the misfortune of Europe and of France, the emperor Napoleon has too long exerciſed beyond the limits of his empire.

"Victory has conducted the allied armies to the banks of the Rhine. The firſt uſe which their imperial and royal majeſties have made of victory, has been to offer peace to his majeſty the emperor of the French. An attitude ſtrengthened by the acceſſion of all the ſovereigns and princes of Germany has had no influence on the conditions of that peace. Theſe conditions are founded on the independence of the French empire, as well as on the independence of the other ſtates of Europe. The views of the powers are juſt in their object, generous and liberal in their application, giving ſecurity to all, honourable to each.

"The allied ſovereigns deſire that France may be great, powerful, and happy; becauſe the French power, in a ſtate of greatneſs and ſtrength, is one of the foundations of the ſocial edifice of Europe. They wiſh that France may be happy, that French commerce may revive, that the arts (thoſe bleſſings of peace) may again flouriſh, becauſe a great people can only be tranquil in proportion as it is happy. The allied powers confirm to the French empire an extent of territory which France, under her kings, never knew; becauſe a valiant nation does not fall from its rank, by having in its turn experienced reverſes in an obſtinate and ſanguinary conteſt, in which it has fought with its accuſtomed bravery."

Immediately after the iſſuing of this declaration, the allies having completed their arrangements, croſſed the Rhine for the purpoſe of invading France; as, however, the ſtrong fortreſſes near Mentz rendered the paſſage in this place rather difficult, they preferred paſſing through Switzerland, by the inhabitants of which country they were hailed as friends, and afforded every aſſiſtance.

The allied army entered Switzerland on the 20th of December, penetrated to Zurich and Berne, and croſſed the Rhine at Baſle without firing a ſhot, and before the end of the year detachments of the allies made their way to Langres, in Champagne, which was about 100 miles within the old French frontier. The year 1814 opened with an invaſion of France, not only by the allies in the eaſt and north, but on the ſouth by lord Wellington, while the Auſtrian forces in Italy, aided by the naval exertions of Great Britain, and by detachments from our garriſons in the Mediterranean, completely kept the viceroy in check. Every event tended to ſhew that Bonaparte's power was tottering, and he muſt have been convinced that he had only one thing to depend on, *viz.* his own perſonal prowefs. He accordingly left Paris on the 25th of January to take command of the armies, and on the 1ſt of February a great battle was fought between him and marſhal Blucher, which was decided in favour of the allies, and the retreat of Napoleon from his poſitions about Brienne, with the loſs of 4000 priſoners, was the conſequence of his defeat.

On the 7th of February the poſition and town of Troyes was taken poſſeſſion of by the allies; this town was thought to be of great importance to their cauſe, on account of its reſources, its population, and of the number of roads leading to it from different parts of France. At this period negociations were carrying on at Chatillon-ſur Seine for the purpoſe of effecting a peace, during which the allies had gained ſeveral conqueſts over the French armies. Bonaparte had been beaten in ſeveral engagements with Blucher and prince Schwartzenburg, whoſe armies, at the cloſe of February, were at Troyes and Chalons, while he himſelf was at Rheims. On the 19th of March the negociations were to terminate, and on that day Napoleon refuſed the terms that were offered him, though by thoſe terms he would have continued at the head of the French, with dominions as extenſive and powerful as had ever been enjoyed by any of the former monarchs.

On the day that the conferences at Chatillon were terminated, the French army moved upon Arcis, behind which the corps commanded by field marſhal count Wrede was poſted.

The allies, under Schwartzenburg, concentrated on the Aube, near Pougy and Arcis, and a general attack was made by the allies on the 20th, in which the enemy was defeated at all points, with great loſs, and Arcis was taken.

At this juncture, Napoleon formed the deſperate and extraordinary plan of paſſing between the two armies of the allies, and of ſtriking at their communications with the Rhine, intending at the ſame time to liberate the garriſon of Metz. For this purpoſe he moved by Chalons on Vitry and St. Dizier, his head-quarters being, on the 22d, at Obcomte, between the two latter places. This bold and characteriſtic reſolution was formed in the expectation that it would alarm the allies ſo much for their own ſafety, as not only to draw them away from Paris, but actually entangle them in the very difficulties with the proſpect of which he endeavoured to terrify them;—this movement was fortunately defeated by their reſolution of marching upon Paris, a reſolution which was—conſidering the time and circumſtances in which it was taken—one of the grandeſt that ever entered into the mind of man, and does the higheſt honour to the names of the emperor Alexander and prince Schwartzenburg;—to which of thoſe great men the idea ſuggeſted itſelf, perhaps they themſelves are not conſcious; but it is certain they both eagerly adopted it, and muſt equally ſhare in the glory of that great enterpriſe in which they riſked themſelves and their armies for the deliverance of mankind.

For two days after this determination and change of march, Bonaparte was employed, as he hoped, in anticipating the allies, and in preparing the ſprings in which his victims were to be caught; but no enemy came—no intelligence arrived: from Paris he heard nothing—from the reſt of France little; and a hoſtile army of 200,000 men muſt be, he knew, at no great diſtance from him, but he could not gueſs where. Over Winzingerode, who was in his vicinity, near St. Dizier, with a ſmall force, he obtained ſome, and claimed greater advantages; but theſe ſucceſſes left him as much in the dark as ever.

He was convinced that this corps was but the advanced guard of the Ruſſians; and when one of his generals reported it was not ſo, and that the main body of the allies had ſuſpended their retreat, he himſelf thought the news almoſt too good to be believed, and calculated that the time thus loſt would enable him to perfect his plans for their deſtruction.

In theſe circumſtances, it was Napoleon who thought his enemies undone; and far from conſidering them as having reſumed the offenſive, he ſaw in their movement of concentration only a meaſure of retreat. He announced it triumphantly to the empreſs in letters written with his own hand: theſe letters were intercepted by the allies. They were then certain of having deceived him, and they urged with great precipitation their movement againſt the capital.

Of the march upon Paris either he never thought, or his arrogance haſtily rejected the idea; but at laſt, after a loſs of three days, he felt that it became abſolutely neceſſary to aſcertain the enemy's poſition, and he accordingly haſtened by forced marches through Bar-ſur-Aube towards Troyes. A junction was, however, formed by prince Schwartzenburg and marſhal Blucher; and the whole allied force marched upon Paris, with a rapidity that inſured its ſucceſs. The defences which had been raiſed in the neighbourhood of that city were attacked late in the day of the 30th March, and the enemy, under the command of Marmont, made a moſt determined reſiſtance; but the allies were almoſt every where ſucceſsful.

At the moment of theſe deciſive advantages, a flag of truce was ſent from Marmont, intimating a deſire to receive any propoſitions that it might have been intended to make to him by a flag of truce, which had previouſly been refuſed admittance. An armiſtice was alſo propoſed by him for two hours; to obtain which, he conſented to abandon every poſition he occupied without the barriers of Paris.

On the 31ſt in the morning, the allies entered Paris. In the evening, Caulincourt came from Bonaparte to the emperor of Ruſſia, offering to accede to the terms of peace which the allies had offered at Chatillon. The emperor gave no other anſwer, than that the time was paſt for treating with Bonaparte as ſovereign of France.

Immediately, by the deſire of the emperor of Ruſſia, the ſenate met, and choſe a proviſional government, conſiſting of Talleyrand and four other members. At their ſecond ſitting, they declared that Bonaparte had forfeited his right to the empire, and that his dynaſty was at an end. They alſo reſolved, that the ſenate and legiſlative bodies ſhould form fundamental parts of the new conſtitution.

On the 1ſt of April the proviſional government inſtalled itſelf, and of this Bonaparte ſeems to have been aware; and on the 2d he collected at Corbeil, Fontainebleau, and the neighbourhood, at leaſt 20,000 men, whom he reviewed and thus addreſſed: "The enemy is in Paris. I do not wiſh to ſpeak of the inhabitants of that city, but a horde of emigrants, whom I had recalled, reſtored, and laden with perſonal favours, have offered their ſervices to the emperor of Ruſſia, and have hoiſted the white cockade. The tri-coloured cockade we won in our revolution; we have ennobled it in our empire. It has ſhared too many triumphs with us ever to be abandoned. If Paris is to be retaken at the point of the bayonet, I will march at your head. May I reckon upon you? Am I right? Will you ever abandon this national cockade?" "Never, never; vive l'empereur! vive Napoleon! à Paris!" was the anſwer of the whole line of troops.

The marſhals preſent at this ſcene were far from partaking or encouraging this enthuſiaſm: they that ſame night aſſembled in the palace, and when admitted to Napoleon's preſence, with many references to their former ſervices, and profeſſions of duty and affection, acquainted him that all was loſt; that at moſt he could collect but 56,000 men, and that for them he had not two days proviſions; but the only means of ſaving any thing from this great ſhipwreck, was to abdicate in favour of the king of Rome.

Bonaparte, for the firſt time in his exiſtence, heard a remonſtrance in ſilence, and ultimately aſſented to the propoſal. On the 3d, marſhal Ney put into his hands the Paris journals, in which the déchéance, pronounced by the ſenate the day before, was publiſhed; and, in the name of his brethren, on the public parade, gave him that advice ſo terrible to the ear of a tyrant, "Sire, il faut abdiquer; c'eſt le vœu de la France et de l'armée." Napoleon, thunderſtruck, retired into the palace. On the 4th he ſigned his own abdication, and addreſſed an order of the day to his army, in which, after contraſting forcibly and juſtly the former ſervility and preſent tergiverſation of the ſenate, he intimates, that if he is the only obſtacle to peace, he is ready to make the laſt ſacrifice for France; and that he has ſent Ney, Caulincourt, and Macdonald to Paris, "pour entamer des negociations." Theſe negociations, which had for their object the continuance of Bonaparte's power under the cloak of a regency, to be adminiſtered by his wife, in her own name, or that of her ſon, happily failed. Others then enſued, in which the diſcuſſions were not queſtions of policy, power, or government, but of pounds, ſhillings, and pence; and on the 11th of April was ſigned the famous treaty, by which Bonaparte abandoned for himſelf and his family the thrones of half the world, and ſtipulated only for the empty titles of his better days, a retreat in the obſcureſt corner of his late dominions, and a penſion of 2,000,000 of livres *per annum* from the civil liſt of Lewis XVIII.; and, finally, on the 12th he ſigned the formal inſtrument of his abdication on the part of himſelf and his dynaſty.

Such was the termination of this diſaſtrous revolution; and in a very few weeks after the depoſition of Bonaparte, Lewis XVIII. returned, and took a quiet poſſeſſion of the throne of his fathers. Of the ſtability of the new government we preſume to offer no conjectures. Of the character of the preſent ſovereign much might be ſaid in applauſe; of the new conſtitution, at preſent, we know but little: and into what it may ultimately ſettle it is difficult to ſpeak. Many recent occurrences in different parts of Europe have mortified the friends to human happineſs; the ſociety of Jeſuits, always inimical to the intereſts of mankind, has been re-eſtabliſhed. The Inquiſition, which Bonaparte aboliſhed, and which it was imagined could, in this enlightened age, never more rear its horrid head, has been revived in Spain, to the everlaſting diſgrace of the prince who ordered its eſtabliſhment, and to the people who permitted it. When we read the decree, that "the

tribunal of the Inquiſition is aboliſhed, as derogatory to the ſovereign power, and to civil authority," we did anticipate a new era, even for Spain, and are mortified, beyond the power of language to deſcribe, to find that ſeveral of the beſt and moſt virtuous inhabitants of that country are now ſuffering under a tribunal which curſed the world for ſo many centuries, which, for the boldneſs and wickedneſs of the original conception, the immenſe extent of its power, the audacity of its attempts, the greatneſs of its ſucceſs, and the length of its domination, finds no parallel in the records of the world.

We might, as a concluſion to this article, take ſome notice of the principal actors and ſufferers in the revolution which we have been contemplating, but we are afraid of tranſgreſſing the allowed limits. Beſides, in our alphabetical arrangement, we have already noticed ſeveral of the moſt diſtinguiſhed of theſe perſons; ſee particularly the articles Bailly, Condorcet, Marat, Mirabeau, Lewis XVI., Maleshierbes, and Neckar, and to ſome others, according to the plan of our work, diſtinct articles will hereafter be given. (See Roland-Turgot, Robespierre, Vergniaud, &c.) Of Danton, who took a very active part in ſome of the bloodieſt ſcenes in Paris, and who fell a victim to the axe which he had ſharpened for others, we may obſerve, that he was educated to the law, and in the progreſs of the revolution was ſucceſſively the aſſociate of Mirabeau, Marat, and Robeſpierre. He organized ſome of the chief tumults and maſſacres in the city, particularly that of the 10th of Auguſt. After the fall of royalty, he obtained an appointment of adminiſtrator of juſtice, a ſtation in which money poured on him from all ſides, and which was ſpeedily diſtributed by him to procure adherents and reward atrocities. He was deeply involved in the horrid maſſacres of September, and, when ſubſequently called to account for the diſtribution of the money charged for ſecret ſervice, he declared, that "in a revolution there could be no reckoning in detail." It was Danton who prevented the national aſſembly from leaving Paris on the approach of the Pruſſians. He was brought to the guillotine by Robeſpierre, who was his rival, but his inferior in every thing but cunning and hypocriſy. For this article, we refer, as authorities, chiefly to the volumes of the New Annual Regiſter.

Revolution *of America*. See America, and United States.

Revolution *in Poland*. See Poland.

Revolution, in *Geometry*. The motion of any figure quite round a fixed line, as an axis, is called the revolution of that figure; and the figure ſo moving is ſaid to revolve.

Thus, a right-angled triangle, revolving round one of its legs, as an axis, generates, by that revolution, a *cone*; which ſee.

Revolution, in *Aſtronomy*, denotes the period of a ſtar, planet, comet, or other phenomenon; or its courſe from any point of its orbit, till it return to the ſame.

The planets have a twofold revolution. The one about their own axis, uſually called their *diurnal* rotation, which conſtitutes what we call their *day*.

The other about the ſun, called their *annual* revolution or *period*, conſtituting their year. See *Motion of the* Planets.

REVOLUTUM Folium, in *Botany*. See Leaf.

REUS, in *Geography*, a town of Spain, in Catalonia, where ſeveral merchants at Barcelona have agents for the purchaſe of wine, brandy, and fruit, with which the country abounds.

REUSS, a river that riſes from a lake in Mount St. Gothard, croſſes the canton of Uri, paſſes through the lake of the Four Cantons to Lucerne, and then taking a northerly courſe, runs into the Rhine, two miles N. of Klingnau, in the county of Baden.

REUSSEN, a princely county of Saxony, divided into ſeveral branches, which take their names from the towns which they poſſeſs, all ſituated in the Vogtland.

REUSSIN, or Redzen, a town of the duchy of Warſaw; 40 miles S.S.W. of Poſen.

REUT, a town of Bavaria, in the biſhopric of Bamberg; three miles E. of Forcheim.—Alſo, a river of European Turkey, which runs into the Dnieſter, near Uſtia, in the province of Moldavia.

REUTELE, in *Ichthyology*, a name uſed by ſome for the *umbla minor*, or red charr, a fiſh common in the lakes of Germany, and of the northern parts of England and Wales. The name is originally German.

REUTLINGEN, in *Geography*, a town of Wurtemberg, on a ſmall river, which runs into the Neckar. It has only one parochial church, together with one hoſpital, an orphan-houſe, and a grammar-ſchool. The magiſtrates and burghers are Lutherans. Near it was diſcovered, in 1716, a ſulphurous ſpring; 32 miles W. of Ulm. N. lat. 48° 30′. E. long. 9° 8′.

REUTO, a town of Saxony, in the Vogtland; 6 miles W.S.W. of Plauen.

REUTTE, a town of Germany, in the county of Bregentz; 9 miles S.S.E. of Bregentz.

REUTTEN, or Reita, a town of the Tyroleſe, on the borders of Swabia; 32 miles N.W. of Inſpruck.

REVULSION, in *Medicine*, the derivation of the fluids of the body, from a part in which they are morbidly accumulated, to another part, whether near or diſtant.

This principle is much acted upon in the practice of medicine, although conſiderably leſs than by the advocates of the humoral pathology. Theſe practitioners carried the principle ſo far as to make their evacuations generally at ſome point oppoſite and diſtant to the part diſeaſed; thus, to relieve the head, they would bleed from the foot, or from the hæmorrhoidal veins about the anus; and if a pleuriſy occurred in the left ſide, they would open a vein in the right arm; and ſo forth. Theſe were mere hypothetical refinements, and have fallen into diſuſe in this country. Much of the practice of medicine, however, in acute and in ſome local chronic diſeaſes, hinges upon the principle of revulſion. Thus, for the removal of inflammatory congeſtion in any internal organ, as in the lungs or brain, a counter-inflammation is excited externally in the ſkin of a contiguous part, by applying a bliſter, or a ſtimulating liniment, to the ſurface of the cheſt, to the neck, or on the ſcalp: and thus by bringing an afflux of the fluids to theſe external parts, which are of leſs importance to life, the congeſtion in the veſſels of the more important and vital organs is diminiſhed, and the inflammation cured. In a ſimilar manner, the derivation of the fluids to the inteſtines by cathartic medicines, to the kidnies by diuretics, and to the ſkin by ſudorifics, tends to diminiſh the congeſtion of the circulating ſyſtem at large, and conſequently of particular organs. Blood-letting, whether by directly opening the veins and ſmall arteries, or by the application of leeches, or of cupping-glaſſes after ſcarification, likewiſe operates upon the principle of revulſion.

Conſiderable errors, however, have been committed, eſpecially by the humoral pathologiſts, by carrying this doctrine too far. For in their attempts to procure evacuations of the fluids, eſpecially from the ſkin, they have employed heat, and ammoniacal, ſpirituous, and other ſtimulant medicines, which, by the excitement and irritation which they

occaſioned in the nervous and vaſcular ſyſtem, produced much more inflammatory action, than the revulſion, reſulting from the evacuation, could poſſibly ſubdue. See HUMORAL *Pathology*.

REVULSION is alſo uſed for a ſpontaneous turn or reflux of humours in the body. Sudden diſeaſes are occaſioned by great revulſions of humours, which fall all at once on certain parts.

REWAH, in *Geography*, a town of Hindooſtan, in the country of Allahabad; 57 miles S.S.W. of Allahabad. N. lat. 24° 35′. E. long. 81° 36′.

REWARDS. Military rewards, among the Athenians, conſiſted ſometimes in crowns preſented to thoſe that had merited them; on which their names and noble actions were inſcribed. Some had leave granted them to erect pillars or ſtatues in honour of ſome god, with inſcriptions ſetting forth their victories. This was a favour that was ſeldom granted; Cimon indeed was honoured with it, but Themiſtocles could never obtain the like. Another honour conferred at Athens on the valiant, was to have their arms placed in the citadel, and to be called *Cecropidæ*, or citizens of the true old blood. Others were preſented with a παναοπλια, or complete ſuit of armour. Songs of triumph were honorary compliments paid to ſome. The children of thoſe who were killed in battle were maintained at the public expence, till they came to maturity; at which time they were preſented before the aſſembly of the Athenian people with a complete ſuit of armour, one of the public miniſters proclaiming before them, "that hitherto, in remembrance of their fathers' merits, the commonwealth had educated theſe young men, but now diſmiſſed them ſo armed, to go forth and thank their country by imitating their fathers' examples."

Solon made a farther proviſion for the parents of thoſe that died in the wars, it being extremely reaſonable that they ſhould be maintained at the public expence, who had loſt their children, the comfort and ſupport of their declining age, in the ſervice of the public.

As for thoſe who were any wiſe diſabled, they had an allowance from the public towards their maintenance. Potter, vol. ii.

Triumphal honours were reckoned among the military rewards which the ancients voted to their beſt generals. Fabius Maximus, Paul Emilius, Camillus, and the Scipios, were ſatisfied with this recompence for their ſervices. With reſpect to old infirm ſoldiers, who were invalided, they were provided for by receiving, each, a lot of ground, which they cultivated and improved. Lands, thus appropriated, formed part of the republican or national domains, or were divided amongſt them in the conquered countries.

The Roman officer was rewarded for his ſervices, or for particular acts of bravery, in three ways: 1ſt. By marks of honour or diſtinction, which conſiſted of two ſorts, *viz.* of that which was merely ornamental to their own perſons, or limited to the inveſtiture for life; and of that which may be called *rememorative*, ſuch as ſtatues, &c. The latter deſcended to their poſterity, and gave their families a certain rank in the republic. 2dly. By penſions or allowances. And 3dly. By a grant of lands which exceeded the lots given to private ſoldiers.

The French, who got poſſeſſion of the country which was formerly occupied by the Gauls, had, at firſt, no other method of recompenſing their generals than by giving them a certain proportion of land. This grant did not exceed their natural lives, and ſometimes it was limited to the time they remained in the ſervice.

Theſe uſages inſenſibly changed, and by degrees it became cuſtomary for the children of ſuch men as had received grants of national territory, to continue to enjoy them; upon condition, however, that the actual poſſeſſors of ſuch lands ſhould be liable to military ſervice. Hence the origin of fiefs in France, and the conſequent appellation of *milice des fieffés*, or militia, compoſed of men who held their lands on condition of bearing arms when called upon. The French armies were for many years conſtituted in this manner; and the cuſtom of rendering military ſervice in conſideration of land tenure, only ceaſed under Charles VII.

In proceſs of time, thoſe lands which had been originally beſtowed upon men of military merit, deſcended to their children, and were gradually loſt in the aggregate lots of inheritable property. Other means were conſequently to be reſorted to by the ſtate, in order to ſatisfy the juſt claims of deſerving officers and ſoldiers. The French, therefore, returned to the ancient cuſtom of the Romans, and rewarded thoſe, who diſtinguiſhed themſelves in war, by honorary marks of diſtinction.

Honorary rewards and compenſations for ſervice were not confined to individual officers and ſoldiers. Whole corps were frequently diſtinguiſhed in the ſame manner. When ſeveral corps acted together, and one amongſt them gave ſignal proofs of gallantry and good conduct, that one frequently took precedence of the others in rank, or was ſelected by the ſovereign to be his perſonal guard. Sometimes, indeed, the king placed himſelf at the head of ſuch a corps on the day of battle, thereby teſtifying his approbation of their conduct, and giving a proof of his confidence in their bravery.

It is now uſual, in moſt countries, to confer marks of diſtinction on thoſe corps that have formed part of any army that has ſignalized itſelf. Thus the kettle-drums, under the appellation of *nacaires*, were given to ſome regiments, as proofs of their having behaved gallantly on trying occaſions.

The military order of St. Louis, which was created by Louis XIV. in 1693, and that of Maria Thereſa, as well as many other orders in different countries, were only inſtituted for the purpoſe of rewarding military merit. The eſtabliſhment of hoſpitals for invalids, ſuch as Chelſea, &c. owes its origin and continuance to the ſame juſt ſenſe of what is due to deſerving officers and ſoldiers. Hence, likewiſe, our invalid companies and retired liſts.

Philip Auguſtus, king of France, firſt formed the deſign of building a college for ſoldiers who had been rendered infirm, or were grown old in the ſervice. Louis, ſurnamed the Great, not only adopted the idea, but completed the plan in a grand and magnificent ſtyle. Charles II. on his reſtoration to the crown of Great Britain, eſtabliſhed Chelſea, and James II. added conſiderable improvements to this royal inſtitution. During the preſent reign, military merit has been rewarded by titles and penſions; but, what is ſtill more creditable to the government, and reflects honour upon his royal highneſs the duke of York (for his co-operation with thoſe who originally ſuggeſted the idea) old and meritorious ſoldiers are taught to expect a ſecure retreat in the decline of life; and every rank is provided for according to the claims and ſervices of individuals.

REWARDS, in a *legal ſenſe*. There are rewards given in many caſes, by ſtatute, for the apprehending of criminals, and bringing them to juſtice; as a reward of 40*l.* to thoſe who apprehend robbers on the highway, and proſecute them to conviction, by 4 & 5 W. & M. c. 8, to be paid to them (or, if killed in the endeavour to take them, their executors) by the ſheriff of the county; to which the ſtatute 8 Geo. II. c. 16. ſuperadds 10*l.* to be paid by the hundred indemnified by ſuch taking. Alſo the like reward of 40*l.* for apprehending

hending and profecuting of burglars. Stat. 5 Ann. cap. 31. See LARCENY.

The fame reward for apprehending of money-coiners, or clippers, &c. 6 & 7 W. III. And the like reward for the apprehenfion of thief-takers, not profecuting felons; and of perfons refifting the officers of the cuftoms, by force of arms, &c. 6 Geo. I. cap. 20. 22. See DISCOVERY *of Accomplices*.

REWARI, in *Geography*, a circar of Hindooftan, in the Subah of Delhi, between Ballogiftan on the N. and Mewat on the S.—Alfo, a town of Hindooftan, and capital of the forementioned circar; 48 miles S.W. of Delhi. N. lat. 28° 13′. E. long. 36° 52′.

REWEY, a term among *Clothiers*, fignifying cloth unevenly wrought, or full of *rewes*. 43 Eliz. cap. 10.

REX AMAROIS, in *Botany*, Rumph. Amboin. v. 2. 129. t. 41, a fhrub or tree, fo called on account of its fupreme bitternefs, as well as its reputed medical virtues. The natives of Ternate, according to Rumphius, efteem it a perfect panacea. In cholera, pleurify, and various kinds of fevers, it is particularly recommended. The fruit, of a compreffed heart-like fhape, and coriaceous texture, is cut into fmall pieces, and chewed with Betle-nut. Its exceffive bitternefs caufes a naufea, fuppofed to be beneficial to the patient. Linnæus cites the above chapter of Rumphius, in his *Syft. Veg.* under *Ophioxylon*, but incorrectly, *Rex amoris*. A fpecimen of the true plant is found in his herbarium, but it has no affinity to *Ophioxylon*. We have a more perfect fpecimen, gathered in the ifland of Honimoa, by the late Mr. Chriftopher Smith, in March 1797, by which the plant feems to belong to *Pentandria Digynia*. The *leaves* are elliptical, entire, a fpan long, alternate, on long ftalks; their under fides filky, efpecially when young; with one ftout midrib, and many ftraight parallel tranfverfe veins. *Flowers* very fmall, in numerous, fimple, filky, axillary, folitary clufters. *Calyx* minute, apparently of only two acute leaves. *Petals* five, larger than the calyx, uniform, oblong, concave, at length reflexed. *Stamens* awl-fhaped, fimple. *Anthers* roundifh, fimple, two-lobed. *Germen* fuperior, obovate, compreffed, cloven at the top. Styles none. *Stigmas* obtufe, converging. The ripe *fruit* we have not feen. Rumphius fays it confifts of two cells, with a white feed, like that of a cucumber, in each. The foliage bears confiderable refemblance to fome of the *Contortæ*, but there is no character of that tribe in the fructification; as far, at leaft, as we can difcern. The *germen* and *ftigmas* are not unlike thofe of *Ulmus*. The half-formed *fruit* proves intenfely bitter, as foon as it is put into the mouth.

REX *Minftrellorum*, king of the minftrels. About the year 1330, the minftrels of Paris formed themfelves into a company, and obtained a charter. The police frequently repreffed their licentiofnefs, and regulated their conduct. Philip Auguftus banifhed them the firft year of his reign; but they were recalled by his fucceffors, and united under the general name of *meneftraudie*, minftrelfy; having a chief appointed over them who was called king of the minftrels. Lewis IX. exempted them from a tariff or toll at the entrance into Paris, on condition that they would fing a fong, and make their monkies dance to the tollman, perhaps to prove their title to fuch indulgence; and hence arofe the well-known proverb, "Payer en gambades et en monnoïe de finge."

The affociated minftrels inhabited a particular ftreet, to which they gave the name, which it ftill retains, of St. Julien des Meneftriers. It was here that the public were provided with muficians for weddings, and parties of pleafure; but as a greater number of them ufually attended on fuch occafions than were ordered, and all expected to be paid the fame price, William de Germont, provoft of Paris, in 1331 prohibited the jongleurs and jongleresses from going to those who required their performance in greater numbers than had been ftipulated, upon a fevere penalty. In 1395 their libertinifm and immoralities again incurred the cenfure of government, by which it was ftrictly enjoined that they fhould henceforth, neither in public nor private, fpeak, act, or fing any thing that was indecorous or unfit for modeft eyes and ears, upon pain of two months' imprifonment, and living on bread and water.

In the reign of Charles VI. they feem to have relinquifhed the juggling art, and to have confined themfelves more particularly to the practice of mufic. It was about this time that treble and bafe rebecs, or viols with three ftrings, began to be in ufe, either to play in octaves to each other, or perhaps in a coarfe kind of counterpoint, of which the laws were now forming: on this occafion the minftrels affumed the title of players on high and low inftruments (joueurs des inftrumens tant haut comme bas), which feems to imply treble and bafe inftruments. And the charter under this denomination was confirmed in 1401.

REX *Mullorum*, in *Ichthyology*, a name given by fome authors to a fpecies of mullet, diftinguifhed from all the others by its having a prominent belly, and having no beards under the mouth.

REX *Sacrificulus*, the *King-prieft*, in *Mythology*, was inftituted, after the expulfion of the kings of Rome, to perpetuate the memory, according to Dionyfius Halicarnaffeus, of the great fervices fome of their kings had done to Rome. A law was made, that the pontiffs and augurs fhould choofe one of the oldeft to have the charge of divine worfhip; but for fear that the name of king fhould again create jealoufy, it was appointed at the fame time, that the rex facrificulus fhould be fubject to the high prieft. He had likewife the name of "Rex Sacrorum," and his wife that of "Regina Sacrorum." The firft perfon that was chofen under this appellation, after the expulfion of the Tarquins, was Maxim Papirius, of Patrician extraction.

REX, in *Ornithology*, a fpecies of *Turdus*; which fee.

REX *Vulturum*. See VULTUR *Papa*.

REY, in *Geography*, a town of Perfia, in the province of Irak, called *Rae*; which fee.

REY, a river of England, in Wiltfhire, which runs into the Thames, near Cricklade.

REY *Ifle*, a fmall ifland in the bay of Panama. N. lat. 8°. W. long. 79° 46′.

REY-*Grafs*, in *Agriculture*, a hardy early fort of grafs, much efteemed among farmers. See LOLIUM *Perenne*, and RAY-*Grafs*.

REYES, in *Geography*, a town of New Navarre; 64 miles S. of Cafa Grande.—Alfo, a town of Peru, in the Audience of Lima; 12 miles N. of Tarma.

REYES, *Los*, a town of South America, in the province of St. Martha; 140 miles W. of Maracaybo. N. lat. 10° 15′. W. long. 73° 30′.—Alfo, a fmall ifland near the coaft of Patagonia, at the entrance of Port Defire. S. lat. 47° 50′.

REYES *Magos*, a town of Brazil; 40 miles N. of Spiritu Santo.

REYES *le Yapey*, *Los*, a town of South America, in the province of Buenos Ayres; 180 miles S.E. of Corrientes.

REYGADA, a town of Portugal, in the province of Beira; fix miles N.N.E. of Pinhel.

REYGATE, or REIGATE, a borough and market-town in the weft half hundred of Reygate, and county of Surrey, England, is fituated at the diftance of 19 miles eaft from Guilford,

Guilford, and 21 ſouth by weſt from London. It is of great antiquity, and is mentioned in the General Survey by the appellation Cherchefelle, or Cherchfield; but it ſoon afterwards became generally known by that of Ridge-gate, ſince corrupted into Reygate. The manor was formerly veſted in the crown; and, previous to the Conqueſt, conſtituted part of the property ſettled by king Edward the Confeſſor on his queen, Edith. King William Rufus granted it to the illuſtrious family of the Warrens, earls of Warren and Surrey, ſeveral of whom obtained conſiderable privileges for the town. John, earl of Warren, in the reign of Edward II. procured for the inhabitants the charter, under which they now enjoy the right of holding a weekly market on Tueſday. Another, held on the firſt Wedneſday of every month, was eſtabliſhed by charter from Charles II.; it was for many years diſuſed, but has lately been revived.

Reygate is a borough by preſcription only. The government is veſted in a bailiff, conſtable, tythingman, ale-taſter, fleſh-taſter, fiſh-taſter, and leather-ſeller, with a conſtable for the foreign diviſion, and a tythingman for each of the forenſic ſubdiviſions, or tythings. This town originally ſent members to parliament in the twenty-third year of Edward I. The electors are the freeholders of meſſuages or burgage tenements within the precincts of the borough, and the bailiff is the returning officer.

The pariſh of Reygate is divided into two capital precincts, which provide ſeparately for the maintenance of their reſpective poor, *viz.* the borough and the forenſec, or foreign, the latter including all that portion of the pariſh not comprehended in the former. Within the precinct of the borough ſtands the town itſelf, which is ſeated at the baſe of a ſteep hill of chalk. The buildings are principally diſpoſed in two long and ſpacious ſtreets, of which one, called the High-ſtreet, runs in a direction from weſt to eaſt; and the other, called Bell-ſtreet, in a direction from north to ſouth. The pariſh church, placed at a ſmall diſtance from the town, although not diſtinguiſhed for its antiquity or elegance of its architecture, is nevertheleſs one of the beſt eccleſiaſtical ſtructures in the county. It is divided into a nave, two ſide aiſles, and a chancel, with an embattled tower at the weſt end. The nave and chancel are ſeparated from the aiſles by ſeven pointed arches; five of which, on each ſide, are in the nave and two in the chancel; thoſe of the former being ſupported by pillars, alternately round and octagonal; and thoſe of the latter by cluſtered pillars of a more elegant form. Every portion of the interior is crowded with monuments and inſcriptions to the memory of the Thurlands, of Thurland Caſtle in Nottinghamſhire, the Jameſes of Reygate, the Skinners of the ſame place, and others of leſs note. In a vault under the chancel, conſtructed by William, firſt baron Howard of Effingham, are depoſited many leaden coffins, containing the remains of the founder, and of ſeveral of his deſcendants, earls of Nottingham, and their families. The moſt remarkable of theſe is that inſcribed to the memory of Charles Howard, earl of Nottingham, who commanded the Britiſh fleet in the memorable conteſt with the Spaniſh armada, A. D. 1588.

The old market-houſe ſtood at the weſt end of the town, but it having gone to decay, the preſent houſe was erected, by ſir Joſeph Jekyll, near the ſcite of the ancient priory, which formed one of the terminations of Bell-ſtreet. This religious eſtabliſhment was founded by William de Warren, earl of Surrey, and Iſabel his wife, about the year 1230. The inmates conſiſted of a prior, and a few canons regular, of the order of St. Auguſtine, whoſe clear annual revenue, at the time of the diſſolution, amounted to 68*l.* 16*s.* 8*d.* After that event the ſcite of the priory, with its appurtenances, was granted by king Henry VIII. to William, lord Howard, in exchange for the rectory of Tottenham in Middleſex. The other religious buildings here were, two chapels, dedicated to St. Lawrence, and to Thomas à Becket, and the hoſpital of the Holy Croſs, which ſeems to have been connected with the priory.

On a conſiderable eminence to the north of the town, ſtood the ancient caſtle of Reygate, the foundation and hiſtory of which are little known. Moſt of the very ſlender accounts of it which have reached our times, aſcribe its origin to ſome of the more ancient earls of Warren and Surrey, but others aſſert, that the original ſtructure was of much earlier date, and the work of our Saxon anceſtors. Indeed, if the inhabitants of this part of the country were ſo active and ſucceſsful in repelling the Daniſh invaders, as to give riſe to the proverb attributed to them by Camden, "The Vale of Holmeſdale,—never wonne, ne never ſhall," it ſeems not improbable, conſidering alſo the importance and advantage of the ſituation, that their leaders had a fortreſs here ſufficient for the purpoſes of rendezvous and ſecurity. It is certain that there was a fortreſs at Reygate, of conſiderable note, under the earls of Warren, and which ſeems to have been for many years one, at leaſt, of the capital ſeats of their barony. William, earl of Warren, who poſſeſſed it in king John's time, is the firſt of the family ſpoken of by Dugdale as the proprietor of it; and he acknowledges his title to be derived from his earlieſt anceſtors. This earl, in the conteſt between that king and his barons, was one of the neutral lords who joined in the confederacy againſt the king with reluctance, and who, at the great council at Runnymead, were inclined to favour him; and by whoſe advice the great charter was eventually ſigned by him. This dubious policy of the earl occaſioned the loſs of his caſtle at Reygate, which, ſoon after the landing of Louis the dauphin, was ſurrendered to him. When it was firſt diſmantled is uncertain, but it is mentioned as having been decayed and ruinous in the reign of James I. Even then, and for ſome time after, it muſt have been capable of defence, as in the time of the civil wars, A. D. 1648, the committee of the houſe of commons were ordered "to take care of it, and to put it into ſuch a condition, that no uſe might be made to the endangering the peace of the kingdom." What the immediate reſult of theſe orders was we are not informed, but it was probably demoliſhed ſoon afterwards, though a ſmall part of the walls was ſtanding within the laſt forty years. Now, however, every veſtige of theſe is gone; but the vallum and ditch are ſtill nearly entire on the ſouth and weſt ſides; and in the centre of the area is a deſcent, by a flight of ſteps, to a paſſage 235 feet long, which leads into a cave 123 long, 13 wide, and 11 high. This cave is conjectured to have ſerved the double purpoſe of a repoſitory for military ſtores, and a place of cuſtody for priſoners: it might alſo be a place of ſafety in times of public commotion.

The park at Reygate is ſituated to the ſouth of the town. It contains about 150 acres, and appears, by a ſurvey made in 1622, to have been then well ſtored with timber trees, and with veniſon. It was diſparked within twenty years from that period, and now retains few of its former characteriſtics, except the name. At Eaſt-Beechworth, to the weſtward of Reygate, is a ſeat of the late Hon. William Henry Bouverie, which was built by ſir Ralph Freeman in the reign of James I.; and near it is Wonham, a manſion belonging to viſcount Templetown: Gatton, to the northward, about two miles, affords an example of nominal borough repreſentation, ſcarcely a houſe being left ſtanding within its limits. In this pariſh, at a place called

Battle-

Battle-bridge, tradition affirms that a great ſlaughter of the Danes took place. Aubrey ſtates that a caſtle exiſted here, but no traces of ſuch a building can now be diſcovered. See GATTON.

Merſtham, to the eaſt of Gatton, is noted for its ſtone quarries, which were anciently held in ſuch high repute that the crown deemed it expedient to keep them in its own poſſeſſion. A great part of Windſor caſtle, and the magnificent chapel of Henry VII. at Weſtminſter, were conſtructed with ſtone from theſe quarries. The quality which renders it peculiarly valuable, is its effectual reſiſtance againſt fire, whence it is denominated fire-ſtone. It is very ſoft when firſt raiſed from the quarry, but becomes indurated by expoſure to the atmoſphere. A rail-road has been formed here to facilitate the conveyance of ſtone and lime from the quarries to the metropolis. Merſtham-place is a ſpacious manſion belonging to Hylton Jolliffe, eſq. In the pariſh of Newdigate, about ſix miles ſouth-weſt from Reygate, is Ewood, a manſion lately erected by the preſent duke of Norfolk. The houſe ſtands on the brow of an eminence, and is ſurrounded by a park containing about 600 acres of ground, and ornamented with a fine lake, covering ſixty acres. At Nutfield, as well as at Reygate, are ſome fuller's-earth pits, which yield excellent earth. Hiſtory and Antiquities of the County of Surrey, by the Rev. Owen Manning; edited, with additions, by W. Bray, eſq. F.S.A.; vol. i. folio. Beauties of England and Wales, 8vo. vol. xiv. by I. Shorbel.

REYHER, SAMUEL, in *Biography*, an eminent German mathematician, was born at Schleuſingen, in Saxony, in the year 1635. He received the early part of his education under his father, and then purſued his mathematical ſtudies at the univerſity of Leipſic. He next went to Leyden, and ſtudied the algebra of Vieta under the celebrated James Golius, with whom he contracted an intimate friendſhip. On his return to Leipſic, he obtained ſo high a reputation in teaching the mathematics, that he was nominated preceptor to the young prince of Gotha, the eldeſt ſon of the duke of Saxe-Gotha. In 1665 he accepted an invitation to fill the mathematical chair at the univerſity of Kiel, and having firſt paid a viſit to Leyden, he was there admitted to the degree of doctor in civil law. In a few years afterwards he was appointed profeſſor extraordinary of civil law, in 1683 profeſſor in ordinary of the Inſtitutes, and in 1692 profeſſor of the code of Juſtinian. He died in 1714, in the 80th year of his age. He tranſlated the works of Euclid into the German language, illuſtrating the geometrical with algebraical demonſtrations, wherever they would admit of it; and he publiſhed, among many other works, a learned work entitled "Matheſis Biblica;" and a very curious "Diſſertation concerning the Inſcription on the Croſs of Jeſus Chriſt, and the Hour of his Crucifixion." Moreri.

REYN, JAN DE, or RHENI, called alſo *Lang Jan*, was an artiſt of very conſiderable merit, a diſciple, and ſkilful imitator, of Vandyke; to whom he was ſo much attached that he followed him to London, and remained ſome time with him. He was born at Dunkirk in 1610; and he ſo effectually benefited by the inſtructions of Vandyke, that his pictures are frequently ſold for thoſe of that maſter. But as he, in general, painted hiſtory more than portrait, he has a freer line in compoſition, though not ſo correct a one as his maſter. His works are ſcarce, though he lived to the age of 68, but their apparent ſcarcity is poſſibly owing to ſo many of them being imputed to Vandyke. Among the works which are indiſputably his, are mentioned the Baptiſm of Totila, which is in a church at Dunkirk; and a grand altar-piece in the pariſh church of St. Martin, at Bergues, repreſenting Herodias bringing the head of St. John to Herod. He died in 1678.

REYNA, CASSIODORUS DE, celebrated for being the firſt tranſlator of the whole bible into the Spaniſh language, and on this account he is noticed, though we have no particulars concerning his life. To his tranſlation he introduced notes explanatory and critical. The place where this verſion was printed is not mentioned in the title-page, though, from ſome typographical marks, it may be aſcertained pretty correctly that it was at Baſil; and as the author was probably a Proteſtant, he thought proper to conceal his name, that it might not prevent his work from being received among the Spaniſh Catholics, and it has only his initials R. C. to a Latin preface, recommending it to the kings, princes, and nobles of Europe, and particularly of the Roman empire. The date is 1569, and it is entitled "La Biblia, Que Es, Los Sacros Libros Del Vieio y Nuevo Teſtamento. Tranſladada en Eſpagnol." The firſt edition of this verſion is now very ſcarce. Moreri.

REYNEAU, CHARLES RENÈ, an eminent French mathematician, was born at Briſſac, in the province of Anjou, in the year 1656. At the age of twenty, he took up his reſidence in the houſe belonging to the congregation of the Oratory at Paris, without any intention of entering into the community. His object was to enjoy the advantages in ſtudy which that celebrated order afforded for improvement in literature. In a ſhort time, however, a change took place in his mind, and he became a member of the houſe. He became ſtrongly attached to the ſcience of geometry, and in 1683 he was appointed to a mathematical profeſſorſhip at Angers: this poſt he retained 22 years with extraordinary reputation. In this ſituation he undertook to reduce into one body, for the uſe of his ſcholars, the principal theories ſcattered through the writings of Deſcartes, Leibnitz, Bernouilli, the Leipſic Acts, the Memoirs of the Paris Academy of Sciences, and other works. The fruit of this undertaking, entitled "The Analyſis demonſtrated, &c." he publiſhed at Paris in the year 1708, in two vols. 4to. He aſſumed this title for his work becauſe it contained demonſtrations of ſeveral methods of analyſis which had not been demonſtrated by the authors of them, or, at leaſt, not with ſufficient perſpicuity and exactneſs. By ſupplying what was left undone by other perſons, he rendered ſo ſignal a ſervice to mathematical ſtudents, that it became a maxim, at leaſt in France, that to follow father Reyneau was the beſt way to make much progreſs in mathematics. Hence he was eſteemed the Euclid of the ſublime geometry. His great work was reprinted in 1738. In the year 1714 he drew up an elementary work on the ſubject, under the title of "The Science of Calculation, &c." which was moſt favourably received. This came out in one volume, and he had prepared materials for a ſecond, which did not make its appearance till after the author's death. In 1716 the Royal Academy of Sciences at Paris admitted ſome new members, under the deſignation of "free aſſociates:" father Reyneau was of that number, and he frequently aſſiſted at their meetings. He died in 1723, at the age of 72, regretted as well for his many virtues, as for profound and extenſive learning. The firſt men in France for talents deemed it an honour to count Reyneau among their friends. In this number was father Malebranche, of whom Reyneau was a zealous diſciple. He left behind him a treatiſe on "Logic, or the Art of Reaſoning," which was publiſhed in 1745. Moreri.

REYNEL, in *Geography*, a town of France, in the department of the Upper Marne; 12 miles W. of Bourmont.

REYNESBURCH, a town of Holland; three miles N.W. of Leyden.

REYNOLDS,

REYNOLDS, *Sir* JOSHUA, *Knt.*, in *Biography*, was the ſon of the Rev. Samuel Reynolds, rector of Plympton, near Plymouth, in Devonſhire, and was born there, on July 16, 1723; the tenth of eleven children, five of whom died in their infancy. He was, for ſome time, inſtructed in the claſſics by his father, and was intended for the practice of phyſic; but he began, at a very early age, to diſplay an inclination for the art in which he ſubſequently made ſo diſtinguiſhed a figure. At eight years of age he made himſelf ſo far maſter of perſpective, as to draw his father's bookcaſe according to rule, and, encouraged by his affectionate parent, amuſed himſelf by copying prints that he found in books, and particularly thoſe in Jacob Kat's emblems. From theſe early labours the tranſition was eaſy to the attempt at drawing likeneſſes of his friends, and in theſe he obtained tolerable ſucceſs. Richardſon's Treatiſe on Painting was then put into his hands, and, according to his own report, he was, by that work, ſtimulated to the greateſt degree of enthuſiaſm for the art of painting, and led to regard its profeſſors, particularly Raphael, as among the greateſt and moſt illuſtrious of men, either in ancient or modern time. After he had ſpent ſome time practiſing in the neighbouring country, his parents were induced, by the advice of a Mr. Cranch, to ſend him to London, as the place beſt calculated to improve talents ſuch as he had ſo decidedly exhibited; and accordingly, in October 1741, he firſt viſited the capital, and was immediately placed with Mr. Hudſon, the moſt renowned portrait painter of that time, in order to acquire the firſt rudiments of this art.

Whatever was the cauſe, whether, as it is ſaid, Hudſon became jealous of the ability of his pupil, or, as is equally probable, the pupil became diſguſted with the want of taſte exhibited by his maſter, in little more than two years they diſagreed, and young Reynolds returned to his father, and again employed himſelf in painting his friends. Many of theſe early productions of his pencil are ſtill to be ſeen in the town and neighbourhood of Plymouth, and ſome of them poſſeſs very conſiderable merit, and indicate his future proweſs. One of them, particularly, of a boy reading in reflected light, 30 years afterwards, excited ſurprize in his own mind, and an expreſſion of regret that, in ſo many years, he ſhould have made ſo little progreſs in his profeſſion. He is ſaid to have lamented having paſſed this period of his life in the way he had done; moſt probably, however, that regret alludes to his abſence from London, where he would moſt undoubtedly have ſeen more of the art, and learnt more of its practice, than elſewhere. But perhaps it was a fortunate occurrence that he was removed to a ſtation where he had to rely upon his own emotions, unbiaſſed by the groſs and barbarous taſte which then prevailed; ſince, guided by thoſe emotions, he attempted to follow the dictates of nature, untrammelled by the pedantry of amateurs, and the low ignorance of the greater part of the profeſſors of the day.

Finding his practice increaſing, he took a houſe at Plymouth Dock, and there became known to the family of Mount Edgecumbe, by whom he was warmly patronized, and recommended to captain (afterwards lord) Keppel, who carried him to Italy in 1749; and it would appear, from a letter of his to lord Mount Edgecumbe, written when he was in Rome, that that noble lord defrayed the expence of his reſidence there. The courſe of his ſtudies during the three years that he ſpent there, is not preciſely known. He made ſome few copies of figures and heads from the works of Raphael, but that does not appear to have been a favourite mode of ſtudy with him, for in one of his lectures he has ſaid, "the man of true genius, inſtead of ſpending all his hours, as many artiſts do while they are at Rome, in meaſuring ſtatues, and copying pictures, ſoon begins to think for himſelf, and endeavours to do ſomething like what he ſees. I conſider general copying as a deluſive kind of induſtry; the ſtudent ſatisfies himſelf with the appearance of doing ſomething; he falls into the danger of imitating without ſelecting, and of labouring without any determinate object: as it requires no effort of the mind, he ſleeps over his work; and thoſe powers of invention and diſpoſition, which ought particularly to be called out and put in action, lie torpid, and loſe their energy for want of exerciſe. How incapable of producing any thing of their own, thoſe are, who have ſpent moſt of their time in copying, is an obſervation well known to all who are converſant in our art." That he reflected deeply on the great works of the ancient and modern maſters is evident, both from his pictures and writings; though the taſte with which he ſubſequently applied the knowledge he had acquired, proves the originality of his mind, and the extent of his genius.

Mr. Reynolds returned through Paris to England in October 1752, and after a ſhort time ſpent at his native place, to recruit his health, which had ſomewhat ſuffered by the journey, he fixed his ſettled reſidence in the metropolis; taking a houſe in St. Martin's-lane. He there painted, as his firſt eſſay, a head, from an Italian youth he had brought over with him, (Giuſeppe Marchi). He dreſſed it in a rich turban, and its execution excited ſo much attention, that his old maſter, Hudſon, was induced to go to ſee it, and carefully watched its progreſs: when, upon ſeeing at length no trace of his own manner left, and unable, or unwilling, to find any other merit in it, he exclaimed, "why Reynolds, you don't paint ſo well as you did when you left England!" Notwithſtanding this augural declaration, the pupil became the ſuperior favourite with the public; and Hudſon retiring, left him without a competitor.

In 1753, or 4, he took a large houſe in Newport-ſtreet, where he reſided for eight or nine years, and there he painted a whole length portrait of his friend commodore Keppel walking on the ſea-ſhore, which drew upon him univerſal admiration, and fixed him completely in the public eſteem. At this time his price was ten guineas for a head; in 1755 he raiſed it to twelve; and in 1758 to twenty guineas; and he afterwards, by degrees, advanced it to fifty; at which it remained till he declined practice; the price of a half length, during the latter period, being 100, and for a whole length 200 guineas.

To ſay that he was univerſally regarded as being at the head of the profeſſion of portrait painting at the time adverted to, cannot indeed be conſidered as any great praiſe, ſuch was its degraded condition; though Hudſon had certainly advanced above his immediate predeceſſors. Reynolds however, deſerved much more, for he united to a dignified characteriſtic reſemblance of the head, an endleſs variety of ſpirited and graceful attitudes, pictureſque back-grounds, novel and ſtriking effects of light and ſhade, with a voluptuous richneſs and harmony of colour, which certainly had never before been ſeen united to ſo many other qualities in that branch of the art. It muſt not, however, be underſtood, that his performances at that time poſſeſſed thoſe excellencies to the degree in which we find them in his latter works; for he was one of the few, whoſe efforts ended but with his life; who has been heard to ſay, that he never began a picture without a determination to make it his beſt; and whoſe unceaſing progreſs almoſt juſtified the maxim he was ſo fond of repeating continually, "that nothing is denied to well directed induſtry." Beſides his uncommon

aſſiduity,

affiduity, which was apparent to all, little information remains to us of the precife method of ftudy by which fuch extraordinary excellence was attained, except what may be collected from the following extract, made from fome papers left by him, and intended perhaps for infertion in another difcourfe; in which, as his biographer obferves, he fpeaks of his merits and defects with fingular modefty and candour. "Not having the advantage of an early academical education, I never had that facility of drawing the naked figure which an artift ought to have. It appeared to me too late when I went to Italy, and began to feel my deficiencies, to endeavour to acquire that readinefs of invention which I obferved others to poffefs. I confoled myfelf, however, by remarking, that thofe ready inventors are extremely apt to acquiefce in imperfection, and that if I had not their facility, I fhould, for this very reafon, be more likely to avoid the defect which too often accompanied it,—a trite and common-place invention. How difficult it is for the artift who poffeffes this facility to guard againft careleffnefs and common-place, is well known; and in a kindred art, Metaftafio is an eminent inftance, who always complained of the great difficulty he found in obtaining correctnefs, in confequence of his having been in his youth an *improvifatore*. Having this defect conftantly in my mind, I never was contented with common-place attitudes or inventions of any kind. I confidered myfelf as playing a great game; and inftead of faving money, I laid it out fafter than I got it, in purchafing the beft examples of the art that could be procured; for I even borrowed money for this purpofe. The poffeffing portraits by Titian, Vandyke, Rembrandt, &c. I confidered as the beft kind of wealth. By ftudying carefully the works of great maffers, this advantage is obtained: we find that certain niceties of expreffion are capable of being executed, which otherwife we might fuppofe beyond the reach of art. This gives us a confidence in ourfelves, and we are thus incited to endeavour at not only the fame happinefs of execution, but alfo at other congenial excellencies. Study, indeed, confifts in learning to fee nature, and may be called the art of ufing other men's minds. By this kind of contemplation and exercife, we are taught to think in their way, and fometimes to attain their excellence. Thus, for inftance, if I had never feen any of the works of Correggio, I fhould never, perhaps, have remarked in nature the expreffion which I find in one of his pieces: or if I had remarked it, I might have thought it too difficult, or perhaps impoffible, to be executed.

"My fuccefs and continual improvement in my art (if I may be allowed that expreffion), may be afcribed, in good meafure, to a principle which I will boldly recommend to imitation; I mean a principle of honefty, which in this, as in all other inftances, is, according to the vulgar proverb, certainly the beft policy. I always endeavoured to do my beft. Great or vulgar, good fubjects or bad, all had nature; by the exact reprefentation of which, or even by the endeavour to give fuch a reprefentation, the painter cannot but improve in his art.

"My principal labour was employed on the whole together, and I was never weary of changing and trying different modes and effects. I had always fome fcheme in my mind, and a perpetual defire to advance. By conftantly endeavouring to do my beft, I acquired a power of doing that with fpontaneous felicity, which at firft was the effort of my whole mind, and my reward was three-fold; the fatisfaction refulting from acting upon this juft principle, improvement in my art, and the pleafure derived from a conftant purfuit after excellence.

"I was always willing to believe that my uncertainty of proceeding in my works, that is, my never being fure of my hand, and my frequent alterations, arofe from a refined tafte, which could not acquiefce in any thing fhort of a high degree of excellence. I had not an opportunity of being early initiated in the principles of colouring; no man, indeed, could teach me. If I have never been fettled with refpect to colouring, let it at the fame time be remembered, that my unfteadinefs in this refpect proceeded from an inordinate defire to poffefs every kind of excellence that I faw in the works of others: without confidering that there are in colouring, as in ftyle, excellencies which are incompatible with each other: however, this purfuit, or any fimilar one, prevents the artift from being tired of his art. We all know how often thofe maffers who fought after colouring changed their manner, while others, merely from not feeing various modes, acquiefced all their lives in that in which they fet out. On the contrary, I tried every effect of colour; and by leaving out every colour in its turn, fhewed every colour that I could do without it. As I alternately left out every colour, I tried every new one; and often, as is well known, failed. The former practice, I am aware, may be compared by thofe whofe firft object is ridicule, to that of the poet mentioned in the Spectator, who in a poem of 24 books, contrived in each book to leave out a letter. But I was influenced by no fuch idle or foolifh affectation; my ficklenefs in the mode of colouring, arofe from an eager defire to attain the higheft excellence. This is the only merit I can affume to myfelf from my conduct in this refpect."

His affiduity and love of his profeffion left him little leifure for country excurfions. Occafionally, however, he fpent a few days at his villa on Richmond-hill, and vifited, at different times, the feats of fome of the noblemen and gentlemen of his acquaintance, from whence he was always glad to return to the practice of his profeffion, and the enjoyment of that intellectual fociety, of which, like his friend Johnfon, he juftly confidered London as the head-quarters. He, very foon after he became fettled, perceived the advantage which one confined to the laborious duties of an arduous profeffion might derive from the fociety of literary men. Finding how little time he could fpare from his profeffion, for the purpofe of acquiring general knowledge from books, he refolved to partake as much as poffible of the benefits which might be drawn from the converfation of the learned and ingenious men of his time. In confequence of this, and of his cheerful and convivial habits, his table, for above thirty years, exhibited an affemblage of all the talents of Great Britain and Ireland; there being, during that period, fcarcely a perfon in the three kingdoms diftinguifhed for his attainments in literature or the arts, or for his exertions at the bar, in the fenate, or the field, who was not occafionally found there.

Soon after the return of fir Jofhua from Italy, he became acquainted with Dr. Johnfon, to whofe fuperior talents he was always proud to acknowledge his obligations; and in the paper we have before-mentioned, had expreffed his fenfe of the benefit he had derived from his fociety. When fpeaking of the value of affociating either perfonally or by ftudy with the truly great, he adds, "May I prefume to introduce myfelf as an inftance of the truth of what I have remarked. Whatever merit the difcourfes which I have had the honour of delivering from this place may have, it may in great meafure be imputed to the education which I may be faid to have had under Dr. Johnfon. I do not mean to fay, though it certainly would be to the credit of thefe difcourfes, if I could fay it with truth, that he

contributed

contributed even a ſingle ſentiment to them; but he qualified my mind to think juſtly. No man had, like him, the faculty of teaching inferior minds the art of thinking."—"The obſervations which he made on poetry, on life, and on every thing about us, I applied to one art; with what ſucceſs others muſt judge." The great leviathan of literature found in the mind of Reynolds a congenial purity and ſtrength, and became zealouſly attached to him; who, with ſuch a coadjutor, found but little difficulty in collecting around him a circle of the moſt able and uſeful members of ſociety. Many illuſtrious foreigners were perſonally intimate with him; and his friendſhip was ſought by individuals of the higheſt quality; who revered his genius as much as they reſpected the worth of his private character. From ſuch connections, his mind, rich in its own ſtores, received an acceſſion of moſt extenſive information, and an inexhauſtible treaſure for converſation. He had a mind ever open to acquire uſeful knowledge; a ſound and penetrating judgment to ſelect what he acquired, and great induſtry and application in rendering his acquirements uſeful.

The variety of talent he exhibited, and the conſequent eminence which he gained, qualified him to ſhare the honours of the firſt ſcientific inſtitutions. He was accordingly admitted to the Royal, the Antiquarian, and the Dilletanti Societies; and when the late lord North was inſtalled chancellor of the univerſity of Oxford, in July 1773, ſir Joſhua was admitted to the honorary degree of doctor in civil law. He had previouſly, in 1769, been elected to the preſidency of the Royal Academy, in the formation of which he had a principal ſhare, and had, upon the occaſion, been honoured by his majeſty with the rank of knighthood. To this inſtitution he was a moſt invaluable member, and repaid the honour and fame he acquired from his ſituation in it, by a zealous attention to its intereſts. Nor did the Academy derive leſs credit from the admirable works which he continued yearly to exhibit in it, conſiſting indeed chiefly of portraits, though he rarely ſuffered a ſeaſon to paſs in which he did not bring forwards one or more ſpecimens of his powers in hiſtory. From the year 1769, when, as we have ſaid, the academy was founded, till 1790, incluſive, it appears that he ſent no leſs than 244 pictures to the exhibition.

The taſk of reading lectures was no part of the preſcribed duty of his office: but impoſed voluntarily upon himſelf for the following reaſons, aſſigned by him in his fifteenth diſcourſe. "If prizes were to be given, it appeared not only proper, but almoſt indiſpenſably neceſſary, that ſomething ſhould be ſaid by the preſident on the delivery of thoſe prizes; and the preſident, for his own credit, would wiſh to ſay ſomething more than mere words of compliment: which, by being frequently repeated, would ſoon become flat and unintereſting; and by being uttered to many, would at laſt become a diſtinction to none. I thought, therefore, if I were to preface this compliment with ſome inſtructive obſervations on the art, when we crowned merit in the artiſts whom we rewarded, I might do ſomething to animate and guide them in their future attempts." To the exertions which this moſt judicious ſenſe of propriety ſtimulated him to make, he is indebted, principally, for his renown as an author. In the courſe of twenty-one years, *viz.* from 1769 to 1790, incluſive, he compoſed fifteen diſcourſes; replete with the ſoundeſt principles, and the moſt uſeful information concerning the art he practiſed, that ever have been given to the world. In which, though it muſt be acknowledged that there are ſome few points not ſufficiently explained, yet they are free from the affected rant of connoiſſeurſhip, and practically efficient to guide the young, whilſt it confirms the more advanced, in purſuit of the juſt objects of the art of painting, and the ſureſt means of obtaining ſucceſs. Beſides theſe, he wrote three papers for the Idler, in 1759; *viz.* Nos. 76, 79, and 82; in which is exhibited his original turn of thinking on the nature and properties of beauty and of art: and in 1783, his notes to Maſon's tranſlation of Du Freſnoy's poem on Painting, gave to the world many practical obſervations and explanations of the rules laid down in the text, which convey inſtruction of the moſt uſeful kind, and tend to ſhew how carefully, and how ſyſtematically, his mind was made up on the ſubject.

It has been conjectured, and widely diffuſed in opinion, that ſir Joſhua did not compoſe his lectures himſelf. In ſupport of what is due to him on that head, Mr. Northcote, who lived ſome years in his houſe, has ſaid in his memoirs, "At the period when it was expected he ſhould have compoſed them, I have heard him walking at intervals in his room till one or two o'clock in the morning, and I have on the following day, at an early hour, ſeen the papers on the ſubject of his art which had been written the preceding night. I have had the rude manuſcript from himſelf, in his own handwriting, in order to make a fair copy from it for him to read in public: I have ſeen the manuſcript alſo after it had been reviſed by Dr. Johnſon, who has ſometimes altered it to a wrong meaning, from his total ignorance of the ſubject and of art; but never, to my knowledge, ſaw the marks of Burke's pen in any of the manuſcripts.

"The biſhop of Rocheſter, alſo, who examined the writings of Mr. Burke ſince his death, and lately edited a part of them, informed a friend that he could diſcover no reaſon to think that Mr. Burke had the leaſt hand in the diſcourſes of Reynolds." And Burke himſelf, in a letter to Mr. Malone, after the publication of ſir Joſhua's life and works, ſays, "I have read over ſome part of the diſcourſes with an unuſual ſort of pleaſure, partly becauſe being faded a little in my memory, they have a ſort of appearance of novelty; partly by reviving recollections mixed with melancholy and ſatisfaction. The Flemiſh journal I had never ſeen before. You trace in that, every where, the ſpirit of the diſcourſes, ſupported by new examples. He is always the ſame man; the ſame philoſophical, the ſame artiſt-like critic, the ſame ſagacious obſerver, with the ſame minuteneſs, without the ſmalleſt degree of trifling." We may ſafely ſay, this is not the language of one who had himſelf contributed much to thoſe diſcourſes. And if neither Johnſon nor Burke wrote for Reynolds, to whom elſe among his contemporaries ſhall the praiſe due to thoſe invaluable compoſitions be given, if Reynolds is to be deprived of it!

It is much to be lamented, that the world was deprived of this great artiſt before he had put into execution a plan which his biographer, Mr. Malone, ſays appears, from ſome looſe papers, to have been revolved in his mind. "I have found," ſays that author, "among ſir Joſhua's papers, ſome detached and unconnected thoughts, written occaſionally, as hints for a diſcourſe, on a new and ſingular plan, which he ſeems to have intended as a hiſtory of his mind, ſo far as concerned his art; and of his progreſs, ſtudies, and practice; together with a view of the advantages he had enjoyed, and the diſadvantages he had laboured under, in the courſe that he had run: a ſcheme, from which, however liable it might be to the ridicule of wits and ſcoffers, (of which, he ſays, he was perfectly aware,) he conceived the ſtudents might derive ſome uſeful documents for the regulation of their own conduct and practice." Such a compoſition, from ſuch a man, written after he had ſpent a long life in ſucceſsful practice, with none to guide him; who had choſen a line of art for himſelf, ſtamped with originality; and in which he had to develope

develope principles, and elucidate them by practice; and competent as he was to explain the operations of his own mind; could not fail of being interesting and useful in the highest degree. One of these detached ideas we have quoted above, and lament that any of them should be withheld from publication.

In 1781, during the summer, he made a tour through Holland and the Netherlands, with a view of examining critically the works of the celebrated masters of the Dutch and Flemish schools. An account of this journey, written by himself, containing much excellent criticism on the works of Rubens, Vandyke, Rembrandt, &c. in the churches and different collections at Antwerp, Brussels, Ghent, the Dusseldorf gallery, and at Amsterdam, was published after his death; it concludes with a masterly drawn character of Rubens.

In 1783, in consequence of the emperor's suppression of some religious houses, he again visited Flanders, purchased some pictures by Rubens, and devoted several more days to the contemplation and further investigation of the performances of that great man. On his return, he remarked that his own pictures wanted force and brilliancy, and appeared, by his subsequent practice, to have benefited by the observations he had made. This year, on the death of Ramsay, he was made principal painter in ordinary to his majesty, and continued so till his death.

For a very long period he had enjoyed an almost uninterrupted state of good health, except that in the year 1782 he was for a short time afflicted with a paralytic stroke. A few weeks, however, perfectly restored him, and he suffered no inconvenience from it afterwards. But in July 1789, whilst he was painting the portrait of lady Beauchamp, he found his sight so much affected, that it was with difficulty he could proceed with his work; and notwithstanding every assistance that could be procured, he was in a few months totally deprived of the use of his left eye. After some struggles, he determined, lest his remaining eye should also suffer, to paint no more: and though he was thus deprived of a constant employment and amusement, he retained his usual spirits, and partook of the society of his friends with apparently the same pleasure to which he had been accustomed; and was amused by reading, or hearing others read to him. In October 1791, however, his spirits began to fail him, and he became dejected, from an apprehension that an inflamed tumour, which took place over the eye that had perished, might occasion the destruction of the other also. Meanwhile he laboured under a more dangerous disease, which deprived him both of his spirits and his appetite. During this period of great affliction to all his friends, his malady was by many supposed to be imaginary, and it was erroneously conceived, that by exertion he might shake it off; for he was wholly unable to explain to the physicians the nature or seat of his disorder. It was only about a fortnight before his death that it was found to be in the liver; the inordinate growth of which, as it afterwards appeared, had incommoded all the functions of life. Of this disease, which he bore with great fortitude and patience, he died, after a confinement of three months, at his house in Leicester-square, on Thursday evening, February 23, 1792, at the age of 69.

In stature, sir Joshua Reynolds was rather under the middle size, of a florid complexion, roundish, blunt features, and a lively pleasing aspect; not corpulent, though somewhat inclined to it; and extremely active. With manners uncommonly polished and agreeable, he possessed a constant flow of spirits, which rendered him at all times a most desirable companion: always ready to be amused, and to contribute to the amusement of others, and anxious to receive information on every subject that presented itself: and though he had been deaf almost from the time of his return from Italy; yet, by the aid of an ear trumpet, he was enabled to partake of the conversation of his friends with great facility and convenience. On the 3d of March his remains were interred in the crypt of St. Paul's, near the tomb of sir Christopher Wren, with every honour that could be shewn to worth and genius by an enlightened nation; a great number of the most distinguished persons attending the funeral ceremony, and his pall being supported by three dukes, two marquisses, and five other noblemen.

In many respects, both as a man and a painter, sir Joshua Reynolds cannot be too much studied, praised, and imitated by every one who wishes to attain the like eminence. His incessant industry was never wearied into despondency by miscarriage, nor elated into neglect by success. Either in his painting-room, or wherever else he passed his time, his mind was devoted to the charms of his profession. All nature, and all art, was his academy, and his reflection was ever on the wing, comprehensive, vigorous, discriminating, and retentive. With taste to perceive all the varieties of the picturesque, judgment to select, and skill to combine what would serve his purpose, few have ever been empowered by nature to do more from the fund of his own genius: and none ever endeavoured more to take advantage of the labours of others. He made a splendid and useful collection, in which no expence was spared. His house was filled, to the remotest corners, with casts from the antique statues, pictures, drawings, and prints, by various masters of all the different schools. Those he looked upon as his library, at once objects of amusement, of study, and competition. After his death they were sold by auction, with his unclaimed and unfinished works, and, together, produced the sum of 16,947*l.* 7*s.* 6*d.* The substance of his whole property, accumulated entirely by his pencil, and left behind after a life in which he freely parted with his wealth, amounted to about 80,000*l.*

It remains to speak of his style as an artist, which is precisely that, denominated in his lectures the ornamental style; but which, beautiful and seducing as it undoubtedly is, cannot be recommended in so unreserved a degree as his industry both in study and practice: that which he characteristically terms his own uncertainty, both in design and in execution, operates too frequently and too powerfully against its entire adoption. In the higher attainments of the art, colouring and chiaro-scuro were undoubtedly elements which he favoured, and in which he moved uncontrolled. Drawing, as he himself candidly confessed, was the part of the art in which he was most defective; and from a desire perhaps to hide this defect, with an over-solicitude to produce a superabundant richness of effect, he was sometimes tempted to fritter his lights, and break up his composition, particularly if it happened to be large, into too many parts: yet, in general, his taste in lines and forms was at the same time grand and graceful; and the taste and skill with which he drew and set together the features of the human face, has never been surpassed by any artist. We would be understood to speak of his finest productions; of the ordinary class among them, we must allow, that the marking favours of manner, and the substance is not always characteristic of flesh.

In execution, though he wanted the firmness and breadth which appertain to the highest style of art, yet the spirit and sweetness of his touch were admirable, and would have been more remarkable, had he been more a master of drawing: but not being able readily to determine his forms, he was obliged to go over and over the same part, till some of the vivacity of his handling was frequently lost; his la-

bour, however, was never wholly ſo, for he added to the force and harmony of his pictures by theſe repetitions; and frequently attained graces by them which would otherwiſe perhaps have remained unknown.

The numberleſs inſtances in which he is known to have borrowed thoughts, both in actions of figures, and effect of colour, ſeem to impeach his power of invention. But ſurely it could not proceed from want of a ſufficient portion of that high and neceſſary quality, that he, who produced ſo many novel combinations, adopted that ſhort-hand path to compoſition. We ſee it exemplified in a ſuperior degree in moſt of his principal productions; and particularly in his whole length and half length portraits; the arrangements of which are no leſs beautiful and intereſting, than new, and entirely his own. Theſe are compoſed in a taſte far ſurpaſſing all that had ever been done by his predeceſſors; uniting the grandeur, ſimplicity, and fulneſs of Titian, and the grace and nature of Vandyke, with the artful and attractive effects of Rembrandt.

Moſt probably he adopted that line of conduct from neceſſity; driven to it by the immenſe ſource of employment which his talents for portraiture ſhowered upon him. He had ſcarcely time to invent new actions or effects in all caſes, or to beſtow that ſtudy upon them which would have been requiſite, and therefore he ſatisfied himſelf by endeavouring to infuſe into thoſe he borrowed more elegance, more feeling, or more ſentiment. How effectually he did this, needs not here be mentioned. One quality he had, which no other painter that ever breathed ſhares with him in an equal degree, faſcination. The effect of his beſt pictures acts like a charm, and arreſts the taſteful beholder with irreſiſtible power. On the works of others we look with approbation, and ſometimes with feelings of admiration and delight, or even with a ſenſation of awe; but in thoſe of Reynolds there is generally an indeſcribable unity and amenity, which act upon us with moſt faſcinating power, and rivet the attention with ſuperior gratification. No real connoiſſeur can deny the exiſtence of this quality in his pictures, but wherein it ſpecifically dwells, it is not eaſy to diſcover or define. They are not laboured to perfect imitation, indeed they ſtop very far ſhort of that; yet they preſent a full image, with a degree of life and animation, that has rarely been diſplayed upon canvas. It is a dangerous doctrine to advance, and may be abuſed; but, perhaps, this power may be in great meaſure owing to his having painted leſs upon ſyſtem, than from feeling; and the latter governing the exerciſe of his pencil, not to the neglect of, but in a ſuperior degree to the influence of the former, neceſſarily imbued his works with a glow of nature; which, it will be allowed, attracts beyond the power of art. Whenceſoever this faſcination, of which we ſpeak, proceeds, it muſt be acknowledged, that no painter ever poſſeſſed it like Reynolds.

His hiſtorical works are but few. Thoſe, however, exhibit a power, of which it is fair to ſay, that if it had been early cultivated, and kept in employment, he would moſt probably have rivalled the great names of antiquity. His poetic and fancy ſubjects are treated with originality, variety, taſte, and ſentiment.

The ſenſe of his extraordinary talents was revived and ſtrengthened to its proper medium, by a moſt juſt and pleaſing tribute paid to his memory in the courſe of the year 1813: *viz.* a public exhibition of a ſelection of his works at the gallery of the Britiſh Inſtitution, Pall Mall. About 150 pictures, productions of his eaſel, collected from various poſſeſſors, were arranged for the inſpection of the public; and preſented an aſſemblage of taſte and genius, ſuch as we conceive no other country in the world could boaſt. At leaſt in an equal number of any other artiſt's productions, ſo pleaſing a combination of the beauties of the art of painting could no where be found: and theſe were but a ſmall proportion, indeed, of the number of pictures which he painted. There are engravings from upwards of 700 of his works, and a vaſt number of others have evidently never been under the engraver's hands. The idea of this token of reſpect to our great artiſt originated in converſation at the annual dinner of the Royal Academy, in 1812; when, upon its being propoſed to his royal highneſs the prince of Wales, who was preſent, he entered moſt cordially into it, and profeſſed his readineſs to lend his own pictures for the purpoſe. The exhibition being prepared, it was opened on Saturday, the 11th of May, when the members of the inſtitution gave a grand dinner to a large portion of the nobility and the members of the Royal Academy, which was honoured by the preſence of the prince regent. After the dinner the rooms were illuminated by lamps, and the company increaſed and adorned by the admiſſion of ladies, many of whom had been the happy ſubjects of his ingenious pencil: for he is ſaid to have preſerved to poſterity the features of three generations of the beauty and faſhion of the country.

The pleaſure afforded to the country at large by this exhibition was teſtified by the immenſe concourſe of people that flocked to behold and admire, during the whole time of its remaining open. So that the funds of this excellent inſtitution were well repleniſhed, its object of exalting the honour of the artiſt and his profeſſion moſt amply effected, and the country itſelf exalted in the eſtimation of the world, by this effective diſplay of native power in an art, the neglect of which had been the ſource of obloquy upon our climate, as it continues, notwithſtanding and more juſtly, ſtill to be upon our government.

We ſhall conclude our account of this great and valuable man, by quoting part of an eulogium written by his friend Mr. E. Burke a few hours after the melancholy event, which it commemorates, had taken place. "He poſſeſſed," ſaid that clear inveſtigator of character, "the theory, as perfectly as the practice, of his art. To be ſuch a painter, he was a profound and penetrating philoſopher.

"In full affluence of foreign and domeſtic fame, admired by the expert in art, and by the learned in ſcience, courted by the great, careſſed by ſovereign powers, and celebrated by diſtinguiſhed poets, his native humility, modeſty, and candour, never forſook him, even on ſurprize or provocation; nor was the leaſt degree of arrogance or aſſumption viſible to the moſt ſcrutinizing eye, in any part of his conduct or diſcourſe.

"His talents of every kind, powerful from nature, and not meanly cultivated by letters, his ſocial virtues in all the relations and all the habitudes of life, rendered him the centre of a very great and unparalleled variety of agreeable ſocieties, which will be diſſipated by his death. He had too much merit, not to excite ſome jealouſy; too much innocence, to provoke any enmity. The loſs of no man of his time can be felt with more ſincere, general, and unmixed ſorrow.

"Hail! and Farewell!"

Reynolds' *Iſland*, in *Geography*, a ſmall iſland in the Florida Stream. N. lat. 24°. W. long. 81° 30′.

REYNOSA, a town of Spain, in Old Caſtile; 35 miles N.W. of Frias.

REYOOR, a town of Hindooſtan, in the circar of Condapilly; 15 miles S.E. of Condapilly.

REZ,

REZ, a river of Ruſſia, which runs into the Irbit. N. lat. 57° 50′. E. long. 62° 34′.

REZEMICO, a town of Italy, in the department of the Lario; 20 miles N. of Como.

REZITZA, a town of Ruſſia, in the government of Polotſk; 72 miles N.N.W. of Polotſk. N. lat. 56° 25′. E. long. 27° 4′.

REZZATO, a town of Italy, in the department of the Mela; 4 miles E. of Breſciz.

REZZLE, a term provincially ſignifying the weezle.

RHA, in *Botany*, ῥα, or ῥᾶ, of Dioſcorides, "which ſome," ſays he, "call ῥῆον," is deſcribed by that ancient writer as the produce of the countries above the Boſphorus, from whence it was brought to Greece. "The root is black externally, like the Greater Centaury, but ſmaller, and internally of a more reddiſh hue, deſtitute of odour, looſe, fungous, and rather light." He proceeds to deſcribe its flavour and virtues. The plant of Dioſcorides has generally been ſuppoſed one of the rhubarbs of the ſhops, which acquired, ſubſequently to his time, the name of *Rha-barbarum*, becauſe it was procured from countries deemed barbarous by the Greeks and Romans. What preciſe ſpecies of RHEUM (ſee that article) it might be, we preſume not to determine. Sometimes it has been termed *Rhapontícum;* though the latter appellation has alſo been beſtowed on a ſpecies of *Centaurea*, which Dodonæus and others have thought to be the true ancient *Rha*, or *Rheum*, and which Linnæus, therefore, names *Centaurea Rhapontica*.

RHAAD, in *Ornithology*, a ſpecies of *Otis*; which ſee.

RHABARBARUM, in *Botany*. See RHA.

RHABDOIDES, Ῥαβδοειδής, formed from ῥάβδος, *rod*, or *ſtaff*, and εἶδος, *form*, in *Anatomy*, a name given the ſecond true future of the ſkull, called alſo the *ſagittal future*.

RHABDOLOGY, or RABDOLOGY, in *Arithmetic*, a name ſometimes given to the method of performing the two moſt difficult and operoſe rules, *viz.* multiplication and diviſion, by the two eaſieſt, *viz.* addition and ſubtraction, by means of two little rods or laminæ, on which are inſcribed the ſimple numbers, and which are to be ſhifted according to certain rules.

Theſe rods are what we popularly call *Nieper's bones*, from their inventor, a Scottiſh baron, who likewiſe invented logarithms. For their deſcription and uſe, ſee NIEPER's *Bones*.

RHABDOMANCY, an ancient method of divination, performed by means of rods or ſtaves.

Whence its name, from the Greek ῥάβδος, *rod*, and μαντεία, *divination*.

St. Jerom makes mention of this kind of divination, in his commentary on Hoſea, ch. iv. 12. The ſame he finds again in Ezekiel, xxi. 21, 22.

If it be the ſame kind of divination that is mentioned in the two paſſages, rhabdomancy muſt have been alſo the ſame ſuperſtition with belomancy.

In effect, the two are ordinarily confounded. The Seventy themſelves tranſlate the חצים of Ezekiel, by ῥάβδος, *a rod;* though in ſtrictneſs it ſignifies an *arrow*.

This however is certain; the inſtruments of divination mentioned by Hoſea are different from thoſe of Ezekiel.

In the former it is עצו, *etſo*, מקלו, *maklo*, his *wood*, his *ſtaff;* in the latter, חצים, *hhitſim*, *arrows*. Though it is poſſible they might uſe rods or arrows indifferently; or the military men might uſe arrows, and the reſt rods. It appears by the laws of the Friſones, that the ancient inhabitants of Germany practiſed rhabdomancy The Scythians were likewiſe acquainted with the uſe of it; and Herodotus obſerves (lib. iv.) that the women among the Alani ſought and gathered together fine ſtraight rods or wands, and uſed them in the like ſuperſtition.

RHABDONALEPSIS, Ῥαβδονάλημψις, among the Greeks, the Reception or Elevation of the Rod, a feſtival kept every year in the iſland of Cos, at which the prieſts carried a cypreſs-tree.

RHABDOPHORI, Ῥαβδοφόροι, among the Greeks, officers appointed to preſerve peace and good order, and to correct the unruly at their public games.

RHABDUS, Ῥάβδος, among the *Ancients*, the iron rod with which the boys rolled the trochus.

RHACHITIS, in *Surgery*. See RACHITIS and RICKETS.

RHACOMA, in *Botany*, a name adopted by Linnæus from Pliny, and applied to the genus called by Browne *Croſſopetalum*, but which proves not diſtinct from MYGINDA; ſee that article. The real *Rhacoma* of Pliny appears, by his copious account of its characters and qualities, to be ſome kind of rhubarb (ſee RHA and RHEUM); nor do we pretend to account for the Linnæan application of the name.

RHACOSIS, from ῥάκος, *a rag*, in *Surgery*, a ragged, excoriated, and relaxed ſtate of the ſcrotum.

RHADAMANTHUS, in *Mythology*, one of the three judges or ſovereigns of Hades, or the inviſible world, to whom was aſſigned Tartarus, as Erebus was to Minos, and Elyſium to Æacus. He was the brother of Minos, and the ſon of Jupiter and Europa; and is ſaid to have been preferred to the honour of preſiding over Tartarus, on account of the diſtinguiſhed wiſdom and juſtice of his adminiſtration.

According to Plato, Æacus judged the Europeans; and Rhadamanthus, who had left Crete, and fixed his reſidence in Aſia, had the Aſiatics for his lot, among whom were alſo comprehended the Africans. The ſtern Rhadamanthus ſuperintends in Tartarus the execution of the ſentences which his brother Minos pronounces, after ſhaking the fatal urn in which are contained the deſtinies of all mortals. The office of Rhadamanthus is deſcribed by Virgil, Æneid, lib. iv.

"Gnoſſius hæc Rhadamanthus habet duriſſima regna
Caſtigatque auditque dolos, ſubigitque fateri,
Quæ quiſque apud ſuperos, furto lætatus inani
Diſtulit in ſeram commiſſa piacula mortem."

RHADAMISTUS, in *Entomology*, a ſpecies of *Scarabæus;* which ſee. It inhabits Tranquebar.

RHADEN, in *Geography*, a town of Weſtphalia, in the principality of Minden; 15 miles N.W. of Minden.

RHADES, a town of Africa, in the kingdom of Tunis, anciently called "Ades;" ſix miles S.E. of Tunis.

RHÆTEUM, or RHETEUM, in *Ancient Geography*, a promontory in the vicinity of Troy, on which was erected a tomb to Ajax, mentioned by Strabo (l. 13.) and other ancient writers. Horace indeed ſays (Sat. l. 2.) that this hero remained without burial; but he deviates from the truth, in alluſion to that incident in the tragedy of Ajax, where Sophocles feigns that Agamemnon was unwilling to allow the honours of burial to be conferred upon him, but that he yielded at length to the importunate intreaties of Teucer.

RHÆTIA, a country of Europe, which occupied part of the Alps, and was ſituated to the north of Italy, and to the eaſt of Helvetia. It is not eaſy to aſcertain its limits to the north, but we may ſay that it was bounded in that quarter by Vindelicia; and, in general, that it correſponded to the country

country of the Grisons, and to the cantons of Uri, Glaris, &c. as far as the "Brigantinus lacus," or lake of Constance: it extended also over the Tyrol. This country was called Western Illyricum, and was divided into Rhætia Prima or Propria, and Secunda, extending towards Swabia, Bavaria, and Austria. This district was subjected to the Romans by Drusus, under the reign of Augustus. Soon afterwards Vindelicia took up arms in their favour, and Tiberius was sent against them, and reduced their country, so that the possessions of the Romans extended as far as the Danube. The whole of this extensive territory had borne the name of Rhætia; but under Dioclesian it was divided, as we have said, into Rhætia Prima and Secunda, the latter of which divisions was Vindelicia. Rhætia, Noricum, and some other territories, became a Roman province, and belonged to the kingdom of the Ostrogoths in Italy; but upon the declension of it, they fell under the dominion of the Franks, about which time the name of Bavarians first became celebrated in history. The principal rivers of Rhætia were the Rhenus or Rhine, the Athesis or Adige, the Oenus or Inn, the Ticinus or Tosin, and Addua. The most considerable places were Curia or Coira, at a small distance east of the Rhenus, and Tridentum or Trent, on the Athesis. Ptolemy, in his geography of Rhætia, reckons upon the Danube the following towns, *viz.* Bragodurum, Dracuina, Viana, and Phæniana; and towards the source of the Rhine, Tagahum, Brigantium, Ebodunum, Drusomagus, and Ectodurum.

RHAGADES, Ῥαγάδες, in *Surgery*, a Greek term used for the chaps or clefts in the lips, hands, anus, and other soft parts of the body.

Rhagades are a sort of fissures, and little chapped ulcers of the œdematous kind; formed of a sharp saline humour, and occasioning a great contraction and straightening of the part, which is by this means shrivelled up like a wet parchment, when held to the fire.

They are chiefly found on the fundament, the neck of the womb, the præputium, lips, &c. sometimes even in the mouth; in which case the patient is not able to speak, chew, or the like.

They are sometimes moist, and of a cancerous nature, eating deep, and difficult of cure; but they are more commonly of a less malignant tendency, being often in the anus the consequence of a diarrhœa, dysentery, or the like.

RHAGADIOLUS, in *Botany*, see LAPSANA; under the fourth species of which its etymology is given.

RHAGAURA, in *Ancient Geography*, a town of Asia, in Aria, between Siphara and Zamuchana. Ptolemy.

RHAGE, a word used by medical writers for a fissure or chap in any part. The stones of grapes are also by some called *rhages*; and by others the same word is made to express the extremities of the fingers or toes.

RHAGEA, in *Ancient Geography*, a town of Asia, in Parthia, near Appha, according to Ptolemy.

RHAGES, a town of Macedonia, on the banks of the river Peneus, about ten miles from Larissa, according to Livy.

RHAGIA, a town of Asia, in Babylonia, towards Arabia Felix, between Jamba and Chiriphe, according to Ptolemy.

RHAGIANA, a town of Gedrosia, near the "Portus Mulierum;" so called in the translation of Ptolemy; but in the text of Ptolemy it is called "Rapava."

RHAGODIA, in *Botany*, from ῥαξ, *a berry*, because its little pulpy fruit affords a principal mark of distinction between this genus and several others, to which it is nearly related.—Brown Prodr. Nov. Holl. v. 1. 408. Ait. Hort. Kew. v. 5. 440.—Class and order, *Polygamia Monoecia*, Brown; but we should rather say *Pentandria Digynia*, though some of the flowers are defective as to the stamens or the pistil. Nat. Ord. *Holeraceæ*, Linn. *Atriplices*, Juss. *Chenopodeæ*, Decandolle and Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, concave, permanent, in five deep ovate segments. *Cor.* none. *Stam.* Filaments five, awl-shaped, opposite to the segments of the calyx, and about as long; anthers roundish, two-lobed. *Pist.* Germen orbicular, depressed; styles two, divaricated, short; stigmas simple. *Peric.* Berry orbicular, depressed, encompassed underneath by the calyx. *Seed* solitary, the shape of the berry, "furnished with albumen, and a double coat." *Brown.*

Obs. Labillardiere and Brown describe some flowers as wanting the stamens, others the pistil, though the rest have both. In this polygamous character, but especially in the nature of the fruit, which is a true *bacca*, this genus differs from CHENOPODIUM, as well as from KOCHIA, and other neighbouring genera, of Mr. Brown; see those articles. The stamens are sometims fewer than five. *Brown.*

Ess. Ch. Calyx inferior, in five deep segments. Corolla none. Berry depressed, encompassed with the permanent calyx. Seed solitary, orbicular, depressed. Some male or female flowers are interspersed.

The species, all natives of New Holland, are generally shrubby, rarely herbaceous. *Leaves* almost always alternate, simple, often clothed with mealy powder. *Flowers* either spiked or conglomerated, destitute of *bracteas.*

1. R. *Billardieri.* (Chenopodium baccatum; Labill. Nov. Holl. v. 1. 71. t. 96.)—Shrubby, erect, without thorns. Leaves entire, linear-oblong or lanceolate, flat; powdery beneath. Spikes branched. Native of New South Wales, as well as of the southern coast of New Holland. *Stem* shrubby, branched, five feet or more in height, with round, leafy branches, striated when dry. *Leaves* stalked, spreading, an inch and a half, or two inches, long, and one-third of an inch broad, sharpish; tapering at the base. *Flowers* small, greenish, in terminal, much compounded, or panicled, spikes. *Berries* red, about the size of mustard-seed.

2. R. *crassifolia.*—Shrubby, erect, without thorns. Leaves entire, oval, or linear-oblong, fleshy, convex and powdery beneath. Spikes branched.—Gathered by Mr. Brown, on the south coast of New Holland.

3. R. *linifolia.*—Somewhat shrubby, decumbent. Leaves entire, linear-lanceolate, flat, stamens one or two. Found by the same botanist, in the tropical part of New Holland.

4. R. *hastata.* Ait. n. 1.—Somewhat shrubby, erect. Branches diffuse. Leaves nearly opposite, hastate, somewhat rhomboid, entire, very smooth. Spikes terminal, leafless.—Native of New South Wales, from whence it was sent to Kew by Mr. Peter Good, in 1803. This is a hardy shrub, flowering with us in June and July, and appears to be the only species of the genus before us, that has, as yet, been cultivated in England.

5. R. *parabolica.*—Shrubby, erect, without spines. Leaves triangular, obtuse, powdery. Spike branched.—Observed by Mr. Brown, on the south coast of New Holland, but without fruit.

6. R. *spinescens.*—Shrubby, erect; the young branches becoming spines. Leaves partly opposite, hastate, somewhat rhomboid, entire; powdery and hoary on both sides. Spikes simple.—From the south coast.

7. R. *nutans.*—Herbaceous, prostrate. Branches ascending when in fruit, drooping at the extremity. Leaves opposite, lanceolate-hastate, acute.—Gathered by Mr. Brown, on

on the ſouth coaſt of New Holland, as well as in Van Diemen's iſland.

RHAGOIDES, Ῥαγοειδης, in *Anatomy*, the ſecond coat or tunic of the eye; more uſually called uvea.

It has its name rhagoides, as reſembling a grape-ſtone.

In the tunica rhagoides is the hole called the pupil.

RHAHAANS, in *Hiſtory*, a name given to the prieſts of the Birman empire, to whom are aſſigned kioums, or convents; which are different in their ſtructure from common houſes, and much reſemble the architecture of the Chineſe. Theſe buildings are conſtructed of wood; the roof is compoſed of different ſtages, ſupported by ſtrong pillars; the inſide comprehends one large hall; the whole houſe is open at the ſides; ſome are curiouſly carved with various ſymbolic repreſentations of the divinity. There are no apartments for the private recreation of the Rhahaans; publicity being the prevailing ſyſtem of conduct among the Birmans, who admit of no ſecrets either in church or ſtate. From the number of convents in the neighbourhood of Rangoon, the Rhahaans and Phonghis, who are an inferior order of prieſts called Tallapoins, are preſumed by colonel Symes to exceed 1500; including in this eſtimate thoſe in their novitiate. The age of induction into theſe convents, is generally from eight to twelve years, and young perſons are introduced into them with great formality and ceremony. Parents vie with each other in obtaining this honour for their children, and ſpare no coſt on the occaſion of their admiſſion; the principal charge conſiſting in entertainments, and the cuſtomary preſents to the Rhahaans. When a boy is to be introduced into a convent, either as a temporary reſident, or with a view to future conſecration, his friends prepare their offerings of cloth, rice, preſerves, fruit, fans, cuſhions, mats, and houſhold utenſils. On an appointed day he parades the ſtreets, dreſſed in yellow, and mounted on a horſe richly capariſoned, led by two ſervants: a band of muſic goes before, and a party of Rhahaans encircle him: his male friends follow in a troop, and the females of their families bring up the rear, the latter carrying on their heads the offerings meant for the Rhahaans. Thus they proceed to the convent of which the novice is to become a member, where he is preſented in form to the ſenior of the brotherhood. This ceremony is repeated three times, and at each perambulation, freſh preſents are to be provided.

The Rhahaans, like the Carmelites, go barefooted, and have their heads cloſe ſhaven, on which they never wear any covering. Yellow is the only colour worn by the prieſthood: they have a long looſe cloak, which they wrap round them, ſo as to cover moſt part of the body; they profeſs celibacy, and to abſtain from every ſenſual indulgence. The preſcribed puniſhment for a Rhahaan detected in an act of incontinence is, expulſion and public diſgrace; the delinquent is ſeated on an aſs, and his face daubed with black paint interſperſed with ſpots of white; he is thus led through the ſtreets, with a drum beating before him, and afterwards turned out of the city: but ſuch inſtances of degradation are very rare. The juniors are reſtricted from wandering about licentiouſly, either by day or night. There is a prior in every convent, who has a diſcretionary power to grant permiſſion to go abroad.

The Rhahaans never dreſs their own victuals, holding it an abuſe of time to perform any of the common functions of life, which, ſo long as they occupy, muſt divert them from the abſtract contemplation of the divine eſſence. They receive the contributions of the laity ready cooked, and prefer cold food to hot. At the dawn of the morning they begin to perambulate the town, to collect ſupplies for the day: each convent ſends forth a certain number of its members, who walk at a quick pace through the ſtreets, ſupporting with the right arm a blue lackered box, in which the donations are depoſited; theſe uſually conſiſt of boiled rice mixed with oil, dried and pickled fiſh, ſweetmeats, fruit, &c. During their walk, they never caſt their eyes to the right nor to the left, but keep them fixed on the ground; they do not ſtop to ſolicit, and ſeldom even look at the donors, who appear more deſirous to beſtow, than the others to receive. The Rhahaans eat but once a day, at the hour of noon. A much larger quantity of proviſion being commonly procured than ſuffices for the members of the convent, the ſurplus is diſpoſed of, as charitably as it was given, to the needy ſtranger, or the poor ſcholars who daily attend them to be inſtructed in letters, and taught their moral and religious duties.

In the various commotions of the empire, colonel Symes ſays, that the Rhahaans take no active ſhare, nor do they publicly interfere in politics, or engage in war: by this prudent conduct they excite no reſentment: the Birmans and Peguers profeſſing the ſame religion, the conquerors, to whichſoever party they belonged, equally reſpected the miniſters of their faith. The head of the Rhahaans at Rangoon, called Seredaw, is treated with great veneration. He lives in a very handſome monaſtery half a mile from the town, on the road leading to Shoedagon, or temple. He is in no reſpect diſtinguiſhed, as to his outward appearance, from the common Rhahaans. He goes every day, at the ſame hour, to the temple, to offer his devotions, and performs the journey, which is about four miles, on foot. In his converſation with Symes he betrayed a worldly pride inconſiſtent with his years (being about ſeventy-five) and ſacred function: he announced, with much pomp, that he was the head of the church at Rangoon, and oſtentatiouſly diſplayed, engraven on iron plates, his ſacerdotal titles, which had been conferred on him by the preſent and the late king. Formerly there were nunneries of virgin prieſteſſes, who, like the Rhahaans, wore yellow garments, cut off their hair, and devoted themſelves to chaſtity and religion; but theſe were not long ago aboliſhed, as being injurious to the population of the ſtate. At preſent there are a few old women, who ſhave their heads, wear a white dreſs, follow funerals, and carry water to the convents; and theſe venerable dames are treated with ſome portion of reſpect. Symes's Ava, vol. ii.

RHAIADAR, or Rhayader, in *Geography*, a borough and market-town in the cwmwd of Glynn-Jeithon, cantref of Maelienydd (now called the hundred of Rhayader), county of Radnor, South Wales, is ſituated on the banks of the river Wye, at the diſtance of 20 miles N.W. from New Radnor, and 176 W.N.W. from London. This place is a borough by preſcription, and lays claim to a very high antiquity. It is governed by a bailiff, who is annually elected at a court-leet, held in the town-hall, at which alſo the burgeſſes are choſen by a town jury. Rhayader is one of the five contributary boroughs to return a repreſentative to ſerve in parliament for the town of New Radnor. This place was formerly of much greater conſequence and extent than at preſent. On Cefn-Ceido, about half a mile to the north-eaſt, is a tract of land, called Pant-yr-Eglwys, where, according to tradition, a church anciently ſtood, which was included within the precincts of the borough. The great ſeſſions for the county were at one time held here; and the county-court alternately met at New Radnor and Rhayader, till removed from the latter place to the town of Preſteigne, in the reign of Henry VIII. The gaol for the ſecurity of criminals then ſtood on a ſpot of ground now occupied by a Preſbyterian meeting-houſe; and the place of execution was at

at the north end of the town, near a houſe known by the appellation of Pen-y-Maes. At preſent Rhayader conſiſts of four ſtreets which interſect each other at right angles, and lie nearly parallel to the four cardinal points. In the wide ſpace formed by the interſection of theſe ſtreets ſtands the town-hall, which is a handſome building, rebuilt by ſubſcription in 1762. The church is a plain ſtructure, ornamented with a tower at one end; beſides which there is a place of worſhip for Preſbyterians and another for Methodiſts. The grammar-ſchool was erected A.D. 1793, and has an endowment for the education of a limited number of poor children. The borough of Rhayader is a diſtinct pariſh of itſelf, and is exempt from the payment of county rates. The market-day here is Wedneſday, weekly; and there are fairs on the 6th and 27th of Auguſt, 26th September, 14th October, and 3d December, for horſes, ſheep, and cattle; beſides three great markets in May. The chief ſupport of this town ariſes from the manufacture of woollens, principally flannel. According to the population returns of 1811, the pariſh contained 97 houſes and 446 inhabitants.

On an eminence to the N.W. of the town ſtood the ancient caſtle of Rhayader, which was erected, in the year 1178, by Rhys-ap-Gruffydd, prince of South Wales, in order to check the incurſions of the Normans, who, at that period, made great irruptions in the marches of Wales. In 1194, prince Rhys having been ſurprized and taken priſoner by his own ſons, this caſtle was beſieged and compelled to ſurrender to the ſons of Cadwalhon-ap-Madawe of Maelienydd, by whom it was fortified for their own uſe. In the year 1231, after Llywelyn, prince of North Wales, had taken and deſtroyed the caſtle of Montgomery, he marched hither, and viſited the caſtle of Rhayader with a ſimilar fate. It was rebuilt, however, and continued to be a place of defence till the civil wars in the ſeventeenth century, when it was diſmantled and totally deſtroyed; the foſſe by which it was ſurrounded being the only veſtige of it remaining at the preſent day. The tower, or citadel, ſtood in a direct line between the caſtle and the gaol, overlooking the river. The mount adjacent is ſtill denominated Tower-hill. Near this place a ſtone bridge is thrown over the Wye, which the Welſh call Rhaiadr-Gwy, in alluſion to the rumbling noiſe its impetuous waters make amidſt the rocks. The only religious houſe, recorded to have been ſituated at Rhayader, was a convent of Dominican, or Black friars, founded ſoon after their firſt arrival in England, A. D. 1221. This houſe was ſuppreſſed in the 31ſt year of king Henry VIII.

In the immediate vicinity of Rhayader, the ſcenery of the Wye is peculiarly grand. Raging in its rocky bed, this river is ſeen through the light foliage of impendent trees, ſometimes precipitating its waters over a bold ledge of rock, and ſometimes ſearching its way among protruding crags, in a contracted ſheet of gliſtening foam. The mountains by which the vale of Rhayader is environed, diſplay a wild and rugged character, and are noted, according to local tradition, as being the place of ſhelter in which king Vortigern eluded the ſearch of Hengiſt, after his alleged murder of the Britiſh nobles at Stonehenge. Theſe hills abound with various kinds of minerals, particularly lead and copper. There are ſeveral cairns in this neighbourhood, the moſt remarkable of which is that of Tommen Sant Ffraid, on the S.W. ſide of the town, in the pariſh of Cwm-y-dan-Ddwr, ſuppoſed to be the cemetery of Saint Fraid, the Popiſh tutelary ſaint of that pariſh. Carliſle's Topographical Dictionary of Wales, 4to. 1811. A Tour throughout South Wales and Monmouthſhire, by J. T. Barber, F.S.A. 8vo. 1803.

RHAIDR, a river which riſes in the E. part of Merionethſhire, North Wales, and runs into the Severn on the borders of Shropſhire.

RHAIR, a conſiderable river of Hindooſtan, which runs by the ſouth ſide of Shawpour. The ſtream, which is about 100 yards wide and four feet in depth, daſhes with great rapidity over a bed of rock; which prevents its being navigable for large boats. This river riſes in the hills and foreſts of Surgooja, and after being joined by the Bijool and Gutauin, falls into the Soane near Agowry.

RHAMNÆ, or RHANNÆ, in *Ancient Geography*, a people of India, in the mountains near the river Namadus. Ptolemy.

RHAMNI, in *Botany*, a natural order of plants in Juſſieu, being the 95th in his ſeries, or the 13th of his 14th claſs, and owing its name to the principal genus. See RHAMNUS.

See the character of the claſs under FICOIDEÆ. The order is thus defined.

Calyx inferior, of one leaf, with a definite number of ſegments in the limb. *Petals* five, rarely four or ſix, and very rarely wanting, inſerted into the upper part of the calyx, or into its diſk, either oppoſite to, or alternate with, its ſegments, and equal to them in number; ſometimes reſembling little ſcales, and furniſhed with claws; ſometimes united by their broad baſes. *Stamens* of the ſame number as the petals, and inſerted into the ſame part, either alternate with them, or oppoſite to them. *Germen* ſuperior, encompaſſed below with the diſk of the calyx. *Styles* either ſolitary, or of ſome definite number. *Stigmas* one or more. *Fruit* ſuperior; in ſome inſtances pulpy, either with many cells, or many nuts, the cells, or nuts, ſingle-ſeeded; in other caſes capſular, of many cells and many valves, the partitions from the middle of each valve, and the cells containing either one or two ſeeds. *Corculum* flat and ſtraight, ſurrounded with a fleſhy albumen. *Stem* arboreous or ſhrubby. *Leaves* either alternate or oppoſite, accompanied by *ſtipulas*, that are often very minute.

Section 1. *Stamens alternate with the petals. Fruit capſular. Staphylea; Euonymus;* and *Celaſtrus* of Linnæus; with *Polycardia* of Lamarck.

Sect. 2. *Stamens alternate with the petals. Fruit a drupa or berry.* Some genera of this ſection have the petals connected by their broad baſe.

Myginda; Goupia of Aublet, which is *Gloſſopetalum* of Schreber; *Rubentia* of Commerſon, certainly the ſame genus with Jacquin's *Elæodendrum*, as Juſſieu indeed ſuſpected; *Caſſine; Schrebera* of Linnæus, a genus founded altogether in error, as we ſhall explain in its proper place; *Ilex;* and *Prinos*.

Sect. 3. *Stamens oppoſite to the petals. Fruit drupaceous.*

Mayepea of Aublet, erroneouſly placed here, as belonging really to the *Jaſmineæ* (ſee MAYEPEA); *Samara; Rhamnus; Ziziphus; Paliurus;* the two laſt ſeparated from the Linnæan *Rhamnus*, by Juſſieu. See PALIURUS.

Sect. 4. *Stamens oppoſite to the petals. Fruit three-lobed.*

Colletia of Commerſon, Lamarck Illuſtr. t. 129; *Ceanothus; Hovenia;* and *Phylica;* to which is to be added LASIOPETALUM; ſee that article.

Sect. 5. *Genera akin to Rhamni, their germen moſtly ſuperior.*

Brunia of Linnæus, ſome of whoſe reputed ſpecies have the germen ſuperior, others inferior; and *Bumalda* of Thunberg.

Sect. 6. *Genera akin to Rhamni, but differing in having an inferior germen.*

Gouania; Plectronia, dubiouſly admiſſible here, as we have obſerved in its proper place; *Carpodetus* of Forſter;

Aucuba

Aucuba of Thunberg; and *Glossoma* of Schreber, which is Aublet's *Votomita*.

RHAMNOATZ, in *Geography*, a town of Sweden, in Westmannland; 20 miles N. of Stroemsholm.

RHAMNOIDES, in *Botany*, a name given by Tournefort, and others, to a genus of plants, called by Linnæus *hippophae*; which see.

RHAMNUS, in *Ancient Geography*, a borough of Attica, belonging to the Ajantide tribe, 60 stadia from Marathon, in a northerly direction from the Ægean sea, in a place where the land formed a small peninsula or Chersonesus. The houses were on the sea-coast; and upon an eminence was the temple of Nemesis, in which was a fine statue of the goddess, made by Phidias, of marble, which the Persians had brought from Paros for the purpose of forming a trophy, and which had been found in their camp after the battle of Marathon: the pedestal was adorned with four basso relievos, representing different subjects of Grecian history. Leda is also exhibited presenting Helena to her mother Nemesis. See NEMESIS.

RHAMNUS, in *Botany*, so called by the ancient Romans, and by the Greeks ῥάμνος; words derived, according to De Theis, from the Celtic *Ram*, a head or tuft of branches, which is the origin of the Latin *ramus*, &c. and of the French *Rame*, *ramier*, &c.—Linn. Gen. 105. Schreb. 142. addend. 823. Willd. Sp. Pl. v. 1. 1092. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 261. Prodr. Fl. Græc. Sibth. v. 1. 157. Ait. Hort. Kew. v. 2. 14. Juss. 380. Lamarck Illustr. t. 128. Gærtn. t. 106.—Class and order, *Pentandria Monogynia*. Nat. Ord. *Dumosæ*, Linn. *Rhamni*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, urceolate; its limb in five spreading, acute, equal, coloured segments; the base permanent. *Cor.* Petals five, minute, between the segments of the calyx, opposite to the stamens, converging. *Stam.* Filaments as many as the petals, awl-shaped; anthers small. *Pist.* Germen roundish; style thread-shaped, equal to the stamens; stigma in various divisions. *Peric.* Berry roundish, naked, divided into fewer cells than there are segments of the calyx. Seeds solitary, roundish, gibbous on one side, compressed on the other.

Obs. We follow Jussieu and Schreber (in his addenda) in our denomination of the different parts of the flower, instead of taking the calyx for a corolla, with Linnæus. The genera of PALIURUS and ZIZIPHUS, separated from the original Linnæan *Rhamnus*, will be found in their proper places. *Frangula* and *Alaternus* of Tournefort have no just pretensions to be removed from the present genus.

Ess. Ch. Calyx urceolate. Petals five, opposite to the stamens. Berry superior.

We shall briefly define the species which authors have retained in *Rhamnus*, adding some new ones. The whole are shrubby, sometimes climbing. *Leaves* simple, undivided, stalked, veiny; mostly alternate. *Flowers* lateral, small, green or yellowish; sometimes with only four segments, petals and stamens, and in that case often dioecious, or polygamous, as in the first section.

Section 1. *Branches armed with terminal thorns.*

1. R. *catharticus*. Purging Buckthorn. Linn. Sp. Pl. 279. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 1629. Woodv. Med. Bot. t. 114. Fl. Dan. t. 850. (R. solutivus; Ger. Em. 1337, with Clusius's figure of the following species. Spina infectoria; Matth. Valgr. v. 1. 143.)—Flowers four-cleft, polygamous. Leaves ovate. Stem erect. Berry with four seeds.—Native of woods and hedges throughout Europe, especially in moist situations. This is the white-thorn of the modern Greeks. A rigid bushy *shrub*, nearly smooth in every part; its branches terminating in strong thorns. *Leaves* serrated, with several lateral ribs. *Flowers* from the same buds as the leaves, yellowish-green, mostly, but not altogether, dioecious. *Stigma* four-cleft. *Berry* round, black, very purgative, when unripe affording a yellow dye.

2. R. *infectorius*. Turkey-berry Buckthorn, or Graine d'Avignon. Linn. Mant. 49. Willd. n. 2. Ait. n. 2. (R. catharticus minor; Arduin. Mem. 78. t. 14. R. solutivus minor; Ger. Em. 1337. Spina infectoria pumila prima; Clus. Hist. v. 1. 111.)—Flowers four-cleft, dioecious. Stem procumbent.—Native of the south of Europe. Frequent in rough stony places in Greece, and rightly considered by Dr. Sibthorp as the Λυκιον, *Lycium*, of Dioscorides. The unripe berries are much used for dyeing, and imported in great quantities into England. They are what give the yellow colour to Turkey leather, or yellow morocco. This shrub is very nearly related to the first species, but grows procumbent, not erect, and the *leaves* are smaller and narrower. Gerard observes, that the segments of the *calyx* are but the length of the tube; not longer, as in *catharticus*; and that the *stigmas* are two, reflexed. *Fl. Gallopr.* 462. The *stipulas* are linear; not awl-shaped, as in the former; but we dare not rely on that circumstance, without further examination.

3. R. *lycioides*. Box-thorn Rhamnus. Linn. Sp. Pl. 279. Willd. n. 3. Ait. n. 3. Cavan. Ic. v. 2. 66. t. 182. (R. tertius, fortè niger Theophrasti; Clus. Hist. v. 1. 110. R. tertius Clusii; Ger. Em. 1334.)—Leaves nearly linear, obtuse, entire.—Native of Spain; frequent on the limestone hills of Valentia. *Cavan.* Differs widely from both the former in the narrow and entire *leaves*, tapering down into their slender *footstalks*.

4. R. *Erythroxylon*. Red-wood Buckthorn. Pall. Ross. v. 1. p. 2. 26. t. 62, and t. 100. f. 8. Willd. n. 4.—Leaves linear-lanceolate, serrated, rather acute.—Native of dry rocky places in Siberia.—The strongly serrated and acute *leaves* distinguish this from the last. A variety with smaller, more finely serrated, *leaves*, is Pallas's *R. lycioides*, t. 63.

5. R. *oleoides*. Olive-leaved Buckthorn. Linn. Sp. Pl. 279. Willd. n. 5. Ait. n. 4. (R. secundus; Clus. Hist. v. 1. 110. Ger. Em. 1334.)—Leaves obovate, entire; reticulated with veins beneath.—Native of Spain, *Alstroemer*; of Barbary, *Desfontaines*; of the southern part of Greece, and the island of Milo, *Sibthorp*. The shorter obovate *leaves*, copiously reticulated with veins, especially at the back, differ materially from those of *lycioides*. The *fruit* moreover has a much shorter stalk, though it is not so perfectly sessile as in Clusius's figure, which nevertheless we cannot hesitate to refer to this species.

6. R. *prunifolius*. Plum-leaved Buckthorn. Sm. Prodr. Fl. Græc. Sibth. n. 549. (R. creticus, amygdali folio minori; Tourn. Cor. 41.)—Stem procumbent. Flowers flattish, four-cleft, dioecious. Leaves obovate, obtuse, crenate, naked.—Found on the higher mountains of Crete.—Like the last in habit, but distinguished by its crenate, or somewhat serrated, *leaves*. *Stem* depressed, or procumbent, with many entangled branches. The female *flowers* have occasional rudiments of *stamens*. *Style* cloven half way down. We find no figures referrible to this or the following.

7. R. *crenulatus*. Teneriffe Buckthorn. Ait. n. 5. Willd. n. 6.—Stem erect. Flowers three or four-cleft, dioecious. Leaves elliptic-oblong, bluntly serrated, permanent.—Native of the Canary islands; *Masson*. Brought in 1778 to Kew, where it blossoms in the greenhouse in March. A stout, erect, much-branched *shrub*. The *leaves* are finely reticulated beneath.

8. R. *saxatilis*. Rock Buckthorn. Jacq. Austr. t. 53. Linn. Sp. Pl. 1671. Willd. n. 7. Ait. n. 6. (R. solutivus

tivus pumilus; Ger. Em. 1337. Spina infectoria pumila secunda; Cluf. Hift. v. 1. 112.)—Stem fpreading. Flowers four-cleft, dioecious. Leaves obovate, acute, ferrated, deciduous.—Native of Auftria, Switzerland, Italy, and Greece. The rigid branched *ftems* are more fpreading or diffufe than thofe of *R. crenulatus*; the *leaves* deciduous, much lefs evidently reticulated. The *flowers* are pale yellow. *Stigma* in two deep acute divifions. *Berries* black.

9. R. *theezans*. Tea Buckthorn. Linn. Mant. 207. Willd. n. 8. (R. Thea; Ofbeck's Travels, v. 1. 375.)—Leaves ovate, finely ferrated; paler beneath. Flowers in terminal fpikes, five-cleft.—Native of China.—A *fhrub* fix feet high, with long, roundifh, downy, fpreading *branches*; the lateral ones bearing hairy terminal fpikes of *flowers*, and fubfequently becoming fpinous. *Leaves* an inch long, fomewhat heart-fhaped, befet with fine fharp ferratures; fhining and reticulated above; paler, opaque, and more even beneath. The poor people in China are faid to ufe the leaves as a fubftitute for tea.

Sect. 2. *Without thorns, or prickles.*

10. R. *Sarcomphalus*. Timber Buckthorn. Linn. Sp. Pl. 280. Willd. n. 9. (Sarcomphalus; Browne Jam. 179.)—Leaves oval, coriaceous, emarginate, entire. Flowers in denfe, corymbofe, filky tufts.—Native of Jamaica. Browne fays it is one of the beft timber-woods in the ifland, and rifes generally to a very confiderable height. The *trunk* is often above two feet and a half in diameter, covered with a thick fcaly *bark*. *Wood* hard, dark-coloured, clofe-grained. *Leaves* about three inches long, and two broad, fmooth, with a ftrong mid-rib, and many interbranching veins. Browne's generic name applies to the thick, fleffy, umbilicated *nectary*, or receptacle of the flower. He defcribes no *petals*. The *ftyle* is cloven, with two acute *ftigmas*. *Berry* of two cells.

11. R. *ferreus*. Iron-wood Buckthorn. Vahl. Symb. v. 3. 41. t. 58. Willd. n. 10. Mart. n. 10.—"Leaves oblong-ovate, emarginate, membranous, fmooth, entire. Flowers in axillary umbels."—Native of the ifland of Santa Cruz; *Von Rohr* and *Weft*. *Branches* round, fmooth, afh-coloured. *Leaves* an inch or more in length, very finely ribbed and veined. *Umbels* on fhort ftalks. *Vahl.*

12. R. *lævigatus*. Polifhed Buckthorn. Vahl. ibid. Willd. n. 11. Mart. n. 11.—"Leaves oblong, entire, coriaceous, fmooth. Flowers axillary, about two together."—Found in the fame ifland. *Weft*. *Branches* round, fmooth, afh-coloured. *Leaves* an inch and half long, paler and yellowifh at the edges, efpecially the younger ones; fcarcely veiny on the upper fide; not at all fo underneath. *Flowers* two or three together, on very fhort, fimple, fmooth ftalks. *Calyx* fmooth. *Stigmas* two. *Vahl.*

13. R. *tetragonus*. Square-branched Cape Buckthorn. Linn. Suppl. 153. Willd. n. 12. Thunb. Prodr. 44.—"Leaves ovate, entire, fmooth, feffile. Branches fquare."—Gathered by Thunberg, at the Cape of Good Hope. We have feen no fpecimen, nor is there any figure of this fpecies.

14. R. *polifolius*. Poley-leaved Buckthorn. Vahl. Symb. v. 3. 41. Willd. n. 13.—Leaves lanceolate, entire; fnow-white and downy beneath. Flowers axillary, nearly feffile, moftly folitary.—Suppofed to be a native of New Zeeland. *Branches* flender, hoary; downy when young. *Leaves* hardly an inch long, pointed; fmooth and fomewhat wrinkled above. *Footftalks* very fhort, downy.

15. R. *valentinus*. Valentia Buckthorn. Willd. n. 14. (R. pumilus; Cavan. Ic. v. 2. 65. t. 181.)—Leaves roundifh-elliptical, minutely crenate, nearly feffile. Flowers four-cleft. Style deeply three-cleft. Berry dry.—Gathered by Cavanilles, on the mountains of Meca and Palomera, in the kingdom of Valentia, flowering in May. If he be correct as to the nature of the *fruit*, this is a very diftinct fpecies; otherwife its habit is very like *pumilus* hereafter defcribed. The *ftems* are fhort and depreffed. *Leaves* on very fhort ftalks, and obfcurely crenate. *Flowers* hermaphrodite, four-cleft. *Style* divided to the bafe into three parts. *Capfule*, or dry *berry*, of three cells.

16. R. *cubenfis*. Cuba Buckthorn. Linn. Sp. Pl. 281. Willd. n. 15. Jacq. Hort. Vind. v. 3. 28. t. 49.—"Leaves rugofe, entire, downy. Flowers hermaphrodite. Capfule of three cells."—Native of bufhy places near the fea, in the ifland of Cuba. We have not examined any fpecimen, but by Jacquin's account, this appears rather to have the fruit of a *Ceanothus*. The *petals* indeed are oppofite to the *ftamens*, which is an important character of *Rhamnus*. The *fruit* however is not a dry *berry*, but a true *capfule*, with elaftic valves.

17. R. *colubrinus*. Bahama Red-wood Buckthorn. Linn. Sp. Pl. 280. Willd. n. 16. Ait. n. 7. Jacq. Hort. Vind. v. 3. 28. t. 50. (Arbor baccifera indica, foliis majoribus fplendentibus, flore pentapetalo; Comm. Hort. v. 1. 175. t. 90.)—Leaves ovate, entire, with rufty footftalks. Flowers monogynous, erect. Capfules three-lobed.—Native of the Bahama iflands; introduced into our ftoves by Catefby, in 1726. This has alfo the *fruit* of *Ceanothus*, to which genus Miller refers it.

18. R. *dauricus*. Daurian Buckthorn. Pall. Rofs. v. 1. p. 2. 25. t. 61, catharticus. Willd. n. 17. (Cornus foliis citri anguftioribus; Amman. Ruth. 200. t. 33.)—Leaves ovate, ferrated, veiny; tapering at the bafe. Flowers four-cleft, dioecious.—Found by Gmelin and Pallas on the banks of the river Argunus in Dauria. The *wood* is red, and called Sandal-wood by the Ruffians. The afpect of the *fhrub* is much like *R. catharticus*, but there are no thorns. Pallas's names, pages, and references are wonderfully confufed in this, and too many other, parts of his pompous book.

19. R. *alpinus*. Alpine Buckthorn. Linn. Sp. Pl. 280. Willd. n. 18. Ait. n. 8. (R. n. 823; Hall. Hift. v. 1. 366. t. 40. Frangula ora folii ferrata; Hall. Enum. 164. Alnus nigra baccifera, rugofiore folio, feu major; Bauh. Hift. v. 1. 562. Creutzbeer; Lonic. Kreuterb. 59?)—Stem erect. Leaves elliptic-oblong, with glandular crenatures; fomewhat heart-fhaped at the bafe; veins hairy at the back. Flowers dioecious. Stigma four-cleft.—Native of the alps of Switzerland, Dauphiny, Auftria, Carniola, &c. Gathered probably by Dr. Sibthorp on mount Parnaffus; fee n. 21. A *fhrub*, eight or ten feet high, erect, with a fmooth grey bark. *Leaves* two inches or more in length, broadly elliptical, occafionally obtufe or acute; more or lefs heart-fhaped at the bafe: finely and regularly crenate throughout, with rounded glandular teeth; fmooth, except that the numerous ftraight parallel veins are hairy beneath, efpecially at their origin. *Flowers* copious, axillary, ftalked, four-cleft, dioecious. *Stigma* in four narrow deep fegments. *Berry* black, of three cells, with moftly a feed in each. The female *flowers* have the rudiment of a ftyle, according to Wulfen in Jacq. Coll. v. 3. 16, but the fhrub is nevertheleefs perfectly dioecious.

20. R. *pumilus*. Dwarf Rock Buckthorn. Linn. Mant. 49. Willd. n. 19. Ait. n. 9. Jacq. Coll. v. 2. 141. t. 11. (R. rupeftris; Scop. Carn. v. 1. 164. t. 5, bad. Villars Dauph. v. 2. 538.)—Stem proftrate. Leaves fomewhat obovate, crenate, fmooth on both fides. Stigma three-cleft.—Native of mount Baldus, and the alps of Dauphiny and Carniola. We have gathered it on mount Cenis. This is a fmall depreffed *fhrub*, creeping clofe to the rocks. The

leaves

leaves are ſmaller than the laſt, with broader leſs numerous crenatures, and we find them alſo tapering conſtantly at the baſe, not inclined to be heart-ſhaped, as Scopoli and Wulfen (in Jacquin), both repreſent them. The latter erroneouſly deſcribes and delineates a ſimple capitate *ſtigma;* in our ſpecimens, and thoſe of Villars, that part is deeply three-cleft. We ſee no reaſon to believe the *pumilus* of this laſt author diſtinct from his *rupeſtris*. The *flowers* of our *pumilus* are deſcribed, by moſt writers, as having all perfect *ſtamens* and *piſtils*, but Villars ſays they appeared to him dioecious.

21. R. *pubeſcens*. Downy Mountain Buckthorn. Sm. Prodr. Fl. Græc. Sibth. n. 552. Fl. Græc. t. 239, unpubliſhed.—Leaves obovate-rhomboid, villous, nearly entire. Flowers dioecious. Style deeply divided.—Gathered by Dr. Sibthorp on mount Parnaſſus. This is a knotty, zigzag, ſpreading, not very upright, *ſhrub*, vyeing in magnitude with *R. alpinus*, for which poſſibly Dr. Sibthorp might at one time have taken it, when he made a memorandum of *alpinus* being found on Parnaſſus; as we obſerve no ſpecimen in his collection to confirm ſuch memorandum. It is, nevertheleſs, extremely probable that both ſpecies may grow there. The preſent is very diſtinct from *alpinus* in having downy, and nearly entire *leaves*. The *flower-ſtalks* and *calyx* are alſo downy. *Petals* roundiſh, concave, found in the *male flowers* only. *Female flowers* on a ſeparate plant. *Style* divided nearly to the baſe, with only two *ſtigmas*. This ſpecies is more akin to the following than to any of the foregoing.

22. R. *Frangula*. Alder Buckthorn, or Berry-bearing Alder. Linn. Sp. Pl. 280. Willd. n. 20. Fl. Brit. n. 2. Engl. Bot. t. 250. Fl. Dan. t. 278. (Frangula; Camer. Epit. 978. Matth. Valgr. v. 2. 609. Alnus nigra, ſive Frangula; Ger. Em. 1470.)—Leaves obovate, entire, ſmooth. Style ſimple, very ſhort. Stigma cloven.—Native of buſhy places in the north of Europe more eſpecially, though Dr. Sibthorp obſerved it about Conſtantinople. It flowers, like moſt of the ſpecies of *Rhamnus*, in the ſpring. The *ſtem* is ſhrubby, about four feet high. *Leaves* two or three inches long and about one broad, ſomewhat pointed. *Flowers* whitiſh, with very minute *petals* and *ſtamens*, in the ſame individuals with the *piſtils*. *Style* very ſhort, with two ſmall ſegments to the *ſtigma*. *Berry* black, roundiſh, with ſeldom more than two *ſeeds*, though we have ſeen three, in which caſe, we preſume, there muſt have been a three-cleft *ſtigma*. Theſe *berries* are ſometimes mixed, by herb gatherers, with thoſe of the true Buckthorn, n. 1, or ſubſtituted for thoſe berries; but the ſmaller number of ſeeds betrays the deception. Their qualities perhaps differ very little.

23. R. *latifolius*. Broad-leaved Azorian Buckthorn. L'Herit. Sert. Angl. 5. t. 8. Willd. n. 21. Ait. n. 11.—Leaves elliptical, pointed, entire. Calyx hairy. Style ſimple.—Gathered by Mr. Maſſon in the Azores. He ſent it to Kew in 1778, and it bloſſoms there in July, being kept in winter under cover. This is a tall upright *ſhrub*, with round, ſtraight, ſmooth *branches*. *Leaves* four or five inches long, and two broad; ſmooth above; paler with hairy ribs, beneath. *Flowers* hairy, axillary, many together, on hairy ruſty *ſtalks*. *Petals* broad at the baſe. *Stigma* ſlightly three-cleft.

24. R. *glanduloſus*. Madeira Buckthorn. Ait. n. 12. Willd. n. 22. Venten. Malmaiſ. t. 34.—Leaves ovate, bluntly ſerrated, ſmooth; glandular at the baſe. Stem erect. Flowers racemoſe. Style in three deep ſegments.—Native of Madeira, and the Canary iſlands. Introduced at Kew, by Mr. Maſſon, in 1785. This has the habit of an *Ilex* or *Phillyrea*. The *leaves* are dark green, ſmooth, two inches long, more or leſs, ovate, pointed, rather diſtantly ſerrated, marked on the upper ſide, near the baſe, with two or three glandular ſpots. *Flowers* yellowiſh, numerous, on ſmooth, racemoſe axillary *ſtalks*. *Stamens* twice as long as the *petals*. *Style* deeply three-cleft. *Stigmas* ſimple. We know nothing of the *fruit*.

25. R. *ellipticus*. Oval-leaved Jamaica Buckthorn. Ait. n. 13. Willd. n. 23. Swartz Ind. Occ. v. 1. 497. (R. n. 1; Browne Jam. 172. t. 29. f. 2. Ceanothus reclinatus; L'Herit. Sert. Angl. 6.)—Leaves elliptical, acute, entire; rather villous beneath. Flowers axillary, ſomewhat umbellate. Style in three deep ſegments. Berry dry.—Native of buſhy places on the mountains of Jamaica. Miller cultivated it in the ſtove at Chelſea in 1758. *Aiton*. *Stem* forming a ſmall tree, with ſpreading or dependent *branches*. *Leaves* two or three inches long, thin, downy on the veins beneath. *Flowers* greeniſh-white. The *fruit* ſeems, by Swartz's deſcription, a dry berry, like that of ſome other ſpecies of *Rhamnus*, and not the valvular capſule of a *Ceanothus*, though, when quite ripe and dried, it ſplits into ſix parts, as we find it in Browne's ſpecimen. The *petals* however are oppoſite to the *ſtamens*.

26. R. *prinoides*. Winter-berry-leaved Buckthorn. L'Herit. Sert. Angl. 6. t. 9. Willd. n. 24. Ait. n. 14. (R. celtifolius; Thunb. Prodr. 44. Celtis foliis ſubrotundis dentatis, flore viridi, fructu luteo; Burm. Afr. 242. t. 88.)—Leaves ovate, ſerrated, ſmooth. Stem erect. Flower-ſtalks ſimple. Style ſlightly three-cleft. Flowers polygamous.—Native of woods at the Cape of Good Hope, where it bloſſoms in September; as is the caſe in England, where this ſhrub was firſt cultivated by Robert Edward, lord Petre. Its habit is that of a *Prinos*, or *Phillyrea*. The *leaves* are from one to two inches long, pointed; ſhining above; paler beneath; ſmooth, except occaſional hairineſs at the origin of each vein. *Flowers* on ſimple, ſlender, axillary *ſtalks*, ſeveral together. *Petals* narrow. This ſpecies, except in its *inflorescence*, and the want of glands on the *leaves*, bears a conſiderable reſemblance to the *glanduloſus*.

27. R. *myſtacinus*. Wiry Buckthorn. Ait. n. 15. Willd. n. 25.—Leaves heart-ſhaped, entire. Stem climbing with tendrils. Flowers in axillary umbels. Stigma three-cleft.—Said to be a native of Abyſſinia; at leaſt it was brought to Kew, in 1775, by the celebrated traveller Mr. Bruce. It is kept in the ſtove, and blooms in November. The *ſtem* is weak, climbing to a conſiderable extent, by means of ſimple ſolitary axillary *tendrils* from the upper part of the branches. *Leaves* an inch long, rather downy beneath, obtuſe with a ſmall point, on very ſhort *footſtalks*. *Flowers* greeniſh-white. *Germen* immerſed in a ſnow-white glandular *receptacle*, filling the tube of the *calyx*. As nothing is known of the *fruit*, this plant may poſſibly prove of the genus *Zizyphus*, to which it ſeems moſt akin in habit.

28. R. *alnifolius*. Alder-leaved American Buckthorn. L'Herit. Sert. Angl. 5. Willd. n. 26. Ait. n. 16.—Leaves obovate, pointed, ſerrated, ſmoothiſh, opaque; reticulated beneath. Flowers hermaphrodite. Stem erect.—Native of Pennſylvania, from whence we have a ſpecimen, communicated by the Rev. Dr. Muhlenberg. It has much the aſpect of *R. alpinus*, but the *leaves*, as l'Heritier obſerves, are leſs ſhining, and more reticulated; they ſeem to us more tapering at the baſe, and not at all heart-ſhaped.

29. R. *ſphæroſpermus*. Clear-berried Buckthorn. Swartz Ind. Occ. v. 1. 499. Willd. n. 27.—Leaves oblong, ſerrated, ſmooth. Stem erect. Flowers in axillary cluſters. Style three-cleft. Berry nearly globular, pellucid.—Native of buſhy hills in the more temperate parts of Jamaica, flowering in Auguſt.—A ſmall tree, ten to fifteen feet high, with

ſpreading *branches*. *Leaves* pointed, finely veined. *Cluſters* many-flowered, the length of the *footſtalks*. *Flowers* ſmall, yellowiſh-green. *Style* very ſhort. *Berry* the ſize of a ſmall pepper-corn, either quite globular, or obſcurely three-lobed, pellucid, pale green, with one or three ſeeds. It ripens in October.

30. R. *hybridus*. Mule Buckthorn. L'Herit. Sert. Angl. 5. Willd. n. 28.—" Leaves oblong, pointed, ſerrated, ſcarcely perennial. Stem erect. Flowers male and female on the ſame tree."—L'Heritier deſcribes this as having ſprung up in a garden, from ſeeds of *R. alpinus* impregnated by *R. Alaternus*, and partaking of the nature of both parents.

31. R. *Alaternus*. Common Alaternus. Linn. Sp. Pl. 281. Willd. n. 29. Ait. n. 17. (Alaternus 1 et 2; Clu. Hiſt. v. 1. 50. Ger. Em. 1398.)—Leaves ovate, ſerrated, coriaceous, ſmooth. Stem erect. Flowers dioecious, in axillary, ſomewhat compound, bracteated cluſters. Stigma in three deep ſegments.—Native of the ſouth of Europe. A hardy evergreen *ſhrub* in our gardens, flowering in the ſpring. The *leaves* are about an inch long, of a ſhining yellowiſh-green, and of a thick rigid texture. *Flowers* copious, yellowiſh. *Berries* dark purple, with two or three *ſeeds*.

The 30th ſpecies of Willdenow, *R. carpinifolius*, adopted from Pallas's Fl. Roſſ. t. 60, is, we believe, the ſame tree with *Ulmus nemoralis*, Willd. Sp. Pl. v. 1. 1326, or at leaſt of the ſame genus. See ULMUS.

Sect. 3. *Branches armed with prickles*.

32. R. *capenſis*. Prickly Cape Buckthorn. Thunb. Prodr. 44. Willd. n. 31.—" Prickles ſolitary. Leaves ovate, notched or entire, ſmooth. Umbels axillary."—Found by Thunberg, at the Cape.

33. R. *circumſciſſus*. Prickly Eaſt-Indian Buckthorn. Linn. Suppl. 152. Willd. n. 32.—Prickles ſolitary, hooked. Leaves obovate, abrupt, emarginate, entire, ſmooth. Umbels axillary.—Found by Koenig, in the Eaſt Indies. *Branches* angular. *Prickles* numerous, ſtrong. *Leaves* almoſt an inch long, and nearly as broad. *Umbels* many-flowered. *Style* ſimple, ſhort, permanent. Baſe of the *calyx* cup-like after the limb is fallen.

RHAMNUS, in *Gardening*, furniſhes plants of the tree and ſhrub kinds, of which the ſpecies cultivated are; the purging buckthorn (R. catharticus); the pubeſcent rhamnus, or buckthorn redwood (R. colubrinus); the alder buckthorn, or berry-bearing alder (R. frangula); the common Chriſt's-thorn (R. paliurus); the common alaternus (R. alaternus); the blunt-leaved buckthorn (R. jujuba); the pointed-leaved buckthorn (R. œnoplia); the ſhining-leaved buckthorn, or common jujube (R. zizyphus); and the Syrian Chriſt's-thorn (R. ſpina Chriſti).

It is found that the juice of the unripe berries, in the firſt ſort, has the colour of ſaffron, and is uſed for ſtaining maps or paper, being ſold under the name of French berries: the juice of the ripe berries, mixed with alum, is the ſap-green of the painters; but if the berries be gathered late in the autumn, the juice is purple. The bark affords a beautiful yellow dye.

In the third ſort, the berries gathered before they are ripe, dye wool green and yellow; when ripe, blue-grey, blue, and green. The bark dyes yellow, and with preparations of iron, black.

There are two varieties of this ſort, the broad-leaved, which has larger and rougher leaves; it grows naturally on the Alps: and the dwarf or round-leaved, which is of humble growth, ſeldom riſing above two feet high; it grows on the Pyrenees.

The fifth is a native of the ſouth of Europe, and of Barbary. The freſh branches or young ſhoots, with the leaves, will dye wool a fine yellow. It flowers about April. And there are varieties with variegated leaves, commonly called bloatched phillyrea by the nurſerymen; and with the leaves ſtriped with white and with yellow, called ſilver and gold-ſtriped alaternus. The latter has the leaves much longer and narrower, and the ſerratures on the edges much deeper: this ſhoots its branches more erect, forms a handſomer buſh, and is equally hardy. It is likewiſe obſerved, that the phillyrea is ſometimes different; and according to ſome, there are alſo the large-growing, the ſmall-growing, the broad-leaved, the narrow-jagged-leaved, the yellow-ſtriped jagged-leaved, the white-ſtriped jagged-leaved: all which are confounded with the alaternus, by ſuch perſons as are not botaniſts; but they may eaſily be diſtinguiſhed by the poſition of their leaves, which are alternate in this, but placed oppoſite by pairs in that. And it is ſuppoſed, that the alaternus was much more in requeſt formerly than at preſent, having been planted againſt walls in court-yards to cover them, as alſo to form evergreen hedges in gardens; for which purpoſe it is very improper, as the branches ſhoot very vigorouſly, and being pliant, are frequently diſplaced by the wind; in winter, when much ſnow falls in ſtill weather, the weight of it often breaks the branches; theſe hedges muſt alſo be clipped three times in a ſeaſon to keep them in order, which is both expenſive and occaſions a great litter in a garden.

The fruit, in the eighth ſort, is ſold in the market at Canton during the autumn. In Italy and Spain it is ſerved up at the table in deſerts during the winter ſeaſon, as a dry ſweetmeat.

And the common or cultivated jujube, according to Miller, has a woody ſtalk, dividing into many crooked irregular branches, armed with ſtrong ſtraight thorns, ſet by pairs at each joint; the leaves are two inches long and one broad, ſlightly ſerrate, on ſhort footſtalks; the flowers are produced on the ſide of the branches, two or three from the ſame place, ſeſſile, ſmall and yellow: the fruit oval, the ſize of a middling plum, ſweetiſh and clammy, including a hard oblong ſtone, pointed at both ends.

The wild jujube has ſlender woody ſtalks, which ſend out many weak branches, covered with a greyiſh bark, and armed with ſpines in pairs, one longer and ſtraight, the other ſhort and recurved; the leaves ſmall, oval, veined, half an inch in length and breadth, and ſeſſile. It is found about Tunis in Africa.

Method of Culture.—The firſt, third, and fourth ſorts may be increaſed by ſeeds, layers, and ſometimes by cuttings; the ſeeds ſhould be ſown in autumn as ſoon as ripe, on a bed of light earth, and ſlightly raked in: the plants moſtly appear in the following ſpring, and when they have had a year or two's growth, they ſhould be planted out in nurſery-rows, to have two or three years more growth, when they may be finally ſet out where they are to ſtand.

It may be noticed that the layers ſhould always be made from the young ſhoots, and be laid down in the autumn, in the uſual way, giving a little twiſt or nick at the time in the bark, at a joint. They moſtly become well rooted in twelve months afterwards.

Cuttings of the firſt and third ſorts may be made from the young twigs, and be planted in rows in the autumn, in a bed of good earth, when moſt of them will ſucceed and grow well.

And all the evergreen or alaternus kinds may be raiſed from ſeeds and by layers. The plain ſorts ſucceed in both methods, but the variegated ſorts only with certainty by layers, well laid down.

And

And the ſeeds ſhould be put into the ground in the early autumn in the ſame manner as above; and the layers laid down in the autumn as in the other kinds of plants.

All the other ſpecies may be raiſed by ſowing the ſtones of the fruit in pots in ſpring, plunging them in a moderate hot-bed. When the plants have attained ſome growth they ſhould be removed into ſeparate pots, and be managed as other tender plants. They alſo ſucceed by ſuckers from the roots and layers, as in the above ſorts. And the ſixth and eighth ſorts may be placed in the greenhouſe, and the others in the ſtove.

Theſe are all ornamental plants; the hardy ſorts for the pleaſure-ground, and the more tender ſorts for the greenhouſe and ſtove, among other potted plants of theſe departments.

RHAMNUS *catharticus*, or *ſpina cervina, purging buckthorn*, in the *Materia Medica*. The fruit or berries of this ſhrub, which have been long received into the materia medica, are about the ſize of a ſmall pea, and, when ripe, of a ſhining black colour; they contain a pulpy deep green juice, called by the French "verd de veſſie," or SAP-*green* (which ſee), which has a faint unpleaſant ſmell, and a bitteriſh, acrid, nauſeous taſte; they operate briſkly by ſtool, and hence the plant derives the trivial name "catharticus:" their purgative effects are conſtantly accompanied with conſiderable thirſt, and dryneſs of the mouth and throat, and frequently with ſevere griping of the bowels, eſpecially unleſs ſome diluting liquor be plentifully drunk immediately after taking them. The doſe is ſaid to be about 20 of the freſh berries in ſubſtance; twice or thrice that number in decoction; a drachm or a drachm and a half of the dried berries; an ounce of the expreſſed juice; or half an ounce of the rob or extract, obtained by inſpiſſating the juice. The juice made into a ſyrup is the officinal preparation, and in this ſtate it has been generally preferred by phyſicians, who found that in doſes of one ounce or two it proved a very powerful purgative; and was therefore much employed as a hydragogue. Few patients, however, are able to bear a frequent repetition of this medicine; and even Sydenham, who was partial to the purgative treatment of hydropical diſeaſes, found that other cathartics more effectually anſwered this purpoſe. At preſent it is rarely preſcribed, except in conjunction with other medicines of this claſs. Lewis's Mat. Med. Woodville's Med. Bot.

RHAMNUSIA, in *Mythology*, an appellation given to Nemeſis, on account of her celebrated ſtatue at Rhamnus, in Attica, which has been generally aſcribed to Phidias. Pliny, however, gives the honour of it to Ageracritus, a ſcholar of Phidias, who, as he ſays, had deſigned it for a Venus; but ſeeing one preferred to it, which was executed by Alcamenes, another ſcholar of the ſame maſter, ſold his to the Rhamnuſians, on condition that they would only take it for a ſtatue of Nemeſis, whence ſhe gained the name of Rhamnuſia. See NEMESIS and RHAMNUS.

RHANDÆ, in *Ancient Geography*, a people of Aſia, in Drangiana, on the confines of Aſia. Ptolemy.

RHANTERIUM, in *Botany*, ſo named by Deſfontaines, from ῥαντήριον, *a kind of bruſh for ſprinkling water*, like that uſed in Catholic churches; the down, or crown, of the ſeed having a ſimilar form.—Deſfont. Atlant. v. 2. 291. Willd. Sp. Pl. v. 3. 2105.—Claſs and order, *Syngeneſia Polygamia-ſuperflua*. Nat. Ord. *Compoſitæ diſcoideæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common Calyx* imbricated, nearly cylindrical; ſcales lax, recurved. *Cor.* compound, radiated; florets of the diſk numerous, equal, funnel-ſhaped, five-cleft, erect, all perfect; thoſe of the radius few, ligulate, three-toothed, recurved, female. *Stam.* in the perfect florets five, awl-ſhaped, ſhort; anthers ſimple, united into a five-toothed cylinder. *Piſt.* Germen in all the florets inverſely conical, furrowed; ſtyle thread-ſhaped, the length of the ſtamens; ſtigmas two, club-ſhaped. *Peric.* none, except the permanent calyx. *Seeds* of all the florets the ſhape of the germen; thoſe of the diſk crowned with from four to ſix briſtles, thickened and feathery at the top; thoſe of the radius naked. *Recept.* flat, chaffy; ſcales acute, hollowed on one ſide.

Eſſ. Ch. Receptacle chaffy. Seed-down of about five briſtles, feathery at the top. Calyx cylindrical, imbricated. Seeds of the radius naked.

1. R. *ſuaveolens*. Deſfont. Atlant. v. 2. 291. t. 240.—Found by Deſfontaines on the ſandy ſea-coaſt, near Sfax, in the kingdom of Tunis. *Root* perennial. *Stem* erect, much branched, round, leafy, one or two feet high. *Branches* ſlender, downy, ſtriated, often entangled together. *Leaves* ſcattered, ſeſſile, three quarters of an inch long, lanceolate, acute, ſtrongly ſerrated, either ſmooth or downy; the upper ones ſmaller, linear and entire. *Flowers* terminal, ſolitary, reſembling thoſe of ſeveral of the ſmaller-flowered American Aſters, except in being entirely yellow. This plant flowers in ſummer. The bruiſed leaves have a fragrant ſmell.

RHAPHANEÆ, in *Ancient Geography*, a town of Aſia, in Syria, placed by Ptolemy between Epiphania and Anteradus.

RHAPHIS, in *Botany*, ſo called from ῥαφίς, *a needle*, or *awl*, becauſe of the long needle-like awn of the female flowers.—Lour. Cochinch. 552.—Claſs and order, *Monœcia Triandria*. Nat. Ord. *Gramina*.

Gen. Ch. Male flowers two, ſtalked, in one common involucrum. *Cal.* Glume ſingle-flowered, of two awl-ſhaped, coloured, beardleſs, nearly equal valves. *Cor.* Glume of two lanceolate, membranous, fringed, beardleſs valves, ſhorter than the calyx. *Stam.* Filaments three, ſhort; anthers oblong.

Female flower ſolitary, in the ſame ſhort, one-leaved, hairy involucrum, ſeſſile, below the male flowers. *Cal.* as in the male, but ſhorter. *Cor.* Glume of two valves, nearly equal to the calyx; one of them furniſhed with a longiſh, very ſharp awn. *Piſt.* Germen ovate; ſtyles two, ſhort; ſtigmas feathery. *Peric.* none, except the permanent glumes. *Seed* ſolitary, oblong, compreſſed.

Eſſ. Ch. Involucrum of one leaf, three-flowered. Male, Calyx of two valves, coloured. Corolla of two fringed valves.

Female, Calyx like the male. Corolla of two valves: one of them awned. Styles two. Seed one, oblong.

1. R. *trivialis*. (Gramen aciculatum, Cuſſu Cuſſu; Rumph. Amboin. v. 6. book 10. chap. 8. t. 5. f. 1. Co may of the Cochinchineſe.)—A very common graſs in China and Cochinchina, growing by road ſides, and proving very troubleſome on account of its ſeeds, which ſtick into the clothes of paſſengers, and cannot be ſhaken out. Rumphius ſpeaks of it as equally common in the iſlands of the Eaſt Indies. The *root* is annual, creeping. *Stem* a foot high, erect, round, ſlender, ſmooth, ſcarcely branched, almoſt leafleſs, except at the baſe. *Leaves* nearly all radical, ſeſſile, ſhort, lanceolate, claſping the lower part of the ſtem. *Panicle* ſimple, ſolitary, terminal, conical, lax; its branches long, ſtraight, aſcending. Linnæus erroneouſly cites the above ſynonym of Rumphius, under his *Panicum colonum*, a widely different plant.

Mr. Brown, in Prodr. Nov. Holl. v. 1. 199, ſuggeſts that the above plant of Loureiro and Rumphius ought to be referred

referred to the genus *Holcus*, along with all the panicled ſpecies of *Andropogon;* and he remarks, on the authority of a ſpecimen from the author, in ſir J. Banks's collection, that it ſeems ſcarcely diſtinct from *Andropogon acicularis* of Retzius, Willd. Sp. Pl. v. 4. 906, for which indeed the ſame ſynonym of Rumphius is quoted.

RHAPIS, ſo called by the younger Linnæus, from ῥαπις, *a rod*, probably in alluſion to the name it has obtained from Europeans in China, of Ground Ratan; but we know not preciſely how that name applies to the plant.—Ait. Hort. Kew. ed. 1. v. 3. 473. ed. 2. v. 5. 473. Schreb. 772. Willd. Sp. Pl. v. 4. 1093. Mart. Mill Dict. v. 4.—Claſs and order, *Polygamia Monoecia;* rather *Hexandria Monogynia.* Nat. Ord. *Palmæ.*

Gen. Ch. *Cal.* Perianth inferior, minute, rigid, of one leaf, in three deep, broad, concave, permanent ſegments. *Cor.* of one petal, larger than the calyx, in three deep, erect, concave, equal ſegments, deciduous. *Stam.* Filaments ſix, awl-ſhaped, nearly as long as the corolla; anthers roundiſh, two-lobed. *Piſt.* Germen ſuperior, three-lobed; ſtyle ſhort, awl-ſhaped; ſtigma obtuſe. *Peric.* Berry roundiſh-ovate. *Seed* ſolitary, roundiſh, bony.

Obſ. The flowers are often polygamous or dioecious.

Eſſ. Ch. Calyx three-cleft. Corolla of one petal, three-cleft. Berry with one large, roundiſh, bony ſeed.

1. R. *flabelliformis.* Creeping-rooted Palmetto, or Ground Ratan. Ait. n. 1. Willd. n. 1. Sm. Tour, v. 1. 12. and 279. Jacq. Hort. Schoenbr. v. 3. 36. t. 316. Curt. Mag. t. 1371. (Chamærops excelſa; Thunb. Jap. 130.)—Leaves palmate, plaited; their plaits and margins ſharply toothed.—Native of China and Japan. *Root* creeping, with numerous long ſtraight fibres. *Stem* riſing to a great height in its native country; in our ſtoves it has not yet reached above ſix or eight feet; it is clothed with a looſe network, formed of the baſes of the decayed leaf-ſtalks. *Leaves* ſtalked, divided almoſt to the baſe into many plaited oblong lobes, a ſpan long, rough at the ribs and edges with prickly teeth. *Flowers* moſtly dioecious, yellow, in panicled cylindrical ſpikes. *Berry* ſmall, dark purple, ſweet with a bitteriſh flavour, barely eatable.

2. R. *acaulis.* Swamp Palmetto. Willd. n. 2. Ait. n. 2. (Corypha minor; Jacq. Hort. Vind. v. 3. 8. t. 8. Sabal Adanſoni; Gawl. in Curt. Mag. t. 1434. Purſh v. 1. 239.)—Leaves palmate, ſtriated, entire, ſmooth.—Native of the ſea-coaſt of Carolina and Georgia, flowering in Auguſt. Of humble growth, having no leafy *ſtem.* The *leaves* are longer and narrower than in the foregoing, quite ſmooth and entire. *Flowers* numerous, greeniſh-white, in numerous, cylindrical, lax, panicled ſpikes, ſupported by a ſtraight, round common ſtalk, taller than the foliage. *Berry* the ſize of a ſmall pea, black, ſweetiſh. *Jacq.*

3. R. *arundinacea.* Simple-leaved Palmetto. Ait. n. 3. Willd. n. 3.—Leaves in two deep, acute, plaited lobes; roughiſh at the edges.—Native of Carolina. A greenhouſe plant at Kew, flowering in September.

The orthography of the generic name in Curt. Mag. 1434, is remarkably confuſed, and ſeems to have miſled Mr. Purſh to print it *Raphis*, citing Willdenow without examination.

RHAPONTICUM. See Rha.

Rhaponticum, a medicinal root, in form reſembling rhubarb, and nearly of the ſame virtues.

It was called *rhaponticum*, q. d. *root of Pontus;* becauſe chiefly produced in the country of Pontus in Aſia.

It is the root of a plant, which is a ſpecies of the *rheum*, with ſmooth roundiſh leaves, and ſomewhat channelled pedicles. It grows wild on the mountain Rhodope in Thrace, from whence it was brought into Europe by Alpinus about the year 1610; it bears the hardeſt winters of this climate. The root of this plant, ſays Dr. Lewis, which appears to have been the true rhubarb of the ancients, is confounded by ſome with the modern rhubarb, though conſiderably different from that root in appearance, as well as in quality. The rhapontic is of a duſky colour on the ſurface, and of a looſe ſpongy texture; more aſtringent than rhubarb, and leſs purgative: in this laſt intention, two or three drachms are required for a doſe. Lewis's Mat. Med.

It has, however, been much controverted, whether the rhaponticum of the ancients, and the rhubarb of the moderns, be one and the ſame plant: the reaſoning on both ſides may be ſeen in the appendix to the ſecond volume of John Bauhin's Hiſtory of Plants. See Rhubarb.

RHAPPHA, in *Ancient Geography*, a town of India, on the other ſide of the Ganges, among the people called Gangani. Ptolemy.

RHAPSA, a town of Aſia, in the interior of Media.

RHAPSODI, Ῥαψῳδοι, Rhapsodists, in *Antiquity*, perſons who made a buſineſs of ſinging or reciting pieces of Homer's poems.

Cuper informs us, that the rhapſodi were clothed in red, when they ſung the Iliad; and in blue, when they ſung the Odyſſey.

They performed on the theatres; and ſometimes ſtrove for prizes, in conteſts of poetry, ſinging, &c.

After the two antagoniſts had finiſhed their parts, the two pieces, or papers they were written in, were joined together again; whence the name, *viz.* from ῥάπτω, *ſuo, I join together*, and ᾠδη, *ode, ſong.*

But there ſeem to have been other rhapſodi of higher antiquity than theſe; people who compoſed heroic poems, or ſongs in praiſe of heroes and great men, and ſung their own compoſitions from town to town, for a livelihood; of which profeſſion, it is ſaid, was Homer himſelf.

Hence, ſome critics, inſtead of the former origin, derive the word rhapſodiſt from ῥαβδῳ ᾀδειν, *to ſing with a laurel-rod in the hand*, which, it ſeems, was the badge of the primitive rhapſodi.

Philochorus, again, derives the word from ῥαπτειν τας ᾠδας, *q. d.* συντιθεναι, *to compoſe ſongs or poems;* as if they were the authors of the poems they ſung. This opinion, to which Scaliger inclines, reduces theſe rhapſodi to the ſecond kind.

In effect, it is probable, that they were all of the ſame claſs, whatever diſtinction ſome authors may imagine among them; and that their buſineſs was to ſing or rehearſe poems, either of their own, or other people's compoſition, as might beſt ſerve their purpoſe, which was gaining a pecuniary advantage by them. So that we do not apprehend it any injury to them, to ſet them on the foot of our ballad-ſingers; ſome of whom may probably pen their own ditties. After Homer's time, it is no wonder they confined themſelves altogether to his pieces, for which the people had the utmoſt veneration; nor is it ſurpriſing, that they ſhould erect ſtages, &c. and diſpute the point of recitation in fairs and markets.

The import of the word rhapſodiſt underwent ſeveral changes in antiquity: it was firſt appropriated to bards, who ſung their own verſes from town to town, or at the tables of the great; in this ſenſe Homer was called a rhapſodiſt. It was next beſtowed on thoſe who ſung the verſes of Homer on the ſtage, uſually for a prize, allotted to the beſt performer of them; and, laſtly, to ſuch ſingers of centos, as have been juſt deſcribed. A rhapſody, in modern language, conveys no other meaning than that of an incoherent

incoherent jumble of ideas. This ſenſe of the word undoubtedly took its riſe from the notorious folly and abſurdity of the rhapſodiſts, in their rapturous comments upon their favourite poets; for they undertook to explain, as well as to recite. Hence it is that in Suidas, the word ῥαψῳδία is defined by φλυαρία, *nonſenſe*.

RHAPSODOMANCY, ῥαψῳδομαντεία, an ancient kind of divination performed by fixing on a paſſage of a poet at hazard, and reckoning on it as a prediction of what was to come to paſs.

There were various methods of practiſing this rhapſodomancy. Sometimes they wrote ſeveral verſes or ſentences of a poet on ſo many pieces of wood, paper, or the like; ſhook them together in an urn; and drew out one, which was accounted the lot.

Sometimes they caſt dice on a table, on which verſes were written; and that on which the die lodged, contained the prediction.

A third manner was by opening a book, and pitching on ſome verſe, at firſt ſight. This method they particularly called the *ſortes Præneſtinæ*, and afterwards, according to the poet thus made uſe of, *ſortes Homericæ*, *ſortes Virgilianæ*, &c.

RHAPSODY, ῥαψῳδία, in *Antiquity*, a diſcourſe in verſe, ſung or rehearſed by a rhapſodiſt.

Others will have rhapſody properly to ſignify a collection of verſes, eſpecially thoſe of Homer; which, having been a long time diſperſed in pieces and fragments, were at length, by Piſiſtratus's order, digeſted into books, called rhapſodies; from the Greek ῥάπτω, *ſuo*, *I ſew*, and ᾠδή, *ſong*.

Hence, among the moderns, rhapſody is alſo uſed for an aſſemblage of paſſages, thoughts, and authorities, raked together from divers authors, to compoſe ſome new piece. Lipſius's Politics make ſuch a rhapſody, in which there is nothing of the author's own but conjunction and particles.

RHAPTE, in *Ancient Geography*, the metropolis of the Ethiopians, near the river Raptus. Steph. Byz.

RHATOSTATHIBIUS, or, as Baxter thinks it was originally written, *Retoſtaubius*, a river of the iſle of Albion, (England,) on the weſtern ſide, the mouth of which is placed by Ptolemy between that of the Tobius and the eſtuary of Sabrina. This is the river Wye, and its ancient name is derived from "Rot in Tav," the courſe of a river.

RHATTA, a town of Aſia, in Babylonia, in the vicinity of Chiriphe. Ptolemy.

RHAUCUS, a town of the iſland of Crete. Steph. Byz.

RHAVENA, a prefecture of Aſia, along the Euphrates. Ptolemy places in it ſix towns on the banks of the Euphrates, and four in the interior of the country.

RHAVIUM, a river of Hibernia, the mouth of which is placed by Ptolemy between the promontory "Boreum" and the town "Magnata."

RHAUNEM, in *Geography*, a town of France, in the department of the Seine, and chief place of a canton, in the diſtrict of Birkenfeld. The place contains 547, and the canton 5886 inhabitants, in 35 communes.

RHAUNETI, in *Ancient Geography*, a town of Arabia Felix, on the Arabian gulf, between the town "Phœnicum" and the extremity of this Cherſoneſus. Ptolemy.

RHAURARIS, a river of Gallia Narbonenſis, according to Strabo. This river is called "Araurius" by Ptolemy, and "Arauraris" by Pomponius Mela.

RHAUZIUM, the metropolis of Dalmatia, according to Cedrenus and Curopalata.

RHAW, George, in *Biography*, a learned bookſeller and muſician of Wittemberg, born in 1494. In 1531 appeared an "Enchiridion utriuſque Muſicæ Practicæ, ex variis Muſicorum Libris congeſtum," in 8vo. And in 1538 he not only publiſhed "Select Harmony for four Voices," conſiſting of two Latin Paſſiones, the one by John Galliculus, and the other by Jacob Otrecht, with maſſes, lamentations of Jeremiah, and motets by John Walther, Lewis Senfels, Simon Cellarius, Benedict Dux, Eckel, Lemlin, Stoel, and Henry Iſaac, to which Melancthon furniſhed him with a Latin preface; but in 1544 publiſhed, in oblong quarto, 123 German ſacred ſongs, of four and five parts, for the uſe of ſchools. Prefixed to the ſecond part of this publication, containing eccleſiaſtical hymns, ſet by ſixteen different German compoſers, there is a print of the editor, Geo. Rhaw, Typographus, Wittemb. anno ætatis ſuæ LIV.

RHAZES, one of the oldeſt and moſt diſtinguiſhed of the Arabian phyſicians, was born at Rei, in the province of Choraſan, about the year 852. There was a ſchool in his native town, at which he received his early education; but he is ſaid not to have commenced the ſtudy of medicine till ſomewhat late in life, having given up his time much to the cultivation of muſic. After he was thirty years of age, he removed to Bagdad, and then he turned his attention to philoſophy, and afterwards to phyſic. He became, however, indefatigable in his application, and was continually occupied in obſerving, reading, and writing, until he obtained the higheſt reputation; and he was ſelected out of a hundred eminent phyſicians, who were then reſident at Bagdad, to ſuperintend the celebrated hoſpital of that city. The hiſtorians conſidered him as the Galen of the Arabians; and from his long life and conſtant practice, during which he paid the moſt aſſiduous attention to the varieties of diſeaſe, he obtained the appellation of the experimenter, or the experienced. He was ſaid alſo to be profoundly ſkilled in all the ſciences, eſpecially in philoſophy, aſtronomy, and muſic. He travelled much in purſuit of knowledge, and made frequent journies into Perſia, his native country, and was much conſulted by ſeveral princes, particularly by Almanzor, the chief of Choraſan, with whom he frequently correſponded, and to whom he dedicated ſeveral of his writings. Abi Oſbaia enumerated two hundred and twenty-ſix treatiſes compoſed by Rhazes, among which the *ten* books, addreſſed to his patron Almanzor, are mentioned, and therefore are doubtleſs genuine, although Haly Abbas, who has given an account of him and his works, has not noticed them. This work Rhazes deſigned as a complete body of phyſic, and it may be deemed the great magazine of all the Arabian medicine; the ninth book, indeed, which treats of the cure of diſeaſes, was in ſuch general eſtimation for ſeveral centuries, that it was the text-book of the public ſchools, and was commented upon by the moſt learned profeſſors. Nevertheleſs, like the reſt of the Arabian writings, it contains very little more than the ſubſtance of the works of the Greeks, from whom the Arabians borrowed almoſt all their medical knowledge. They have, indeed, and Rhazes in particular, given the firſt diſtinct account of *the ſmall-pox*, a peſtilential malady which the Greeks have no where accurately deſcribed, and which is, therefore, generally inferred to have been unknown among that people. This is queſtionable; but, at all events, the firſt ſpecific account of the ſmall-pox is to be found in the works of Rhazes. He was the author, alſo, of the firſt treatiſe ever compoſed reſpecting the diſeaſes of children. His book on the affections of the joints is intereſting, and contains an account of ſome remarkable cures, effected chiefly by copious blood-letting. He deſcribes the ſymptoms of hydrophobia very well; and alſo

alſo ſome diſeaſes peculiar to eaſtern countries, as the ignis perſicus, vena medinenſis, &c.; and he firſt noticed the diſeaſe called ſpina ventoſa. Rhazes had the reputation of being a ſkilful alchemiſt; the art of chemiſtry, in fact, originated with the Arabians, and Rhazes is the firſt, as Dr. Freind has ſhewn, who mentions the uſe of chemical preparations in medicine. He has a chapter on the qualifications of a phyſician; and a ſingular tract on quacks and impoſtors, in which he has pourtrayed that claſs of pretenders to the life; and his detail of their pretenſions ſhews that they were at leaſt as numerous, and ingenious in their contrivances of cheatery, as in more recent times.

Rhazes lived to the age of eighty, and loſt his ſight: he died in the year 932. His works that have come down to us, through the medium of tranſlations in Latin, are, 1. A ſort of common-place book, entitled "Continens," or "Libri Continentes." 2. A much more perfect work, the "Libri Decem, ad Almanſorem," publiſhed at Venice, 1510. 3. Six books of aphoriſms, publiſhed under the title of "Liber de Secretis, qui Aphoriſmorum appellatur," Bononiæ, 1489. 4. A tract on the ſmall-pox, often tranſlated, and printed with the title of "De Peſtilentia;" the beſt tranſlation is by Channing, London, 1766. Freind's Hiſt. of Phyſic. Eloy Dict. Hiſt. de la Med.

RHAZUNDA, in *Ancient Geography*, a town of Aſia, in the interior of Media, between "Sanais" and "Veneca," according to Ptolemy.

RHEA, a town of Aſia, in Margiana, according to Ptolemy.

Rhea, in *Mythology*, one of the titles of Cybele, derived from ῥέω, *I flow*, on account of that abundance of benefits which ſhe diſpenſes.

Rhea was, according to Diodorus Siculus, one of the eight great divinities of Egypt; the other ſeven being the Sun, Saturn or Chronos, Jupiter, Juno, Vulcan, Veſta, and Mercury. Chronos, ſays this hiſtorian, having married Rhea, became, according to ſome, the father of Oſiris and Iſis, and, according to others, of Jupiter and Juno. The children of Rhea, by Saturn, were, according to fabulous hiſtory, Veſta, Ceres, Juno, Pluto, Neptune, and Jupiter, the father of gods and men; but that god learning from an oracle delivered by Cœlus and Terra, that one of his children ſhould dethrone him, devoured them as Rhea brought them forth, which threw her into extreme diſtreſs. So that when ſhe was near her time of being delivered of Jupiter, ſhe conſulted her parents to know in what manner ſhe might reſcue him from the cruelty of his father, and by their advice ſhe ſecretly withdrew into Crete, where ſhe was delivered, and preſented Saturn with a ſtone wrapped about with ſwaddling clothes, which he ſwallowed. Jupiter being grown up, reſcued Cœlus from the chains with which Saturn had loaded him; and Cœlus, in return for his ſervice, gave him thunder, by which he became the ſovereign of gods and men. Rhea was one of the names under which the earth was worſhipped.

Rhea *Sylvia*, was the mother of Remus and Romulus; and in order to give dignity to their origin, the fable reports that her uncle Amulius got into her cell, and her father Numitor propagated the ſtory that the twins ſhe brought forth had been begotten by the god of war.

Rhea, in *Ornithology*, a ſpecies of the ſtruthio or oſtrich, the ſame bird with the *nhan-duguacu* of the Braſils. See Struthio.

RHEBAN, in *Ancient Geography*, a river of Aſia, in Bithynia. According to Arrian, the ſource of this river was on mount Olympus, and its mouth in the Euxine ſea, near that of Pſillis.

RHECHIUS, a river of Greece, which diſcharged itſelf into the ſea near Theſſalonica. At the mouth of this river Juſtinian erected a fort called "Artemiſa."

RHEDA, in *Geography*, a town of Germany, the capital of a lordſhip, in the county of Lingen; 10 miles N. of Lipperſtadt. N. lat. 51° 47′. E. long. 7° 50′.

Rheda, a town of Holland, in Guelderland, on the Iſſel; ſeven miles N. of Arnheim.

RHEDONES, in *Ancient Geography*, a people of Gaul, in Armorica, according to Cæſar and Ptolemy.

RHEEDIA, in *Botany*, called Vanrheedia by Plumier, in honour of a moſt illuſtrious promoter of the ſtudy of Eaſt Indian plants, Henry Van-Rheede Van-Draakenſtein, to whoſe judgment and munificence, while governor of Malabar towards the latter part of the 17th century, the publication of that ſplendid work the *Hortus Malabaricus*, in 12 folio volumes, is owing.—Linn. Gen. 260. Schreb. 348. Mart. Mill. Dict. v. 4. Juſſ. 258. Lamarck Illuſtr. t. 457. (Vanrheedia; Plum. Gen. 45. t. 18.) Claſs and order, *Polyandria Monogynia*. Nat. Ord. *Guttiferæ*, Juſſ.

Gen. Ch. *Cal.* none. *Cor.* Petals four, ſeſſile, obovate, concave, ſpreading. *Stam.* Filaments numerous, thread-ſhaped, longer than the corolla; anthers oblong. *Piſt.* Germen ſuperior, ovate; ſtyle cylindrical, the length of the ſtamens; ſtigma funnel-ſhaped. *Peric.* Berry ovate, thin, of one cell. *Seeds* three, very large, ovate-oblong, marked with ſimple or branched lines.

Eſſ. Ch. Petals four. Calyx none. Berry ſuperior, with three ſeeds.

1. R. *lateriflora*. Linn. Sp. Pl. 719. (Vanrheedia folio ſubrotundo, fructu luteo; Plum. Ic. 255. t. 257.)—Native of South America. A *tree* known only to Plumier, whoſe figure repreſents it with large, oppoſite, ſtalked, ovate, entire *leaves*; axillary tufts of numerous, rather ſmall, *flowers*; and ovate pendulous *fruit*, about two inches long. Juſſieu doubts whether the *calyx* be really wanting.

Linnæus does not appear to have ever had a ſpecimen of this plant; nor can we account for his ſtriking out (in Mant. 401.) the obſervation in his Sp. Pl. for which he has ſubſtituted, in Syſt. Veg., the following deſcription, taken from ſome Eaſt Indian ſpecimen, as his original manuſcript ſhews, and certainly foreign to the true *Rheedia*. "A *tree*, with jointed, compreſſed, even, downy *branches*. *Leaves* oppoſite, ſtalked, lanceolate, entire, ſmooth. *Footſtalks* ſhort, downy. *Flower-ſtalks* axillary, about three together, three cleft, three-flowered."

Willdenow has omitted this genus, in its proper place, nor have we diſcovered what he has done with it.

RHEGADORA, in *Ancient Geography*, a town of Aſia, in Cappadocia.

RHEGIANUM, a town of Lower Mœſia, on the bank of the Danube. Ptolemy.

RHEGIAS, a town of Aſia, in Syria: according to Ptolemy it was in Cyrrheſtica, between Ariſeria and Ruba.

RHEGIUM, or Regium, (*Reggio*), a town of Italy, at the extremity of Brutium, in the ſtrait of Sicily. In the time of Dionyſius the tyrant, the inhabitants of Rhegium formed a league againſt him, which terminated in a treaty in the year 354. A difference afterwards occurring between them, he beſieged the town and took it, after about eleven months, in 365. The conduct of Dionyſius during this ſiege was in the higheſt degree ſavage and brutal. Rhegium afterwards became ſubject to the Romans; but a legion, encouraged by the example of the Mamertins of Meſſina, revolted in 472, and took poſſeſſion of the city. After ten years' poſſeſſion, it was beſieged by the Romans, and thoſe who eſcaped the deſtruction of the ſiege, to the

amount of about 300, were carried to Rome, where they were ſcourged and beheaded. This city ſuffered much from the earthquake that ravaged Calabria; and even in the time of the Romans it was abandoned by its inhabitants, on account of the calamities which it had ſuffered; but Cæſar rebuilt it, after having driven Pompey from Sicily. Virgil (l. iii. v. 414, &c.) thus deſcribes it:

"Hæc loca vi quondam, et vaſtâ convulſa ruinâ
(Tantum Ævi longinqua valet mutare vetuſtas)
Diſſiluiſſe ferant, quam protenus utraque tellus
Una foret; venit medio vi pontus, et undis
Heſperium Siculo latus abſcidit arvaque et urbes
Littore diductas auguſto interluit æſtu."

RHEGMA, a place of Aſia, in Cilicia, at the mouth of the river Cydnus. Strabo.—Alſo, a town of Arabia Felix, on the coaſt of the Perſian gulf, in the country of the Anarites. Ptolemy.

RHEGMA, formed of ῥήγνυμι, *I break*, a word uſed by the ancients to expreſs any breaking or burſting of a ſoft part without a wound, but moſt frequently for abſceſſes breaking inwardly.

RHEID, in *Geography*, a town of France, in the department of the Roer; 2 miles E. of Gladbeck.

RHEIMS. See REIMS.

RHEIN, a town of Pruſſia, in the province of Natangen, on a lake which communicates with Spirding lake. It has a large fortified caſtle, and an inferior court of juſtice; 68 miles S.E. of Königſberg. N. lat. 53° 48′. E. long. 21° 42′.

RHEINAU, a town of France, in the department of the Lower Rhine, ſituated on the Rhine, and very much reduced by the inundations of the river; 5 miles S. of Straſburg.—Alſo, a town of Switzerland, in the Thurgau, ſituated on an iſland formed by the Rhine, with a convent; 5 miles S.S.W. of Schaffhauſen.

RHEINBACH, a river of Saxony, which joins the Loderbach, near Bitterfeld.

RHEINBACH, a town of France, in the department of the Rhine and Moſelle, and chief place of a canton, in the diſtrict of Bonn. The place contains 1119, and the canton 16,478 inhabitants, in 37 communes.

RHEINBECK, a town of the duchy of Holſtein; 10 miles E. of Hamburg.

RHEINBERG, a town of France, in the department of the Roer, and chief place of a canton, in the diſtrict of Creveldt; 44 miles N.W. of Cologne. The place contains 1705, and the canton 7166 inhabitants, in 17 communes.

RHEINE, or REINEN, a town of Germany, in the biſhopric of Munſter, on the Embs, near which are ſome ſalt ſprings; 22 miles N. of Munſter. N. lat. 52° 21′. E. long. 7° 25′.

RHEINECK, or RHEINEGG, a town of Switzerland, and capital of the Rheinthal, ſituated on the Rhine, near its confluence with the lake of Conſtance, inhabited chiefly by Proteſtants; 26 miles S.E. of Conſtance.

RHEINFELDEN, a town of Germany, and lately one of the four foreſt towns of Auſtrian Swabia, on the S. ſide of the Rhine, on the oppoſite bank of which is a covered way, built like a horn-work, and communicating with the town by means of a bridge; 9 miles E. of Bâle. N. lat. 47° 35′. E. long. 7° 50′.

RHEINFELS. See RHENFELS.

RHEINHAUSEN, a town of Baden, in the circle of the Upper Rhine, on the E. ſide of the Rhine; 3 miles S.E. of Spire.

RHEINMAGEN. See REMAGEN.

RHEINSDORF. See RONSDORF.

RHEINTHAL, a bailiwic of Switzerland, between the canton of Appenzel and the Rhine, belonging to the nine cantons, about 30 miles long, and from three to eight broad. The country is fertile, and produces excellent wine. The number of inhabitants is about 13,000, who are partly Proteſtants and partly Roman Catholics.

RHEINWALD, a valley in the country of the Griſons, about 20 miles long, which takes its name from a branch of the Rhine that paſſes through it.

RHEMAN, or REMAN, in *Ancient Geography*, a fortified place of Aſia, in Meſopotamia, which belonged to the Romans, according to Ammianus Marcellinus.

RHEMBA, in *Hindoo Mythology*, is a character correſponding in many parts to the popular Venus of the Greeks. Like her ſhe ſprang from the foam of the ocean, when churned by the gods and demons for the purpoſe of obtaining the amrita, or beverage of immortality, as noticed under the articles KURMAVATARA and LAKSHMI. She is ſometimes ſaid to be an incarnation of Lakſhmi, conſort of Viſhnu. More correctly, however, ſhe is ſtationed in the court of Indra, as the chief of his bands of celeſtial choriſters, named Apſara, Devangana, Gandharva, &c. The Apſaras, or Upſaras, are the Nereids of the Hindoo Pantheon: having ſprung from water, they are called water nymphs, and aſſiſt Indra, the Jupiter Pluvius of India, in his regency over aqueous phenomena. (See UPSARA.) In the churning proceſs above adverted to, theſe fair damſels were produced in extravagant numbers, according to the Ramayana, *viz.* 600 millions! "of reſplendent and celeſtial form; adorned with glorious ornaments, and endowed with beauty, youth, ſweetneſs, and every grace." Theſe intereſting offſpring of poetical imagination are proverbially elegant and graceful. The three wives of the mortal father of Ramachandra are ſaid, in the work juſt quoted, to be queens, who, "in elegance of form, rivalled the Apſaras." As the chief of theſe damſels of Paradiſe, the ſubject of this article is ſometimes ſtiled Rhemba-devi, or the goddeſs Rhemba.

In Hindoo writings, eſpecially in amatory poetics, alluſions frequently occur to the Upſaras, who correſpond alſo with the fairies of the Perſians. Many are mentioned by name, Rhemba the oftneſt, Urvaſi, Tilotamma, Menaka, &c. (See thoſe articles.) Under the name of the laſt we have given an inſtance of the uſe made by Indra of theſe obſequious fulfillers of his will; for, as well as in the line of ſinging, dancing, &c. condeſcenſions to the Indra-dikas, or the demi-gods, the Apſaras are the faſcinating diſturbers of holy men, when engaged in ſuch fervent auſterities as threaten the ſafety of Indra in his firmamental throne. In explanation of which, it requires to be noticed that Indra was originally a mere mortal; but learning that the throne of heaven was the reward of the man who ſhould, with the preſcribed ceremonies, perform one hundred aſwamedhas, or ſacrifices of a horſe, he did ſo, and obtained his dominion, and the name of Shatkratu, or he who performs a hundred ſacrifices. (See INDRA.) His throne he retains until another mortal ſhall equal or exceed him in this potent ſtile of propitiation. He is, therefore, always on the watch; and being all eyes, never fails to diſcover auſtere ſaints while performing their rigid duties; when he either ſteals or deſiles the horſe intended and ſanctified for the next ſacrifice, or detaches Rhemba or Menaka, or ſome other of his damſels of "faſcinating ſymmetry of form," who always ſucceed in exciting emotions incompatible with the required purity of ſuch as aſpire to ouſt Indra from his ethereal throne. See MENAKA.

The name Apfara is fometimes written *Upfara*, under which latter word fomething farther concerning thefe damfels will be found.

RHENA, in *Geography*, a town of Germany, in the duchy of Mecklenburg; 22 miles W.S.W. of Wifmar. N. lat. 53° 50′. E. long. 11° 10′.

RHENANUS, Beatus, in *Biography*, a learned German, was born at Rheinac in 1485, and died at Strafburgh in 1547. He was corrector of the prefs for Frobenius, and by that means formed an intimacy with Erafmus. He wrote "A Hiftory of Germany," 4to.; "Illyrici Provinciarum utrique Imperiorum Romano, tam Conftantinopolitano Servientis, Defcriptio," 8vo. He was alfo the editor of Velleius Paterculus, and other works.

RHENEA, in *Ancient Geography*, an ifland of the Ægean fea, in the neighbourhood of that of Delos. Strabo fays that it was deferted, but that it was the place of burial for the inhabitants of Delos; which being deemed facred, it was forbidden to bury the dead in it. The two ifles of Delos and Rhenea are called "Dili or Ifdiles."

Rhenea retains its name, and is denominated alfo Great Delos; it is feparated from the famous ifland of Delos by a ftrait of about 500 toifes. In the middle of this narrow channel are two fhoals, called the Great and the Little Ramateari: the ancient Greeks had confecrated the larger to Hecate or Diana, and called it the ifland of Hecate, or Pfammite. Ships, even men of war, find good anchorage near this ifland. N. lat. 37° 10′. E. long. 25° 15′. See Delos.

RHENEN, in *Geography*, a town of Holland, in the department of Utrecht, feated on the river Leck; 20 miles N.N.E. of Bois-le-Duc. N. lat. 51° 59′. E. long. 5° 30′.

RHENFERD, James, in *Biography*, a celebrated oriental fcholar, was born at Mulheim, in Weftphalia, in the year 1654. He went through a courfe of academical ftudies at the college of Meurs, a city in the duchy of Cleves, and afterwards travelled for improvement into foreign countries. In 1678, when he was 24 years of age, he accepted an invitation to become rector of the Latin college in the city of Franeker; but upon the condition that, while he held that poft, he fhould be at liberty to deliver lectures on the Oriental languages. He refigned his rectorfhip and removed to Amfterdam, where fome of the moft wealthy families in that city employed him in the capacity of tutor, and he enjoyed, at the fame time, a favourable opportunity for converfing with learned Jews, and improving his knowledge of rabbinical learning. In the year 1683, a vacancy having taken place in the profefforfhip of the Oriental languages and facred philofophy at the univerfity of Franeker, by the removal of the famous Vitringa to the theological chair, M. Rhenferd received an invitation to fill it; which he accepted. M. Rhenferd held this poft nearly thirty years, during which he had the honour of being thrice chofen rector of the univerfity. He died in 1712, when he was in the 59th year of his age. His learning was general and extenfive; but he chiefly excelled in an acquaintance with the Hebrew, including the Rabbinical, the Chaldee, and Syriac. He was author of feveral learned works, among which the following may be mentioned; "De Antiquitate Characteris hodierni Judaici," 1696, 4to.; in which he endeavoured to eftablifh the claim of the prefent Hebrew characters to the higheft antiquity, and to prove that the Samaritan characters were borrowed from the Hebrews; "Comparatio Expiationis anniverfariæ Pontificis maximi in Vet. Teft. cum unica atque æterna Expiationis Chrifti Domini;" "Inveftigatio Præfectorum et Miniftrorum Synagogæ," 1700, 4to.; "Differtationum Theologico-philologicarum de Stylo Novi Teftamenti Syntagma, quo continentur Olearii, Cocceii, &c. de hoc genere Libelli," &c. 1701, 4to.; "Arabarcha, feu, Ethnarcha Judæorum," 1702, 4to.; "De Statuis et Aris, falfis verifque Dei et Hominum Internunciis," in illuftration of Exod. xx. 23, 24, 1705, 4to.; "Obfervationum felectarum ad Loca Hebræa Nov. Teft. partes five Difput. Tres," 1705, 4to. &c. In 1706 he commenced the publication of a work, entitled "Rudimenta Grammaticæ Harmonicæ Linguarum Orientalium, Hebrææ, Chaldaicæ, Syriacæ, et Arabicæ," which he did not live to finifh.

RHENONES, among the ancient Germans, a kind of garment covering the fhoulders and breaft down to the middle. It was either entirely made of fkins, or covered over with them; the long hair of which being outward, proved a good defence againft rain.

RHENUS, in *Geography*. See Rhine.

RHEO-STATICS, is ufed by fome for the ftatics, or the fcience of the equilibrium of fluids.

RHERIGONEUS Sinus, in *Ancient Geography*. See Rerigonian *Bay*.

RHESAPHA, a town of Syria, in the Palmyrene, near Cholle. Ptol.

RHESCIPA, or Reschipha, a town of Afia, in Mefopotamia, upon the banks of the Euphrates, between Bethauna and Agamana. Ptol.

RHESINA, a town of Afia, near Mefopotamia, on the river Aboras. Steph. Byz.

RHETICUS, George Joachim, in *Biography*, an excellent German aftronomer and mathematician in the 16th century, and a native of Feldkirk, the chief town of one of the weftern counties of the Tyrolefe, was born in the year 1514. Difcovering early an inclination towards the ftudy of the mathematics, he was initiated in the elements of that fcience at Zurich; whence he removed to the univerfity of Wittemberg: here he took the degree of mafter of philofophy in 1535, and two years afterwards he was made joint profeffor of the mathematics and aftronomy with the famous Reinhold. (See his article.) While he was daily rifing into reputation by his lectures, he was informed of the hypothefis of Copernicus concerning the revolution of the heavenly bodies; which appeared to him to be fo reafonable, that he determined to refign his profefforfhip, and ftudy the doctrine under the inftructions of its author. Accordingly, in 1539, he left Wittemberg, and went into Pruffia, where he became a difciple of that great man. To the fyftem of Copernicus he foon became an entire convert; and he afterwards affifted his mafter for fome years in his aftronomical labours. In vain did he for a long time urge Copernicus, in common with the other friends of that aftronomer, to favour the world with his grand work, "De Revolutionibus Orbium Cœleftium." At length, the perfuafions of his friends having prevailed upon Copernicus to permit the appearance of his work, the care of editing it was confided to Rheticus, who caufed it to be printed at Nuremberg in 1543, in folio. He now began his very elaborate "Canon Doctrinæ Triangulorum," or canon of fines, tangents, and fecants, to fifteen places of figures, and to every ten feconds of the quadrant: a defign which he did not live to complete. The canon of fines, however, to the fame radius, for every ten feconds, and for every fingle fecond in the firft and laft degree of the quadrant computed by him, was publifhed at Francfort in 1613, folio. Upon the death of Copernicus, who lived only a few hours after he received a copy of his printed work, Rheticus returned to Wittemberg, and was again admitted to his poft of mathematical and aftronomical profeffor. For fome time after

after this he taught the mathematics at Leipſic; and he afterwards left Saxony a ſecond time, and went into Poland. In the year 1576, upon the invitation of a Hungarian nobleman, he went to Caſſavia in Hungary, where, in conſequence of ſleeping in a room recently plaiſtered, he caught a diſorder on his lungs, which proved fatal to him in the 63d year of his age. He compoſed and publiſhed "Ephemerides," according to the doctrinae of Copernicus, till the year 1551; "Orationes de Aſtronomia, Geometria, et Phyſica," &c.

RHETORIANS, Rhetorii, a ſect, in the fourth century, in Egypt, ſo nominated from their leader Rhetorius.

His diſtinguiſhing doctrine, as repreſented by Philaſtrius, was, that he approved of all the hereſies before him, and taught that they were all in the right. But what Philaſtrius mentions of him appears ſo abſurd and ridiculous, that St. Auguſtine, Hæreſ. 7, could not perſuade himſelf it was true.

RHETORIC, Rhetorica, formed from ῥητορικὴ, of ῥέω, *I ſpeak*, whence ῥήτωρ, *ſpeaker*, *orator*, *&c.* the art of ſpeaking copiouſly on any ſubject, with all the advantages of beauty and force.

Rhetoric is generally conſidered as the art of perſuaſion. It attempts to produce conviction concerning ſome particular object, that it may influence the will to a correſponding determination. It ſeeks either to arouſe the mind to action, or to diſſuade it from acting upon the reſolutions already taken, or ſuch as are in contemplation. Its immediate employment is not to ſearch after truth, but to render acknowledged or ſuppoſed truths influential. It leaves to logic the province of cool inveſtigation, and of drawing legitimate concluſions from admitted premiſes, without any regard to motives. The rhetorician is ſolicitous to effect ſome particular purpoſe, and calls in the art of reaſon merely as an auxiliary. He attempts to influence the will by reaſoning with the affections; knowing that if they be gained over to the party eſpouſed, the will is ready to follow. He, therefore, artfully conceals, or ſlightly paſſes over, every circumſtance which is not favourable to his views, and brings forwards and largely expatiates upon thoſe which are. He ſuggeſts motives of pleaſure, utility, ſafety, honour, pity, &c. as the ſubject admits. He not only pre-ſuppoſes the object in view of the firſt importance, but he employs every method to implant this conviction in the minds of thoſe whom he endeavours to perſuade. Theſe attempts become moſt ſucceſsful by a cloſe imitation of that train of ideas, and thoſe modes of expreſſion, which any particular paſſion or affection is prone to ſuggeſt. If the deſign be to excite *anger* and *reſentment*, rhetoric imitates the language of anger. It places the ſuppoſed offence in the ſtrongeſt point of view, and deſcribes it in the moſt vivid colours. It aſſiduouſly collects and expatiates upon every circumſtance which contributes to the aggravation of the crime. It is indignant againſt that ſpiritleſs tranquillity which can patiently endure ſuch inſults, and attributes reluctance to revenge to mean and cowardly motives. If its object be to excite *horror*, it aſſembles together every circumſtance which has a tendency to alarm with a ſenſe of danger. It ſtigmatiſes courage with the epithet of raſhneſs, and flight is dignified with the title of prudence, &c. If *compaſſion* be the object, it expatiates upon the wretched ſtate of the ſufferer; his fears, his apprehenſions, his penitence. It palliates his faults, extols his good qualities, and thus collects, in one point of view, all his claims on commiſeration. The ſpecies of argument, which perſons under the influence of paſſions and ſtrong affections perpetually adopt, is rendered more efficacious by appropriate language. The rhetorician, therefore, ſtudies and imitates the particular language of each paſſion, either in its energy, vivacity, or diffuſeneſs. Hence he liberally employs all thoſe tropes and figures of ſpeech which nature ſuggeſts, and art has claſſified.

Oratory adds to rhetorical compoſition the advantages of *elocution*. It adapts the manner of delivery to the nature of the ſubject and the appropriate language. It takes the characteriſtic ſigns of each emotion for its model, as far as it dares to imitate, without the imputation of mimickry; it enters into the attitudes, geſtures, tones of voice, accents, emphaſis, expreſſions of countenance, inſpired by the particular emotion, in ſuch a manner, that not an idea is ſuffered to loſe its proper effect, by any deficiency in kind or degree of energy communicated to it; and thus it enjoys every advantage to be derived from the power of ſympathy.

Eloquence, according to the modern ideas of it, appears to be the medium between the impetuoſity which oratory admits, and which was highly characteriſtic of ancient oratory, and the ſtudied artifice of the profeſſed rhetorician. The term is ſometimes applied to *compoſition*, and ſometimes to *delivery*. When applied to both, it comprehends a certain degree of elegance, both of diction and of manner. The want of that energy which approaches to violence, is compenſated by pertinency of language, fluency of utterance, and guarded chaſtity of addreſs. In a word, its excellency conſiſts in a pleaſing adaptation of language to the ſubject, and of manner to both. It refuſes too cloſe an imitation of the turbid emotions, but it delights in animated deſcription. It ſeems rather partial to the pathetic; the elegance and graces which it loves, harmonize moſt eaſily and ſucceſsfully with the ſofteſt and fineſt feelings of our nature. (Cogan on the Paſſions.) See Elocution, Eloquence, and Oratory.

Rhetoric, *Characters in.* See Character.

RHETORICAL Numbers. See Numbers.

Rhetorical *Accent*, among *Hebrew Grammarians.* See Accent.

RHETORICIAN. See Oratory.

RHEU, La, in *Geography*, a town of France, in the department of the Ille and Vilaine; five miles W.S.W. of Rennes.

RHEUM, in *Botany*, a name derived, as Linnæus ſuppoſes, from ῥέω, *to flow*, on account of its active medicinal properties. The Ῥῆον, or Ῥᾶ, of Dioſcorides is probably of this genus, and the origin of the name.—Linn. Gen. 201. Schreb. 271. Willd. Sp. Pl. v. 2. 488. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 430. Juſſ. 82. Gærtn. t. 119. Lamarck Dict. v. 6. 192. Illuſtr. t. 324. (Rhabarbarum; Tournef. t. 18.) Rhubarb.—Claſs and order, *Enneandria Monogynia.* Nat. Ord. *Holeraceæ*, Linn. *Polygoneæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, narrowed at the baſe, withering, but permanent, cloven into ſix obtuſe ſegments, alternately ſmaller. *Cor.* none, except the three inner ſegments of the calyx be conſidered ſuch, as in *Rumex.* *Stam.* Filaments nine, capillary, equal in length with the calyx, and inſerted into it; anthers twin, oblong, obtuſe. *Piſt.* Germen ſuperior, ſhort, triangular; ſtyles ſcarcely any; ſtigmas three, reflexed, feathery. *Peric.* none. *Seed* ſolitary, large, triangular, acute, with membranaceous margins.

Eſſ. Ch. Calyx ſix-cleft, permanent. Seed one, triangular.

1. R. *Rhaponticum.* Rhapontic Rhubarb. Linn. Sp Pl. 531. Alpin. Rhapont. 1. t. 1.—"Leaves obtuſe,

 ſmooth;

ſmooth; veins ſomewhat hairy beneath; the ſinus dilated at the baſe: ſtalks furrowed on the upper ſide, rounded at the edge."—Native of Aſia, and cultivated, like all the other ſpecies (except *Leucorrhizum*), at Kew, where they moſtly flower in May and June.—*Root* large and thick, much divided, reddiſh-brown on the outſide, yellow within. *Stems* from two to three feet high, jointed, purple. *Leaves* not expanded at firſt, but folded, ſmooth, roundiſh heart-ſhaped, on thick, reddiſh, channelled ſtalks, which have an acid flavour, and are uſed for making tarts. *Flowers* white, forming a thick, obtuſe, denſe tuft, which becomes a panicle of large, triangular, brown *ſeeds*.

2. R. *undulatum*. Waved-leaved or Chineſe Rhubarb. Linn. Sp. Pl. 531. Amœn. Acad. v. 3. 230. t. 4.—"Leaves rather hairy, undulated; the ſinus dilated at the baſe: ſtalks flat above, ſharp at the edges."—Native of China and Siberia.—*Root* compoſed of numerous thick fibres, running further into the ground, and of a deeper yellow than the foregoing. *Stem* upright, three or four feet in height, of a pale browniſh colour. *Leaves* ſomewhat tapering, much waved at their edges, ſtrongly veined beneath. *Flowers* white, in looſe panicles or bunches. *Seeds* of a ruſty brown.

3. R. *palmatum*. Officinal or Turkey Rhubarb. Linn. Sp. Pl. 531. Mill. Illuſtr. t. 30. Woodv. Med. Bot. 127. t. 46.—"Leaves palmate, pointed, roughiſh; the ſinus dilated at the baſe: ſtalks obſoletely furrowed above, rounded at the edge."—Native of China and Tartary.—*Root* perennial, thick, oval, ſending forth numerous tapering branches, externally brown, internally yellow. *Stem* erect, ſix or eight feet high, round, hollow, jointed, ſheathed, ſlightly furrowed, branched towards the top. *Radical-leaves* numerous, large, rough, roundiſh, deeply lobed; *ſtem-leaves* one at each joint, from a membranous ſheath, ſmaller upwards. *Flowers* of a greeniſh-white colour, ſurrounding the branches in numerous cluſters, forming a kind of ſpike.

The roots of this and the laſt ſpecies conſtitute the drugs which in our ſhops are known by the names of Chineſe and Turkey Rhubarb, although other ſpecies of *Rheum*, eſpecially *compactum*, poſſeſs like medicinal properties, and their roots are of courſe ſometimes ſubſtituted for the true ones. Profeſſor Martyn and Dr. Woodville have taken great pains to illuſtrate this genus, ſo juſtly celebrated for its purgative qualities. Dr. Pulteney remarks, that if *R. undulatum* and *R. palmatum* are planted near each other, they produce a hybrid variety, more excellent in kind than the parent plants.

4. R. *compactum*. Thick-leaved Rhubarb. Linn. Sp. Pl. 531. Mill. Ic. v. 2. 145. t. 218.—Leaves ſomewhat lobed, very obtuſe, lucid, ſharply toothed, quite ſmooth.—Native of Tartary.—*Roots* large, much divided, yellow within. *Stems* five or ſix feet high, green, branched at the upper part. *Leaves* long, broad at the baſe, coriaceous and compact, rather waved, and having a ſharp acid flavour. *Flowers* white, forming an erect panicle or ſpike. This is frequently ſubſtituted for the real rhubarb.

5. R. *tartaricum*. Tartarian Rhubarb. Linn. Suppl. 229. Willd. n. 5.—Leaves ovate, heart-ſhaped, undivided, flat, ſmooth, on roundiſh, angulated ſtalks. Panicle furrowed.—Native of Leſſer Tartary. We know of neither ſpecimen nor figure of this ſpecies. Linnæus deſcribed it from the Upſal garden as having large *leaves*, the radical ones procumbent, with dilated veins, on red ſtalks, which are convex beneath. *Inflorescence* ſcarcely higher than the leaves.

6. R. *Ribes*. Warted-leaved Rhubarb. Linn. Sp. Pl. 532. Desfont. in Ann. du Muſ. v. 2. 261. t. 49. (Lapathum orientale, aſpero et verrucoſo folio, Ribes Arabibus dictum; Dill. Elth. v. 1. 191. t. 158. f. 192.)—Leaves very obtuſe, verrucoſe, with ſpinous veins beneath; ſtalks flat above, rounded at the margin.—Native of the Levant; on mount Libanus, and other mountainous parts of Syria.—*Root* thick and fleſhy. *Stems* two feet high, hairy, green, tinged with purple towards the bottom. *Leaves* large, curled at the edges, veined, of a purpliſh-green colour, paler beneath, ſtudded with warts. Linnæus, who had never ſeen the flower, referred this plant to *Rheum* from its habit.

7. R. *hybridum*. Baſtard Rhubarb. Willd. n. 7. Murray in Comment. Gott. 1779, 7. t. 1.—Leaves ſmooth above, rather hairy beneath, ſlightly lobed, acute; the ſinus narrowed at the baſe; ſtalks obſcurely furrowed above, rounded at the margin.—Native of the north of Aſia.—Very ſimilar in habit and appearance to *R. palmatum*, and we are much diſpoſed to conſider it, with profeſſor Murray, as a hybrid plant produced between that and ſome other ſpecies. The *leaves* of this are not ſo much nor ſo deeply cut as thoſe of *palmatum*.

8. R. *leucorrhizum*. White-rooted Rhubarb. Willd. n. 8. Pallas Nov. Act. Petrop. 1792, 381.—Leaves tranſverſely oval, depreſſed. Panicle divaricated when in ſeed. Two ſegments of the calyx many times larger than the reſt.—Native of deſart places, on the mountains of Siberia.—Adopted by Willdenow, on the authority of Pallas, who deſcribes it thus. "*Radical-leaves* uſually three, procumbent, four or five inches wide, three-nerved, much veined, ſmooth, coriaceous, lengthened out at the baſe; rough at the edges, with very minute, cartilaginous, acute crowded teeth. *Stalks* compreſſed, ſmooth, ſolid, ſucculent. *Flowering-ſtem* a ſpan high, furrowed, panicled."

Rheum, in *Gardening*, contains plants of the herbaceous, perennial, luxuriant kind, of which the ſpecies chiefly cultivated are; the rhapontic or common rhubarb (R. rhaponticum); the palmated-leaved (R. palmatum); the compact thick-leaved rhubarb (R. compactum); the waved-leaved Chineſe rhubarb (R. undulatum); the warted-leaved Perſian rhubarb (R. ribes); and the Tartarian or heart-leaved rhubarb (R. tartaricum.)

It is ſtated, on the authority of ſeveral cultivators of the firſt ſpecies of this plant, by the editor of Miller's Dictionary, that by proper attention in the growth and preparation of the root, it may be obtained here nearly in equal goodneſs to the foreign.

Method of Culture.—Theſe plants are all increaſed by ſeeds, which ſhould be ſown in autumn ſoon after they are ripe, where the plants are deſigned to remain, as their roots being large and fleſhy when they are removed, they do not recover it ſoon; nor do the roots of ſuch removed plants ever grow ſo large and fair as thoſe which remain where they were ſown. When the plants appear in the ſpring the ground ſhould be well hoed over, to cut up the weeds; and where they are too cloſe, ſome ſhould be cut up, leaving them at the firſt hoeing ſix or eight inches aſunder; but at the ſecond, they may be ſeparated to a foot and a half diſtance, and more. When any weeds appear, the ground ſhould be ſcuffled over with a Dutch hoe in dry weather; but after the plants cover the ground with their broad leaves, they keep down the weeds without any further trouble. The ground ſhould be cleaned in autumn when the leaves decay, and in the ſpring, before the plants begin to put up their new leaves, be dug well between them. In the ſecond year, many of the ſtrongeſt plants will produce flowers and ſeeds, and in the third year moſt of them. It is adviſed, that the ſeeds be carefully gathered when ripe, and not

not permitted to ſcatter, leſt they grow and injure the old plants.

The roots continue many years without decaying, and it is ſaid that the old roots of the true rhubarb are much preferable to the young ones. The roots may be generally taken up after four years, but if they remain longer, it is ſo much the better.

Theſe plants delight in a rich ſoil, which is not too dry nor over moiſt: and where there is a depth in ſuch land for their roots to run down, they attain a great ſize, both in the leaves and roots.

Some cultivators think that the ſowing is beſt performed in the later ſpring months; but in this way, as the ſeeds are ſlow in vegetating, there is much time loſt. And a hot-bed has been ſometimes employed, though it is not much adviſed.

The rhubarb plants may be alſo increaſed from offsets, ſeparating ſome of the eyes or buds which ſhoot out on the upper parts of the root, together with a ſmall part of the root itſelf, having ſome of the fibres to it. Theſe offsets may be taken from roots of three or four years old, without any injury to the plant. By this method a year is ſaved, and the plants are not in ſuch danger of being devoured by vermin as thoſe from ſeed, nor ſo uncertain in growing; they are not ſo tender, and only require keeping clear of weeds. There is no difference in the ſize of the roots thus raiſed, from thoſe which grow from ſeeds. This method was practiſed by Mr. Hays, and in Mr. Hayward's practice ſeveral offsets were ſlipped from the heads of large plants in the ſpring, and ſet with a dibble about a foot apart. Four years after, he took up the roots, and found them very large, and of excellent quality. On further experience, when he took up his roots, either in ſpring or autumn, he divided the head into many parts; theſe he planted directly, at two feet diſtance, if intended for future removal; but if to remain for a crop, at four feet and a half.

And in the culture of this root for medicinal uſes, the nature of the aſpect is ſaid not to be very material, provided it be not ſhaded too much on the ſouth or weſt. The indiſpenſable points are the depth and good quality of the ſoil, which ſhould be light, loamy, and rich, but not too much ſo, leſt the roots be too fibrous: it can ſcarcely be too dry, for more evil is to be expected from a ſuperabundancy of moiſture than from any actual want of it. If, with theſe advantages, the plantation can be placed on a gentle declivity, ſuch a ſituation may be ſaid to be the moſt deſirable. Where a plantation does not poſſeſs the natural advantage of being on a declivity, narrower beds and deepened trenches are among the artificial means that ſhould be adopted; but moſt ſituations will require ſome care to prevent the ill effects of water remaining on the crowns of the plants: therefore, when the ſeed-ſtalks are cut off, which ought always to be done immediately upon the withering of the radical leaves, they ſhould be covered with mould, in form of a hillock. This proceſs will anſwer two good purpoſes; that of throwing off the rain, and keeping open the trenches by taking the earth from them. And it is obſerved, that the injuries to which the young plants are moſt liable, are from ſlugs and other vermin, from inattention to the ſeaſon and manner of planting, and from too great an expoſure to froſt. Little damage is to be feared from heat; and, in general, they are hardy and eaſy of cultivation when arrived beyond a certain term. It is adviſed to take great care of the nurſery bed, as the pains beſtowed by conſtant waterings, and protecting the young plants from the ravages of inſects, will amply repay the planter. Roots that thrive well here, will in three years arrive at an equal ſize with others, that have not ſucceeded ſo well at the end of five. When a plantation is to be formed, or a vacancy filled up, ſelect the fineſt and moſt thrifty plants. No plant will come to any thing when it has loſt its principal bud.

It is alſo obſerved, that there is a difference of opinion in reſpect to the age at which the roots ought to be taken up for uſe; but it is probably beſt done from four to eight years. They are the beſt when taken up in autumn, in a dry time, and ſhould be immediately dried and prepared by cutting into pieces and cleaning, hanging them on proper ſtrings in a dry airy place.

And ſome plants of each of the ſorts may alſo be introduced in the dry borders and clumps, for the ornamental effect of the leaves and flowers.

RHEUM, in *Medicine*, ῥευμα, *defluction*, a term which was in common uſe in the vocabulary of the humoral pathologiſts, to denote the fluid diſcharged from a part, as of mucus in coryza and catarrh, and alſo a ſuppoſed accumulation or congeſtion of fluid in a part. In their doctrine, every inflammation and tumour was aſcribed to a defluction of ſome humour in the part affected; but modern obſervation has taught us, that the accumulation of fluid, in theſe caſes, is generally the effect, and not the cauſe, of the diſeaſe; being the conſequence of inflammatory action of the veſſels, which produces an increaſed diſcharge and an altered condition of their ſecreted fluids. Although the term and the doctrine are both exploded, they have left a popular appellation attached to a diſeaſe, which is univerſally called *rheumatiſm*.

RHEUMATISM, from the preceding word, a painful diſeaſe uſually affecting the joints, and ſometimes the muſcles. The appellation ſeems to have been firſt limited to this diſorder by a celebrated French writer, Baillou, or, as he calls himſelf in Latin, Ballonius; and has ſince been adopted both by the erudite and the vulgar.

Rheumatiſm aſſumes two or three forms, remarkably different from each other, independently of the varieties which difference of ſeat occaſions; a difference, indeed, which is rather nominal than real. Of the latter diſtinctions, we have *lumbago*, when the diſeaſe is ſeated in the loins (*lumbi*); *iſchias*, or *ſciatica*, when it occurs in the hip; and *pleurodyne*, when it attacks the ſides, which are lined with the membrane called *pleura*, &c. The more remarkable ſpecies of the diſeaſe, however, to which we have alluded, are the *acute* and *chronic* forms which it exhibits. There is alſo a third form, partaking more of the acute than of the chronic ſpecies, which has been called, with ſome impropriety, *rheumatic gout*, or *arthritis rheumatica*. It will be neceſſary to ſpeak of the acute and chronic rheumatiſm, as well as of the rheumatic gout, ſeparately; ſince the treatment, which they reſpectively require, is conſiderably different.

RHEUMATISM, *Acute*, otherwiſe called *rheumatic fever*, begins, like moſt other febrile diſeaſes, with fits of chillineſs, which are ſucceeded by increaſed heat, frequent pulſe, thirſt, loſs of appetite, and proſtration of ſtrength. Not unfrequently, however, the peculiar ſymptoms appear before any febrile ſymptom is obſerved; namely, pain and inflammation in the joints. The pain ſometimes affects the joints alone, but often it affects alſo the muſcular parts, ſhooting along the courſe of the muſcles from one joint to another; and it is always increaſed by the action of the muſcles, that is, by any attempt to move the joints that are diſeaſed. Its uſual ſeat is in the larger joints, ſuch as the hips, knees, ſhoulders, and elbows: the ankles and wriſts are alſo frequently attacked; but the ſmaller joints, ſuch as thoſe of the toes and fingers, ſuffer conſiderably leſs. Two, three, or more of theſe joints are commonly affected at the ſame time:

time; but the pain is conſtantly ſhifting its place, leaving ſome joint and going to another, and frequently returning again to each of them ſeveral times during the courſe of the diſeaſe; and in this manner the diſeaſe is often protracted for a conſiderable length of time. Soon after, and ſometimes at the ſame moment with the commencement of the pain, the joint ſeized becomes ſwelled and ſomewhat red; and this ſwelling is extremely painful to the touch. The pain is ſometimes relieved by the occurrence of ſwelling, but not always; neither is the joint thus rendered more ſecure from a return of the attack. The patient, thus unable to move the joints affected, which are irritated and acutely pained by external contact, ſometimes even by the weight of the bed-clothes, and in a ſtate of ſevere internal pain, unable to find any poſition of eaſe, lies ſleepleſs and reſtleſs for ſeveral days and nights together. The fever accompanying the diſeaſe is moſt conſiderable during the night, at which time the pains alſo are moſt violent. The pulſe is commonly from ninety to a hundred in a minute, and occaſionally more frequent; often full, and ſometimes hard and ſharp, but moſt frequently ſoft. The heat of the ſkin is conſiderable, and the diſeaſe is commonly attended with ſweating, even from an early period, which is often profuſe and conſtant, but never either relieves the pains permanently, or proves a criſis to the fever. The urine, in acute rheumatiſm, is remarkably high-coloured from the beginning, and afterwards depoſits moſt copiouſly a brownifh-red ſediment, like brick-duſt. This ſediment, however, is probably the reſult rather of the profuſe ſweating, than of any peculiarity belonging to the diſeaſe; ſince it is commonly ſeen after a doſe of ſudorific medicine, or any other variety of perſpiration. Like the ſweating, it does not occaſion or betoken any favourable change in the fever. When blood is drawn in this diſeaſe, it always exhibits, and generally in a high degree, the buffy coat, as it is called, or a coriaceous covering of coagulable lymph, on its ſurface.

With the ſymptoms above detailed, the rheumatic fever often continues for ſeveral weeks: it ſeldom, however, proves fatal, and perhaps never, while the joints alone are the ſeat of the diſeaſe; the fever, indeed, uſually becomes leſs violent after two or three weeks, and the pains leſs ſevere, and leſs diſpoſed to change their place. But occaſionally the inflammation of the joints has diſappeared, and ſome vital organ, as the brain, lungs, or ſtomach, has been ſeized with inflammation, by which the patient has been carried off; or theſe organs have become ſimultaneouſly affected, and the ſame fatal event has enſued. We have had occaſion to witneſs two inſtances of this kind, out of ſeveral hundreds of caſes, in which a tranſition of the diſeaſe from the joints to the lungs took place, or, at leaſt, in which, on the ſpeedy ceſſation of rheumatiſm in the joints, a violent inflammation of the lungs ſupervened, and terminated fatally. We have alſo ſeen ſuch a metaſtaſis to the lungs, which was removed by vigorous treatment. The venerable Dr. Haygarth, however, has given a more unfavourable ſtatement of this matter from his experience; for "out of 170 caſes," (ſpeaking of acute rheumatiſm,) he ſays, "I have found twelve which had a fatal termination, either by a tranſlation of the inflammation to the brain, lungs, kidnies, ſtomach, or ſome other vital part, or as being found in combination with other diſeaſes." (See Clinical Hiſt. of Acute Rheumatiſm, p. 61.) Dr. Cullen has not mentioned any ſuch reſult of the diſeaſe. From the obſervations of our contemporaries, it has been found that the heart is peculiarly liable to be affected by a metaſtaſis of rheumatic inflammation, or to be attacked with a ſlow diſeaſe, by which its bulk becomes increaſed, and its functions diſturbed, after the ceſſation of acute rheumatiſm. This fact was firſt mentioned by Dr. Baillie, on the authority of the late Dr. Pitcairn, and has ſince been more fully eſtabliſhed by the records of ſeveral caſes. See eſpecially a paper by Mr. ſerjeant-ſurgeon Dundas, in the firſt volume of the Medico-Chirurgical Tranſactions; alſo Dr. Baillie's Morbid Anatomy.

It has been remarked by Dr. Cullen, as indicative of the peculiar nature of rheumatic inflammation, that "the acute rheumatiſm, though it has ſo much of the nature of the other phlegmaſiæ, differs from all thoſe hitherto mentioned in this, that *it is not apt to terminate in ſuppuration.* This almoſt never happens in rheumatiſm; but the diſeaſe ſometimes produces effuſions of a *tranſparent gelatinous fluid* into the ſheaths of the tendons. If we may be allowed to ſuppoſe that ſuch effuſions are frequent, it muſt alſo happen that the effuſed fluid is commonly re-abſorbed; for it has ſeldom happened, and never indeed to my obſervation, that conſiderable or permanent tumours have been produced, or ſuch as required to be opened, and to have the contained fluid evacuated. Such tumours, however, have occurred to others, and the opening made in them has produced ulcers difficult to heal." (See Cullen, Firſt Lines, par. 448.) The non-occurrence of ſuppuration in theſe violent rheumatic inflammations is of itſelf a ſtriking characteriſtic of the diſeaſe; and the circumſtance, that it is not productive, on the other hand, of what are called *chalk-ſtones*, or of that cretaceous-like ſecretion which is the reſult of the inflammation of gout, diſtinguiſhes it from the latter malady. In addition to this circumſtance, however, there are other points of diſtinction between the *gouty* and *rheumatic* inflammation; namely, that the latter uſually attacks the large joints; that it is not preceded by ſymptoms of indigeſtion; that it does not recur in regular paroxyſms; and that it attacks younger people, and thoſe not liable to gout from their modes of life; and, as we ſhall ſee immediately, is uſually the effect of a ſpecific cauſe, cold.

Cauſes of Acute Rheumatiſm.—The circumſtances which conſtitute a prediſpoſition to the attacks of acute rheumatiſm are various. Perſons of an irritable, plethoric, or ſanguineous habit, are moſt liable to be affected, when expoſed to the action of the exciting cauſes; and a certain period of life, in which there is a conſiderable vigour in the ſanguiferous ſyſtem, alſo prediſpoſes to it. It affects, indeed, perſons of all ages, from five to above ſixty years; but is much the moſt frequent between the time of puberty and the thirtieth year. Dr. Haygarth conſiders it as moſt common between fifteen and twenty. Some difference has been ſuppoſed to exiſt with reſpect to *ſex;* ſince it is certain that males are much more ſubject to the diſeaſe, in this country, than females; Dr. Haygarth ſays, in the proportion of nearly four to three. But it is probable, as the ſame writer ſuggeſts, that this ariſes from the more conſtant expoſure of men to cold and rain, by the nature of their occupations, than women; whence, he was informed, that, in Holland, the rheumatiſm is ſeldom found in women, though the air is very humid, becauſe they are more domeſticated than in this country, and their dreſs is warmer. Preceding attacks of the diſeaſe ſeem to afford a ſtrong prediſpoſition to future recurrences of it.

When theſe prediſpoſitions exiſt, the acute rheumatiſm is readily excited by the ſudden application of cold or damp, when the body has been already much heated, and is perſpiring after fatigue; or when one part of the body is expoſed to cold, while the other parts are kept warm; or, laſtly, by any long continued application of cold and moiſture, under any circumſtances, as by wearing wet or damp

clothes. Whence the diſeaſe is almoſt excluſively obſerved in cold and changeable climates; and is moſt frequent in the moſt variable ſeaſons, as in the ſpring and autumn, very ſeldom occurring during the ſteady heat of ſummer.

Cure of Acute Rheumatiſm.—With reſpect to the treatment, which is moſt ſucceſsful in the removal of this diſtreſſing and painful malady, conſiderable difference of opinion, and ſome fluctuations of opinion, have taken place among profeſſional men. The acute pain, the great heat, the quickneſs and fulneſs of the pulſe, and the buffy or inflammatory appearance of the blood, when drawn, have led the majority to look upon it as a highly inflammatory diſeaſe, and to be cured almoſt excluſively (like the other organic inflammations) by copious *blood-letting*. Boerhaave maintained this doctrine; and Cullen followed him to the full extent. "The blood ought to be drawn in *large quantity*," ſays the latter, "and the bleeding is to be *repeated* in proportion to the frequency, fulneſs, and hardneſs of the pulſe, and to the violence of the pain. For the moſt part, *large and repeated* bleedings, during the firſt days of the diſeaſe, ſeem to be neceſſary, and accordingly have been very much employed; but to this ſome bounds are to be ſet: for very profuſe bleedings occaſion a ſlow recovery, and, if not abſolutely effectual, are ready to produce a chronic rheumatiſm." (Firſt Lines, parag. 463. See Boerhaave, app. 1493.) The Cullenian doctrine is, we believe, even now taught in the ſchool of Edinburgh, with ſcarcely any of the cautionary bounds mentioned by that ſagacious practitioner. Sir John Pringle truſted much to the ſame practice. Sydenham began his career by ordering four bleedings for the cure of rheumatiſm; but he appears to have gradually declined in his attachment to that practice, and ſays, that he found it better to purge after the ſecond bleeding. And again, in the laſt piece which he ever wrote, he ſays, "If we obſtinately perſiſt in theſe evacuations, till the ſymptoms entirely go off, the diſeaſe will often terminate fatally." (Sched. Monitor.) He alſo ſays, in his Proceſſus Integri, which he compoſed for the uſe of his ſon, that in young perſons, who live temperately, "the rheumatiſm may be as ſucceſsfully cured by a very cooling and moderately nouriſhing diet, as by repeated bleedings, which they cannot ſo well bear." Van Swieten, who has traced out this progreſs of Sydenham's experience, admits that he has cured many caſes of acute rheumatiſm without bleeding, if they were mild in the beginning.

Now this has been the progreſs of the general experience in our own times; and at preſent, few Engliſh phyſicians deem blood-letting the leading remedy for acute rheumatiſm. On the contrary, the moſt experienced have fully decided, that, in the great majority of caſes, evacuation is entirely unneceſſary; and that, if it is frequently repeated, it does a material injury, by ſinking the patient into a long and tedious chronic diſeaſe, as Dr. Cullen ſtated, from which there is ſometimes no recovery; and always occaſions a lingering convaleſcence. Perhaps the only caſes in which it is requiſite are in perſons of highly vigorous and inflammatory habits, in whom a ſingle bleeding may diminiſh that diatheſis; and in thoſe caſes in which metaſtaſis threatens, or actually takes place. Where this tranſlation has indeed already occurred to any vital organ, as the lungs or brain, then the moſt vigorous veneſection muſt be reſorted to, as for the moſt dangerous forms of pleuriſy or phrenitis.

But, we repeat it, experience has legitimately proved, that blood-letting may be ſuperſeded altogether, in a great majority of caſes of acute rheumatiſm, by other remedies. Theſe other remedies, to which different practitioners have reſorted, have been chiefly *purgatives*, *ſudorifics*, *opiates*, and the Peruvian *bark*, of each of which it will be neceſſary to take ſome notice; for they are all uſeful under certain conditions of the patient and the diſeaſe, and conſtitute the principal means of cure.

Purgatives, as they contribute, if properly ſelected, to reduce every ſpecies of febrile excitement, though they are alone incapable of effectually relieving this diſeaſe, are yet eſſentially beneficial as a part of the plan of cure. The ſaline purgatives, ſuch as the ſulphate of magnéſia, are the beſt adapted to relieve the bowels and the ſyſtem at large; or they may be aſſiſted by moderate doſes of calomel, which perhaps more effectually empties the upper bowels. They become alſo more particularly neceſſary, when the narcotic medicines, to be mentioned preſently, are adminiſtered, with a view to obviate the conſtipation which the latter produce. But no practitioner would confide in cathartics alone for the cure of acute rheumatiſm.

With reſpect to *ſudorifics*, there is a more general tendency to truſt the cure to them; partly becauſe the pains are often ſaid to be eaſier, while perſpiration is preſent; and partly with the view of aſſiſting the apparent efforts of the conſtitution. It may be remarked, however, that although the moſt profuſe ſweats very frequently break out ſpontaneouſly, they ſeldom afford any eſſential relief; and they will continue day after day, without any apparent influence upon the diſeaſe. Accordingly, much direct benefit could not in reality be expected to ariſe from augmenting a diſcharge, already very profuſe, and of conſiderable duration; and, in truth, we believe mere ſweating is productive of no benefit. But the medicines given as ſudorifics, eſpecially antimonials and Dover's powder, operate beneficially perhaps by their other qualities. Thus the antimonials, and the ipecacuanha, and ſalt of this powder, are kindly and gentle laxatives, and thus produce an antiphlogiſtic effect as evacuants; but the principal operation of the powder of Dr. Dover is probably the reſult of the opium which it contains.

For *opiates* alone, that is, uncombined with antimony or ipecacuanha, have been relied upon by ſome practitioners, and with the moſt marked ſucceſs. As opium, and other ſubſtances, poſſeſſing a ſimilar narcotic power, have been known from ancient times to be highly ſtimulant, that is, to cauſe an increaſed activity and vigour in the circulation and nervous ſyſtem, and therefore to be highly injurious in active inflammations; ſo all thoſe phyſicians, who advocated veneſection, ſhunned the uſe of opiates religiouſly: and even thoſe, who found by experience that blood-letting was not required, queſtioned nevertheleſs the impunity with which opiates might be adminiſtered. Experience, however, has now fully determined this point alſo; that opium may be adminiſtered largely, not only with ſafety, but with moſt eſſential benefit, in the moſt ſevere caſes of acute rheumatiſm. As far as our own obſervation has gone, indeed, (and we have had occaſion to treat ſome hundreds of perſons affected with this malady,) the combination of repeated doſes of opium, with a daily ſaline laxative, with copious thin diluent drinks, and a light diet, in the beginning of the diſeaſe, conſtitutes the moſt ſucceſsful management of the diſeaſe; a practice which, it is but juſtice to ſay, was introduced into St. George's hoſpital, many years ago, by the preſent ſenior phyſician, Dr. George Pearſon. From half a grain to a grain, or more, of ſolid opium may be given three times a day, in the combination juſt mentioned, without affecting the head or the ſtomach, with great, ſpeedy, and often permanent relief to the diſeaſe, and without leaving the tendency to a ſlow convaleſcence, or a chronic malady, like the violent depletory ſyſtem.

In

In favour of the treatment of this apparently acute inflammation by the ſtill more oppoſite means of a powerful tonic, the *cinchona*, or *Peruvian bark*, the recorded teſtimony is ſtill more conſiderable. Dr. Cullen affirmed of the bark, that he had "ſeldom found it uſeful, and in ſome caſes hurtful," when employed before the phlogiſtic diatheſis was abated, and ſomething like remiſſions occurred in the fever. Other practitioners, however, have conſidered theſe previous changes unneceſſary, except in a very partial degree, and contend, that the early uſe of the bark is the moſt efficacious mode of curing acute rheumatiſm. Dr. Haygarth is one of the moſt ſtrenuous advocates for this practice; indeed, a conviction of its advantages is the avowed motive for the publication of his "Clinical Hiſtory" of the diſeaſe, to which we have already referred. He was led to the adoption of the remedy early, on the recommendation of the celebrated Dr. Fothergill, who received it from ſir Edward Hulſe. Dr. Haygarth has recorded eighty-four caſes in which the cinchona was adminiſtered, in general, very early in the diſeaſe, after a moderate evacuation of the ſtomach and bowels, principally by means of antimonial medicines. On ſome occaſions, however, Dr. Haygarth alſo preceded the uſe of this remedy by a bleeding, where the ſymptoms were very violent.

On the whole, the inference which we are diſpoſed to draw from theſe authorities, aided by perſonal obſervation, is, that the moſt ſucceſsful practice conſiſts in a free purgative evacuation, and an occaſional bleeding in particular habits, in the very onſet of the diſeaſe, followed immediately by the free uſe of opiates, with copious drinks and ſaline laxatives, and this ſucceeded, without delay, when the pains and tumours have ſomewhat remitted, by a reſort to the decoction of cinchona, or ſome gentle tonic.

All external applications to the parts which are ſwelled and painful, in acute rheumatiſm, are of little or no ſervice. The warm bath and fomentations, eſpecially in the beginning of the diſeaſe, rather aggravate than relieve the pains. Bliſtering, or the minor degree of ſuperficial inflammation produced by rubefacients, if they diminiſh the pain in one part, generally only occaſion it to ſhift to another, and do little towards the cure of the general affection. The ſame obſervation is applicable to refrigerant remedies, ſuch as to waſhing with cold water or other lotions the tumid joints; the diſeaſe but changes its ſtation, without any tendency to ceaſe altogether; and the change of ſituation, though it is commonly from joint to joint, may nevertheleſs occaſionally take place from the joints to a more important organ.

Rheumatism, *Chronic.* In many inſtances, this form of rheumatiſm is the direct conſequence of an attack of the acute form of the diſeaſe. The febrile ſymptoms, the ſwelling, and particularly the redneſs of the joints, have diſappeared, and the general functions have reſumed their healthy condition; but ſtill certain joints continue to be affected with pains and ſtiffneſs, which are particularly felt on motion, and are often accompanied by a ſpontaneous coldneſs, and a torpor, ſometimes almoſt amounting to paralytic. Theſe affections are much influenced by the changes in the temperature and humidity of the atmoſphere, and are diſtinctly aggravated by external cold, and relieved by external warmth. The parts affected are not eaſily made to perſpire, and when the other parts of the body are brought into a ſtate of free and warm perſpiration, that on the pained joints is only cold and clammy. The pains are alſo, like thoſe of acute rheumatiſm, moſt ſevere in the night.

This chronic affection of the joints, however, is very often altogether independent of any previous inflammation and ſwelling, and occurs in many perſons who have never been ſubject to an attack of acute rheumatiſm. It occurs, indeed, very frequently in perſons ſomewhat advanced in life, and beyond the period when the acute form of the malady is uſually ſeen. In theſe caſes it is commonly aſcribed to the action of cold; very often to partial expoſures of the particular parts of the body in which it takes its ſeat; and it is apt to be produced again and again in thoſe parts which have once ſuffered from expoſure of other parts of the body to cold. Thus, getting the feet wet will induce an attack of lumbago, ſciatica, or a crick in the neck, according to the prediſpoſition induced in theſe reſpective regions by former attacks. Many caſes of chronic rheumatiſm are aſcribed, however, to violent ſtrains of the muſcles of particular parts, occurring on ſudden and ſomewhat violent exertions, and even to fatigue from long continued exertions of particular muſcles.

As the exact nature of the affection called chronic rheumatiſm is not very clearly underſtood, ſo the method of cure, which is uſually purſued, is ſomewhat empirical; *i. e.* the mere reſult of the obſervation of the effects of different medicines which have been tried. Dr. Cullen, indeed, attempted to explain the nature of the diſeaſe, by ſaying, that it conſiſted in "an atony both of the blood-veſſels and of the muſcular fibres of the part affected, together with a degree of rigidity and contraction in the latter, ſuch as frequently attend them in a ſtate of atony;" and therefore concluded, that ſuch remedies were required, as were ſuited "to reſtore the activity and vigour of the vital principle in the part." The explanation of Dr. Bardſley, however, though not very different, is perhaps more conſonant to the general opinion upon this ſubject. He conſiders the principle of cure as ſimple and uniform; namely, that "it conſiſts in removing paſſive inflammation, and reſtoring the debilitated veſſels and muſcular fibres to their due tone and action." (See Dr. Bardſley's Medical Reports, p. 4.) The remedies by which theſe objects are attained, may be included under two heads, internal and external.

The *internal* remedies which have been recommended for the cure of chronic rheumatiſm, though very numerous, have, on the whole, been found to poſſeſs a very uncertain power over the ſymptoms of that diſeaſe; and many which have been highly extolled, have been given up in total diſappointment. Nevertheleſs, in many inſtances, theſe remedies are eſſentially beneficial, ſometimes curing the diſeaſe alone, and generally aiding the operation of external applications. They may be deſcribed under the denomination of ſudorifics and ſtimulants, or ſtimulant-diaphoretics, to which may be added mercurials, and ſome individual articles of peculiar operation.

Theſe ſudorifics appear to poſſeſs very little remedial power over the chronic rheumatiſm, and the leſs in proportion as the diſeaſe partakes leſs of the ſwelling and inflammation of the acute ſpecies, or as it is of longer ſtanding. In the majority of caſes they are even worſe than uſeleſs. Dr. Bardſley ſays, "in ſhort, I can ſpeak decidedly of the injurious effects of ſudorifics, when puſhed to any great extent, in every inſtance of ſevere local affection of the joints; and alſo in moſt other caſes, where the diſeaſe has been long continued, and the patient's conſtitution much debilitated. In chronic lumbago and ſciatica, I have never experienced any laſting benefit to reſult from this mode of practice." Dr. Bardſley, indeed, ſpeaks very lightly of the effects of all the internal remedies, not only of this, but of the ſtimu-

lant

lant claſs. He admits that ſmall doſes of antimonial powder, combined with calomel and opium, are certainly uſeful in allaying pain and irritation; but he believes that their efficacy conſiſts rather in palliating ſymptoms, than in curing the diſeaſe, when it is conſiderable in degree and obſtinate in kind. "The ſame obſervation," he ſays, "will nearly apply to the uſe of ſtimulant remedies, ſuch as reſin of guaiacum, the claſs of terebinthinates, and of eſſential oils. In the moſt aggravated inſtances of general chronic rheumatiſm, where great torpor and debility prevailed, guaiacum, in ſuch large doſes as the ſtomach and bowels would bear, was found to be a powerful auxiliary; and certainly the moſt generally efficacious of all the internal remedies that were employed. But I have ſeen no inſtance of its complete ſucceſs, when unaided by topical applications, in any ſpecies of the diſeaſe where much local injury of the joints had taken place. It acted moſt beneficially when exhibited in ſubſtance, well triturated with mucilage; to which was occaſionally added gum kino, or tincture of opium, to prevent its effects on the bowels. In many obſtinate caſes, the ammoniated tincture of guaiacum, incorporated with mucilage, and joined to a ſtrong decoction of bark, proved of great ſervice, where the conſtitution was broken down by the violence and length of the diſeaſe. There were but few protracted caſes in which the Peruvian bark was not preſcribed with advantage as a tonic, eſpecially at the cloſe of the diſeaſe. It was, however, never adminiſtered with any other deſign than as an auxiliary." (Loc. cit. p. 16.) We have quoted this paragraph, as containing the reſult of the deductions from a large number of caſes, treated in a public hoſpital, by a careful and intelligent obſerver; and, therefore, as affording a probable approximation to the general fact of the operation of theſe medicines. The ſame obſervations, we believe, are applicable to ſome of the other remedies, of a ſtimulant and diaphoretic quality, which are often reſorted to; ſuch as the preparations of ammonia, infuſion of horſe-radiſh, decoctions of mezereon and rhododendron, muſtard-ſeed, and all the terebinthinate ſubſtances and hot gums. The oil of turpentine itſelf has been much employed, and perhaps conſtitutes a part of the celebrated noſtrum called the eſſence of muſtard; but our experience of its effects accords with that of Dr. Bardſley, who ſays, that, in every form, turpentine was found to be an ungrateful medicine to the ſtomach; often impairing the appetite, and not producing, when even duly perſiſted in, effects as ſalutary as the guaiacum and other remedies already mentioned. Nevertheleſs, we muſt remark, that in different individual inſtances, one of theſe remedies will ſometimes ſucceed when the others have failed, and that therefore none of them ſhould be excluded from the catalogue of uſeful expedients.

Some other ſubſtances have been employed, with occaſional ſucceſs, in the cure of different caſes of chronic rheumatiſm, which do not appear to poſſeſs any quality in common, and the operation of which, therefore, cannot be ſatisfactorily explained. Among theſe we may mention *ſulphur*, which has long poſſeſſed a ſort of popular reputation for the cure of lumbago, and ſome other varieties of the diſeaſe. Taken nightly in a conſiderable doſe, ſo as to act gently upon the bowels, it has ſucceeded, in ſome inſtances, in affording a very ſpeedy and marked alleviation of the ſymptoms; but, on the other hand, it has very often failed to produce any effect whatever; and under what circumſtances theſe reſpective variations in its operation occur, we have not been able to aſcertain. Another remedy has enjoyed a very high reputation in ſome parts of the country, eſpecially in Lancaſhire; we mean the *cod-liver oil*, or *ling-liver oil*; for it appears that the oil obtained from the liver of either of theſe fiſh is equally efficacious. Of this remedy many teſtimonies might be adduced in proof of its occaſional efficacy in the moſt unyielding caſes of chronic rheumatiſm. From long and repeated experience, Dr. Bardſley affirms that he is enabled to ſpeak of it as a medicine of conſiderable but limited powers: in ſome inſtances, where every other means had proved unſucceſsful, it has operated in a manner ſo decidedly beneficial, as to excite aſtoniſhment; but, on the other hand, he found it to fail often in the more mild and common rheumatic affections. He believes it to be moſt beneficial in the chronic rheumatiſm of perſons advanced in age, which is accompanied with extreme rigidity of the muſcles, and inflexibility of the joints, in conſequence of much expoſure to cold and moiſture, with hard fare and much fatigue. It was commonly taken in warm table-beer by the hoſpital patients, in doſes of half an ounce, or from that to an ounce and a half twice or thrice a day, according to its effects, or to its agreement with the patient's ſtomach. Its operation is various, ſometimes upon the kidnies, and ſometimes upon the bowels; and occaſionally it produced an eruption on the ſkin: but theſe effects occurred only at the firſt taking; for after a ſhort continuance, it ceaſed to produce any ſenſible operation. When it produced relief, this was obvious by the end of a fortnight, and continued ſlowly to increaſe; and in theſe caſes the patients generally began to increaſe at the ſame time in bulk and fatneſs. Nevertheleſs, the objections to the general uſe of this medicine, from its extremely naufeous ſmell and taſte, which render it abſolutely intolerable to many ſtomachs, however diſguiſed, and the admiſſion of Dr. Bardſley, that it is only to be deemed an auxiliary, and in many reſpects inferior to guaiacum, do not lead us to expect that it will ever be generally adopted, notwithſtanding its reputation and extenſive employment in the Mancheſter Infirmary, where the annual conſumption has been nearly ſixty gallons for about forty years. Bardſley, loc. cit. p. 22.

As another expedient for the cure of chronic rheumatiſm, the *arſenical ſolution* of Dr. Fowler has been recommended by Mr. Jenkinſon and others. For our own part we have not been ſo fortunate as to diſcover any remedial properties of this ſort in that ſolution; but from the evidence of two or three caſes adduced by Dr. Bardſley, it appears probable that this medicine is capable of producing very beneficial effects in protracted chronic rheumatiſm, where the vital powers are much diminiſhed, and the ends of the bones, perioſteum, capſules, or ligaments of the joints, are likewiſe partially affected; though in the milder caſes, where the muſcles and their inveſting membranes are the ſeat of the complaint, it appears to be uſeleſs.

External Remedies.—Among the remedies which are uſually employed externally for the cure of chronic rheumatiſm, and which, when aided by the adminiſtration of medicines internally, have been found moſt ſucceſsful, are principally the *warm* and *vapour bath*, and various *epiſpaſtic*, *rubefacient* and *ſtimulant* plaſters, liniments, and embrocations, employed with or without conſiderable *friction*.

The *warm* or *tepid bath*, from the temperature of 85° to 95° of Fahrenheit's thermometer, is very uſeful in ſoothing pain, and in relaxing the ſtiffened joints and rigid fibres of the muſcles, eſpecially in elderly patients, whoſe ſtrength is conſiderably reduced by the length and violence of the diſorder. But the uſe of a warmer bath, ſo as to excite ſweating, is apt to induce both local and general debility in protracted caſes, and affords but a temporary relief to the diſeaſe. But on the whole, the application of the *vapour* of hot water to the ſurface is a more efficacious remedy. Dr. Bardſley ſays, "whenever the joints were found ſo rigid as to be nearly immoveable, and the pains upon motion exquiſitely

quiſitely ſevere, or when the muſcles had become contracted and almoſt paralytic,—and indeed in every protracted caſe of the diſeaſe of the hip-joint, *lumbago*, or *ſciatica*, the vapour of hot water, locally and properly applied, afforded (eſpecially in conjunction with other topical applications) a ſafe and often ſucceſsful remedy." It may be neceſſary to deſcribe the mode of employing this vapour. It conſiſts in conveying the ſteam, from a boiler, through tubes of different diameter, ſo as to apply it to the different parts of the body. In all obſtinate affections of the joints, the author juſt quoted obſerves, a pipe of nearly half an inch in diameter is to be preferred, and a quarter of an hour is the ſhorteſt period for its application. In the commencement, however, it is better, as a general rule, to uſe a pipe of ſmaller ſize, and only to permit the vapour to ſtrike upon the affected part at ſome diſtance from its aperture; for by theſe means an inconvenience will be avoided, which has ſometimes prevented the ſteady application of the remedy; namely, a conſiderable irritation of the ſkin from an exceſs of heat. By degrees the parts become able to bear a large column of vapour, at a very ſmall diſtance from the extremity of the pipe; and thus the remedy will be moſt likely to produce its full effect. This effect, however, is generally only to be deemed auxiliary, at leaſt in obſtinate caſes; for it will ſeldom alone accompliſh the cure.

Among the epiſpaſtic applications, *bliſtering* is commonly reſorted to, and often with conſiderable benefit, eſpecially when the pains appear to be ſeated only in the faſcia and ſuperficial fibres of the muſcles. A repetition of bliſters is preferable on the whole, both as productive of leſs diſtreſs to the patient, and more benefit to the diſeaſe, to the practice of keeping the bliſter open by a ſtimulating ointment. Some authors have recommended *iſſues* in preference to bliſters, where they could be applied without inconvenience. The excitement of an external inflammation, by the application of the ointment of *emetic tartar*, has been alſo employed inſtead of bliſtering; and in ſome caſes its effects have been highly beneficial.

Rubefacients, or thoſe ſubſtances which ſtimulate the cutaneous veſſels, and excite a redneſs of the ſurface by cauſing them to be diſtended with blood, have been found by the experience of all ages to be capable of removing ſlight inſtances of chronic rheumatiſm, and of alleviating the more ſevere, eſpecially when their operation was aided by *friction*, and by warm or ſtimulant plaſters. Where the pains are local and permanent, that is, not liable to ſhift about from joint to joint, great advantages reſult from ſtimulating the ſkin with an active liniment, and ſupporting the excitement by means of a warm plaſter. The liniments may be compoſed of any ſtimulant, oleaginous, ſpirituous, or ſaponaceous liquids: as the common liniment of ammonia and oil, the ſoap liniment, with camphor, ammonia, tincture of cantharides, or turpentine; and the plaſters may be compoſed of the gum-reſins, eſpecially ammoniacum, with the acetic acid, or vinegar of ſquills, turpentine, plaſter of cantharides, &c. Dr. Ferriar's formula, which is borrowed from Dr. Home, and conſiſted of two drachms of camphor, with an ounce of baſilicon, and half an ounce of black ſoap, is ſaid by him to have been very efficacious in the relief of *lumbago*. Theſe liniments ſhould be diligently rubbed upon the parts affected, after the ſkin has been warmed and irritated by the friction of hot, dry, and coarſe cloths, or the application of the fleſh-bruſh; or, eſpecially in *ſciatica* and *lumbago*, during the expoſure of the part to the vapour-pipe. By theſe methods the ſtimulating effects of the liniments are much increaſed, the pain is more effectually relieved, and the cure much accelerated; eſpecially when a warm plaſter is added to keep up theſe effects. (See Bardſley, loc. cit; and Ferriar's Med. Hiſt. and Reflections, vol. i. p. 186.) The liniment originally employed by Dr. Home was ſpread upon leather, and applied over the diſeaſed part; he ſpeaks, not only from his own experience, but from that of others who had adopted it, of the efficacy of the preſcription. (See Medical Facts and Experiments, part i. ſect. 4; and again in his Clinical Experiments and Hiſtories, ſect. 14.) His formula is perhaps more active than that of Dr. Ferriar, containing cumin ſeed and ammonia in addition to the camphor, oil of turpentine, and common black ſoap. But the diſpenſatories abound with formulas for the compoſition of ſtimulating liniments and plaſters of ſimilar powers.

Among other ſtimulants which have been employed for the cure of chronic rheumatiſm, eſpecially in thoſe caſes which are obſtinate and of long duration, or are accompanied by conſiderable torpor and rigidity, and a diminution of the vital heat, the influence of the *electric* and *galvanic* fluids has been reſorted to; and many teſtimonies might be adduced in proof of the beneficial operations of both theſe agents. Dr. Bardſley affirms, that the application of electricity by ſparks and ſhocks, eſpecially the former, was manifeſtly advantageous; at the ſame time he acknowledges, that it was chiefly in conjunction with the local application of vapour, and with tonics and anodynes, adminiſtered internally, that the moſt marked advantages were produced. For our own part, we have witneſſed ſo little decided effect from the operation of electricity in any diſeaſe whatever, that, after a long and frequent uſe of that agent, we have given it up in deſpair. Where it produces any effect at all, it is probably by its operation upon the mind of the patient, upon the ſame principle as the *metallic tractors* occaſionally alleviated pain, (ſee IMAGINATION, *Influence of, on the Body*,) and not from any ſpecific operation upon the diſeaſed muſcles.

The operation of mere *friction* aſſiduouſly employed, either by means of flannel or rough cloths, of the fleſh-bruſh, or ſimply of the hands, or that ſort of rubbing or kneading of the body which is called *champooing*, have been often reſorted to with conſiderable benefit, eſpecially in the caſes connected with a paralytic torpor and rigidity of the parts affected. Perhaps, indeed, it is the ſtimulus of the friction, to which much of the benefit of liniments and embrocations ought to be aſcribed; but as the patient's faith is chiefly fixed upon *medicated* frictions, ſo it is generally neceſſary to preſcribe them, in order to enſure his perſeverance in the rubbing.

The preceding obſervations have been applied to rheumatiſm generally, with only occaſional references to the particular forms under which it occurs, ſuch as *lumbago*, *ſciatica*, *pleurodyne*, rheumatic head-ache, &c. becauſe the treatment is generally applicable to the different ſituations of the body in which the diſeaſe ſeats itſelf. The principal attention that is requiſite to theſe varieties ariſes from the re[illegible] ſymptoms to thoſe of ſome other diſea[illegible] *eurodyne*, or rheumatiſm affecting the mu[illegible] and the diaphragm, being accompanied with a[illegible] ficult reſpiration, might be confounded with p[illegible] erroneouſly treated: but in this rheumatic affe[illegible] cheſt there is ſeldom any cough, and no fever, two ſyn[illegible]ms which are neceſſarily preſent in the caſe of pleuriſ[illegible] ain, the *lumbago* is apt to be miſtaken for *nephralgia* [illegible] in the kidnies, connected with inflammation in theſe [illegible]ns, or with the preſence of gravel in them or in the [illegible]s: it may be diſtinguiſhed, however, from the diſeaſe [illegible] kidnies, by the circumſtances, that the pain does not follow the courſe of the ureters, but ſtretches

ſtretches rather down the thighs to the toes; that it is chiefly ſevere on aſſuming the erect poſture; that it is not accompanied by ſickneſs or vomiting; and that the urine is not changed in quantity or quality. Dr. Home, and ſome others, have believed that the ſciatica is ſeated in the great ſciatic nerve, or in its ſheath, and the lumbago in the lumbar nerves.

Of *Arthritis rheumatica*, or *rheumatic gout*. This term, though improper, and calculated to miſlead us in our notions reſpecting the nature of the diſeaſe, is retained in conſequence of the want of a more correct appellation. The diſeaſe, in fact, is not a compound of gout and rheumatiſm, but probably rheumatiſm reſembling, in ſome reſpects, the gout in its appearances. It has been called, by an able teacher at a large hoſpital in Southwark, the *rheumatagra*, or *acuto-chronic* rheumatiſm. In ſome caſes, the diſeaſe is merely a partial degree of acute rheumatiſm, affecting only one or two of the ſmaller joints, as the wriſt or even the knuckles, with ſwelling, redneſs, and acute pain. This is often called gout; but as it occurs under circumſtances which differ materially from thoſe under which gout appears, is not preceded by indigeſtion, and does not terminate in the formation of chalk-ſtones, it is obviouſly a different diſeaſe. In many caſes, however, it is the conſequence of acute rheumatiſm, in which the joints laſt occupied by that diſeaſe, eſpecially the ankles and wriſts, remain ſwelled, ſtiff, and painful, and ſometimes œdematous, for many weeks. The pain, in theſe caſes, is generally aggravated at night, or by external heat; but it is accompanied by very little or no feveriſhneſs.

The more acute caſes require nearly the ſame treatment as is employed for the cure of acute rheumatiſm. But when they aſſume more of a chronic form, when the ligaments and membranes of the joints are the peculiar ſeat of the diſeaſe, or an enlargement of the extremities of the bones appears to have taken place, eſpecially in young or vigorous ſubjects, the firſt attempts to relieve ſhould be made by means of *local bleeding*, either by the application of leeches, or, what is perhaps preferable, by the operation of cupping and ſcarifying. Theſe local evacuations ſhould be repeated, if the pain and irritation are not materially relieved; and the good effects may be aided by the application of *bliſters* over the affected joints. Dr. Bardſley ſtrongly recommends the opening of a drain from the parts by means of *iſſues*, made by cauſtic; and affirms that, in obſtinate caſes, which have reſiſted all other means, he has found the happieſt effects from iſſues. The *tepid bath* will often aid the operation of theſe remedies, together with the uſe of mild diaphoretics, followed by tonic bitters, ſuch as the Peruvian bark, chalybeates, the myrrh mixture with ſteel, and the occaſional uſe of antimonials with calomel.

Nodoſity of the Joints.—Before we conclude the ſubject of rheumatiſm, it ſeems neceſſary to notice a ſtate of the joints which is generally deemed rheumatic. Dr. Haygarth, however, obſerves, that it is nearly allied to gout in its character, and in the perſons whom it attacks. Theſe *nodes*, which occur moſt commonly about the fingers, hands, and wriſts, but occaſionally alſo on the knees, ankles, feet, elbows, ſhoulders, and other joints, produce ſtrange diſtortions of the parts, twiſting the fingers, &c. in various directions, and rendering the joints almoſt immoveable. They are not ſeparate tumours, but feel as if they were an enlargement of the bones themſelves. Dr. Haygarth, indeed, is of opinion, that the ends of the bones, the perioſteum, and the capſules or ligaments which form the joints, are the ſeat of this diſeaſe; though he does not appear to have ever examined the matter anatomically. In bad inveterate caſes, he believes that the joints are not merely diſtorted, but diſlocated. The ſwellings are generally painful, eſpecially in the night, though not ſeverely, and often ſore to the touch. In a few patients, a crackling noiſe is perceived in the joints when moved, particularly in the neck. The ſkin is ſeldom, if ever, affected with inflammation. There is one diſtreſsful circumſtance belonging to this diſeaſe, that it has no intermiſſion, and but ſlight remiſſions: for during the remainder of the patient's life, the nodes gradually enlarge, impeding more and more the power of motion. The malady alſo ſpreads to other joints, without producing any alleviation in thoſe which it had previouſly attacked. In one caſe, mentioned by Dr. Haygarth, the fingers, wriſts, knees, ankles, elbows, ſhoulders, neck, and hips, were all affected with this diſeaſe at the ſame time, that is thirteen joints, excluſive of the numerous joints of the hands: if each individual joint of the hands had been taken into the account, they would have amounted to not leſs than forty. In this caſe, the malady had been rapidly advancing for ten years: yet, though theſe nodes, in their gradual progreſs, ſadly embitter the comforts, they do not ſhorten the duration of life: for Dr. Haygarth's firſt patient lived to the age of ninety-three. From the experience of this veteran phyſician it appears, that women are much more frequently the ſubject of nodoſity at the joints than men, and that it commonly firſt begins to ſhew itſelf about the period of the ceſſation of the menſes.

Various remedies have been recommmeded for the relief of theſe nodes; but they have not been found in general to be poſſeſſed of much efficacy. On the whole, the warm bath, a ſtream of warm water, ſuch as the Bath pumping, or a warm *douche* on the nodes, together with the repeated application of leeches, appear to be productive of the moſt decided benefit in this diſeaſe; and the uſe of the leeches appears to conſtitute a very important part of that practice. In bad caſes, from four to ten ſhould be applied to the affected joints once or twice a week. The temperature of the pumping and *douching* ſhould be varied, and that which appears, from the patient's report, to agree the beſt, and to be productive of the moſt decided effect in alleviating the pain and ſwelling, and in improving the power of motion in the joints, ſhould be adopted. This will be found to vary, in different perſons, from 81 to 113 degrees of Fahrenheit's thermometer.

Some authors have conceived that, together with theſe external remedies, the uſe of ſoda, or the vegetable alkali, internally, has been attended with conſiderable benefit. And Dr. Bardſley relates a caſe, in which the continued uſe of mercury, ſo as to excite a moderate ptyaliſm, was apparently remedial. See Haygarth's Clinical Hiſtory of Diſeaſes, pt. ii.; and Bardſley's Reports.

RHEXIA, in *Botany*, derived from ῥῆξις, *a rupture*, or *fracture*, is the ſynonym in Pliny of a plant, reputed to be endowed with numerous virtues, and, amongſt others, with the powers of curing ruptures, or ſimilar complaints. His deſcription leaves us in no doubt as to his plant; ſo far, at leaſt, as its being of the Alkanet tribe, a ſpecies of *Anchuſa*, or perhaps of *Echium*. Why Gronovius and Linnæus choſe this name for the preſent elegant American genus, does not appear.—Linn. Gen. 187. Schreb. 249. Willd. Sp. Pl. v. 2. 301. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 340. Purſh v. 1. 257. Juſſ. 330. Lamarck Illuſtr. t. 283. Gærtn. t. 112.—Claſs and order, *Octandria Monogynia*. Nat. Ord. *Calycanthemæ*, Linn. *Melaſtomæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, oblong, ſwelling in the lower part; limb in four deep, acute ſegments, without any intermediate teeth or ſcales; permanent. *Cor.*

Petals four, roundiſh, ſpreading, inſerted into the calyx. *Stam.* Filaments eight, thread-ſhaped, inſerted into the calyx, longer than its limb; anthers declining, furrowed, linear, obtuſe, verſatile, with a curved beak. *Piſt.* Germen roundiſh, ſuperior, unconnected with the tube of the calyx; ſtyle ſimple, the length of the ſtamens, declining; ſtigma oblong, obtuſe. *Peric.* Capſule roundiſh, of four cells and four valves, within the body of the calyx, but unconnected with it. *Seeds* numerous, roundiſh. *Receptacles* four, attached to the central column.

Eſſ. Ch. Calyx with four permanent ſimple teeth. Petals four, inſerted into the calyx. Anthers declining, beaked. Capſule of four cells, within the body of the calyx.

Obſ. For the difference between this genus and Osbeckia, ſee that article.

Willdenow has 17 ſpecies of *Rhexia*, but we have not the means of correctly aſcertaining the generic characters of all of them. They are divided into two ſections, of which the following examples may ſuffice.

Section 1. *Leaves ſeſſile.*

R. *virginica.* Virginian Rhexia. Linn. Sp. Pl. 194. Willd. n. 1. Ait. n. 1. Curt. Mag. t. 968.—Leaves ſeſſile, lanceolate, three-ribbed, with fringe-like teeth. Calyx fringed with glands.—Native of watery places in North America, flowering in July and Auguſt. It ſucceeds tolerably with us, in a bog bed, with plenty of water, but requires ſhelter in winter; nor is it fit for general cultivation; which is much to be regretted, conſidering the great beauty and ſingularity of the large crimſon *flowers*, with their great yellow curved *anthers*. The *root* is fibrous, perennial. *Stem* herbaceous, erect, ſquare, with membranous angles. *Leaves* ſtrongly ribbed, ſmooth, with acute ſlender teeth. *Panicle* forked, ſpreading. *Calyx* brown, beſprinkled with hairs, whoſe points are glandular and viſcid.

R. *mariana.* Maryland Rhexia. Linn. Sp. Pl. 491. Willd. n. 2. Ait. n. 2. (Lyſimachia non pappoſa, terræ marianæ, &c.; Pluk. Mant. 123. t. 428. f. 1. Lamarck, f. 1?)—"Leaves ſeſſile, lanceolate, three-ribbed, fringed with ſoft hairs. Hairs of the calyx ſtellated."—Found in bogs, and ſandy woods, near waters, from New Jerſey to Carolina, flowering in July and Auguſt. From one to three feet high. *Flowers* handſome, either purple, light red, or pale. *Purſh.*

Sect. 2. *Leaves ſtalked.*

R. *glutinoſa.* Viſcid Shrubby Rhexia. Linn. Suppl. 216. Willd. n. 8.—Leaves ſtalked, oppoſite, elliptical, three-ribbed, ſmooth. Stem ſhrubby. Flowers in terminal, denſe, forked panicles. Calyx ſmooth.—Found in New Granada by Mutis, who ſent fine dried ſpecimens to Linnæus, along with an Indian-ink drawing, cited in the Supplement as a publiſhed work. The whole plant is very handſome, quite deſtitute of pubeſcence, but the *calyx*, and upper ſide of the *leaves*, are extremely glutinous. The *leaves* are rather above an inch long, with three ribs, united above their baſe; the under ſide pale and yellowiſh. *Flowers* copious, large, purple.

R. *inconſtans.* Stitch-leaved Rhexia. "Vahl. Ecl. v. 1. 37." Willd. n. 13. (Oſbeckia ornata; Swartz Ind. Occ. v. 2. 647.)—Leaves ovate, clothed with depreſſed briſtles; pale and three-ribbed beneath. Panicle forked, of few flowers. Calyx rough with ſpreading briſtles.—Native of elevated ſituations on the mountains of Guadaloupe, Nevis, Montſerrat, St. Kit's, &c. among moſs.—The *ſtems* are a foot or two high, erect, branched, rigid, ſquare and briſtly. *Leaves* ovate, a quarter of an inch long, their green convex upper ſide moſt elegantly clothed with ſtrong, depreſſed, yellow briſtles, as if ſtitched with gold thread. *Flowers* purple, uſually five-cleft.

R. *aquatica.* Marſh Rhexia. Swartz Ind. Occ. v. 2. 650. Willd. n. 16. Ait. n. 3. (Melaſtoma aquatica; Aubl. Guian. v. 1. 430. t. 169.)—Leaves oppoſite, heart-ſhaped, minutely crenate, nearly ſmooth. Panicles terminal, three-forked, ſlender, widely ſpreading, many-flowered.—Native of watery places in Guiana and the Weſt Indies.—*Stems* ſhrubby, a yard high. *Leaves* flat, above an inch long, pointed. *Flowers* copious, rather ſmall, white, with purple *ſtamens*. *Calyx* ſmooth.

Rhexia, in *Gardening*, contains plants of the hardy, herbaceous, perennial kind, of which the ſpecies cultivated are; the Virginian rhexia (R. virginica); and the Maryland rhexia (R. mariana).

Method of Culture.—Theſe plants may be increaſed by ſowing the ſeeds procured from their native ſituations, in the autumn or ſpring, in pots filled with good freſh mould, placing them under the protection of frames, or if in a mild hot-bed they will be rendered more forward. When ſown at the latter ſeaſon, the plants ſeldom appear the ſame year. When the plants have attained ſufficient growth they ſhould be planted out partly in a dry ſheltered eaſt border and partly in pots, to have the protection of a frame againſt the froſts in winter. They flower the ſecond year, and with care continue three or four.

And they may be introduced, as they afford ornament, in the borders as well as among flowery potted plants.

RHEXIS, or Rhegma, formed from ῥῆξις, *rupture*, of ῥήγνυμι, *I break*, in *Surgery*, denotes a rupture of the corner of the eye.

RHHENZABERN, in *Geography*, a town of France, in the department of the Lower Rhine; 8 miles S.E. of Landau.

RHIBII, in *Ancient Geography*, a people of Scythia, on this ſide of the Imaus, near the river Oxus, to which belonged the town of Dauaba. Ptolemy.

RHIGIA, a town ſituated in the interior of the eaſtern part of Hibernia, near Rhœbe, according to Ptolemy.

RHIME, or Rime, in *Poetry*. See Rhyme.

RHINANTHUS, in *Botany*, derived from ῥὶν, *a noſe*, or *ſnout*, and ἄνθος, *a flower*, becauſe of its ringent corolla, compreſſed at the upper lip, ſo as to reſemble the ſnout of ſome animal.—Linn. 304. Schreb. 400. Willd. Sp. Pl. v. 3. 188. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 649. Ait. Hort. Kew. v. 4. 2. Purſh 429. Michaux. Boreal.-Amer. v. 2. 17. Juſſ. 101. Lamarck Illuſtr. t. 517. Gærtn. t. 54. (Pedicularis; Tournef. t. 77. Elephas; Tournef. t. 482.)—Claſs and order, *Didynamia Angioſpermia*. Nat. Ord. *Perſonatæ*, Linn. *Pediculares*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, roundiſh, inflated, compreſſed, four-cleft, permanent. *Cor.* of one petal, ringent; tube rather cylindrical, the length of the calyx; limb gaping, compreſſed at the baſe: upper lip helmet-ſhaped, compreſſed, emarginate, narrower; lower ſpreading, flat, trifid half way down, obtuſe, the middle ſegment broader. *Stam.* Filaments four, the length of the upper lip, the two ſhorter ones concealed under it; anthers incumbent, cloven on one ſide, hairy. *Piſt.* Germen ſuperior, ovate, compreſſed; ſtyle thread-ſhaped, longer than the ſtamens, but ſtanding between them; ſtigma obtuſe, inflexed. *Peric.* Capſule obtuſe, erect, compreſſed, of two cells and two valves, gaping at the margins; partition contrary. *Seeds* numerous, compreſſed.

Obſ. Elephas of Tournefort has the margin of the capſule blunt; the ſeeds ſimple; and the calyx unequal, of two lips. It was ſo named from the reſemblance its flowers bear to an elephant's trunk.

Crista-galli of Rivinus has the margin of the capſule extended,

extended, the ſeeds membranous, clothed with wool; and the calyx equal, four-cleft.

Eſſ. Ch. Calyx inflated, compreſſed, four-toothed. Upper lip of the corolla compreſſed. Capſule of two cells, blunt, compreſſed. Seeds imbricated, flat.

1. R. *orientalis*. Linn. Sp. Pl. 840. (Elephas orientalis flore magno proboſcide incurva; Tournef. Voyage, v. 2. 126, with a figure.)—Upper lip of the corolla awl-ſhaped, incurved.—Native of the Levant, on the confines of Perſia, flowering in July.—*Stems* more than a foot high, hollow, ſquare, hairy. *Leaves* oppoſite, on ſhort ſtalks, notched, hairy, veined. *Flowers* on the upper part of the ſtems, fragrant, of a yellow colour, with a brown ſpot on the lower lip and two red ones on the upper. Tournefort reckons this a very ornamental plant.

2. R. *Elephas*. Linn. Sp. Pl. 840. (Elephas Campoclarenſium; Column. Ecphr. 186. t. 188.)—Upper lip of the corolla awl-ſhaped, ſtraight.—Native of ſhady woods in Italy, flowering in May.—This annual is very ſimilar in habit to the laſt, but its *calyx* is trifid, with two of the ſegments recurved, and the third larger, erect, plaited, acute. Tournefort mentions a variety of this which he found on the coaſt of the Black ſea.

3. R. *Criſta-galli*. Yellow Rattle. Linn. Sp. Pl. 840. Engl. Bot. t. 657. Curt. Lond. faſc. 5. t. 43. Mart. Ruſt. t. 148.—Upper lip of the corolla arched. Calyx ſmooth. Leaves lanceolate, ſerrated.—Common in our meadows and paſtures, flowering from June to Auguſt. *Root* annual, fibrous. *Stem* branched, ſmooth, frequently ſpotted. *Leaves* oppoſite, ſeſſile, rough; heart-ſhaped at the baſe. *Flowers* ſomewhat alternate, on ſhort ſtalks, yellow. *Seeds* with a membranous border. The Engliſh name has obtained, from the rattling of its ſeeds in the capſule.

4. R. *Trixago*. Linn. Sp. Pl. 840. (Bartſia Trixago; Sm. Prodr. Fl. Græc. Sibth. v. 1. 427. Trixago apula unicaulis; Column. Ecphr. 199. t. 197.)—Calyx hairy or downy. Leaves oppoſite, bluntly ſerrated. Stem perfectly ſimple.—Native of Italy, the ſouth of France, and Paleſtine. It flowers in May.—*Root* annual, but throwing out runners. *Stem* more than a foot high, ſtraight, firm, ſquare, rather woolly. *Leaves* long, narrow, pale green, toothed or rather jagged. *Flowers* in large, yellow ſpikes. Ray obſerves that the figure of Columna poſſibly may be a variety of this ſpecies, for it differs in a few ſlight particulars.

5. R. *maximus*. Willd. n. 5. Desfont. Atlant. v. 2. 34. —Lower lip of the corolla longer than the upper; ſegments obtuſe, equal. Calyx villous. Upper leaves alternate, oblong, bluntly toothed. Stem branched.—Native of Crete. We know not of any figure of this ſpecies which is admitted on the authority of Willdenow and Desfontaines.—*Stem* from eighteen inches to two feet high, branched at the upper part, and downy. *Lower leaves* oppoſite. *Flowers* in yellow ſpikes at the tops of the ſtem and branches. This ſpecies has much the appearance of *Bartſia viſcoſa*, of which indeed the *R. maximus* of Lamarck is merely a variety. The ſame author makes the preſent a variety of the following.

6. R. *verſicolor*. Willd. n. 6. Desfont. Atlant. v. 2. 33.—Corolla gaping; lower lip longer than the upper; ſegments obtuſe; the middle one narrower. Calyx villous. Leaves moſtly oppoſite, lanceolate, the upper ones toothed at the baſe. Stem ſimple.—Native of Italy and the north of Africa. This differs from the preceding, in having a ſimple *ſtem*. *Leaves* linear-lanceolate, the upper ones only toothed at the baſe. *Bracteas* ovate, acuminate. *Corolla* only half as large, of a purple colour, the middle ſegment of the lower lip narrower than the other two.

7. R. *capenſis*. Willd. n. 7. (Buchnera africana; Linn. Sp. Pl. 879.)—Calyx downy. Bracteas ovate. Leaves lanceolate, toothed.—Native of the Cape of Good Hope. This is nearly allied to *R. Trixago*, becoming totally black in drying.—The *leaves* have three or four teeth on each ſide, the upper ones ſometimes alternate. *Bracteas* downy, a little pointed. *Calyx* four-cleft, obtuſe as in *Criſta-galli*.

8. R. *indicus*. Linn. Sp. Pl. 841. Fl. Zeylan. 107. Burm. Ind. 131. t. 39. f. 1.—Leaves nearly lanceolate, hairy, entire.—Native of Ceylon.—*Root* annual. *Stem* a ſpan high, erect, ſimple, ſquare, hiſpid. *Leaves* oppoſite, ſmall. *Flowers* ſeſſile, ſolitary, oppoſite, turned to one ſide.

9. R. *virginicus*. Linn. Sp. Pl. 841. Gronov. Virg. 192. —Corolla ſpreading at the throat. Leaves ſinuated and toothed.—Native of Virginia. This plant is nearly akin to *Gerardia*, of which it is moſt probably a ſpecies. The *anthers* are rough with hairs.

10. R. *trifida*. Willd. n. 10. Vahl. Symb. v. 1. 44.—Corolla wide at the throat. Leaves trifid.—Native of ſandy hills in Armenia and Galatia.—*Root* annual. *Stem* ſix inches high, herbaceous, aſcending, quite ſimple, rather downy, round. *Leaves* oppoſite, ſeſſile, downy, ribbed, deeply three-cleft. *Flowers* axillary, ſolitary, oppoſite, ſeſſile.

RHINBERG, in *Geography*. See Rheinberg.

RHINE, a river which riſes in the Griſon Alps in three branches, which unite into one ſtream. Cæſar is the moſt ancient author who has traced the courſe of this river from its ſource in the Alps to its diſcharge into the ſea. According to this writer it commenced in the territory of the Lepontii; and Pomponius Mela mentions two lakes which it traverſes ſoon after, *viz.* the "Lacus Venetus" and the "Lacus Acronius." Of the deſcriptions given by ancient writers of this river, that of Tacitus is the moſt preciſe and ſatisfactory. The Rhine, ſays this hiſtorian, after having purſued its courſe in one bed, and arriving near the country of the Batavi, divides itſelf into two branches; one of which preſerves its name and the rapidity of its courſe along the borders of Germany until it diſcharges itſelf into the ſea; the other runs towards Gaul, in a larger channel and more tranquil ſtate, and is called by the people of the country "Vahalis," or Wahal. But it ſoon changes this name for that of "Moſa," or Meuſe, and blended with this river diſcharges itſelf into the ocean. Such is the account of Tacitus, to which we ſhall ſubjoin ſome other particulars from ancient writers. The Rhine, which, as we have ſaid, has its ſource in the Alps, aſſumes a northerly direction, and for a conſiderable interval ſeparates Gaul from Germany. At the town of "Burgenatium," or "Quadriburgium," it ſeparated itſelf into two arms or branches; the one flowing northward, and the other towards the weſt. This laſt aſſumed the name of Vahalis (Vahal), and watered the towns of Noviomagus, Grinnes, &c. united with the Moſa or Meuſe, and in this confluent ſtate diſcharged itſelf into the ſea. The other branch, which ran in a northerly direction, watered Arenatium, ſince called Caſtra Herculis; at which place commenced the canal of Druſus, "foſſa Druſiana." Here a new diviſion took place; the canal of Druſus purſued a northerly courſe, and the bed of the Rhine was directed towards the weſt. This laſt watered, beſide other places, Batavodurum, Trajectum, Lugdunum Batavorum, and emptied itſelf into the ſea, at a place called "Caſtellum Romanum." We ought, however, to obſerve, that near Trajectum it furniſhed a ſmall branch which had a northern courſe. The canal of Druſus flowed northwards, and it is now called the Yſſel. This canal, before it reached the ſea, traverſed a ſmall lake called Flevo, from which iſſued a ſmall

a ſmall river of the ſame name, which ran towards the ſea in a northerly direction, and diſcharged itſelf into it near a place called "Caſtellum," which defended the entrance of this river. The lake juſt mentioned is conſiderably enlarged, and communicates with the ſea under the name of Zuiderzee. The Rhine has been almoſt always regarded by the Romans as the boundary of their empire between Gaul, which they had conquered, and Germany, into which they made frequent incurſions. According to modern accounts of the courſe of the Rhine, it commences, as we have ſaid, in the Alps of the Griſons in three branches, which afterwards unite into one ſtream. The principal branch deſcends from the mountain of St. Gothard, and runs into the lake of Conſtance, near Rheineck; traverſing the lake of Conſtance and Zell, it paſſes near Stein, Schaffhauſen, Egliſau, Keiſerſtuhl, Seckingen, Rheinfelden, Bâle, Huningue, Straſburg, Spire, Worms, Oppenheim, Bingen, Mentz, St. Goar, Coblentz, Bonne, Cologne, Zons, Nuys, Duſſeldorp, Duyſberg, Rees, and Emeric, a little below which a large branch ſeparates to the left, and takes the name of Wahal; it then proceeds to Huiſſen and Arnheim, near which another branch breaks off to the right and joins the Iſſel. The ſtream that ſtill maintains the name of Rhine paſſes on to Wageningen, and Wyck le Duerſtede, where it is again divided. The larger part to the left takes the name of the Leck and joins the Meuſe; the ſmaller and leſs branch paſſes by Utrecht, Voerden, Leyden, &c. and loſes itſelf at laſt in the ſand, juſt before it reaches the German ſea, a few miles after it has left Leyden. By the treaty of Paris in 1814, the Rhine is to remain as the boundary of France and Germany, and the main ſtream of this river conſtitutes the frontier, provided however that the changes that may hereafter take place in the courſe of that river ſhall not affect the property of the iſlands.

Rhine is alſo a river of Brandenburg, which runs into the Havel, 10 miles above Havelburg.—Alſo, a river of France, which runs into the Loire, near Roanne.

Rhine, *Circle of the Lower*, a diviſion of Germany, bounded by the circles of Weſtphalia, Upper Rhine, Franconia, and Swabia, and by the duchy of Luxemburg and France. In conjunction with the circle of the Upper, it is ſaid to contain 960 ſquare German miles. The ſtates of this circle were the electors of Mentz, Treves, and Cologne, together with the Palatine, the duke of Aremberg, the prince of Taxis, the Teutonic bailiwic of Coblentz, the prince of Naſſau-Dietz, on account of the ſeigniory of Beilſtein, the elector of Treves, on account of Lower Iſenburg, and the count of Sinſendorf, on account of the burgraviate of Rheineck. The claim of the town of Gelnhauſen was diſputed. The ſummoning prince and director of the circle was the elector of Mentz. The diets of the circle have ever ſince the middle of the 17th century been held at Francfort on the Mayn. This circle was one of thoſe called the "anterior circles," but which, in the years 1697 and 1702, formed with each other a mutual compact for defence againſt the attacks of an enemy. This compact continued, and the circle always appointed its quota of horſe and foot; which quota, as well as the contribution of the circle to the aid of the empire, was generally equal to that of the circle of the Upper Rhine. In regard to religion, this circle was reckoned among the mixed.

Rhine, *Circle of the Upper*, was bounded by the circles of the Lower Rhine, Weſtphalia, Upper and Lower Saxony, Swabia, and Franconia, and by thoſe of France, formerly called Alſace and Lorraine, in the latter of which were ſome lands belonging to this circle. The ſtates belonging to this circle were the biſhoprics of Worms and Spire, with the provoſtſhip of Weiſſenburg, Straſburg, Bâle, and Fulda, and the commandery of the order of St. John, and alſo the princely abbey of Prum, with the provoſtſhip of Odenheim, and the electorate palatinate of Simmern, Lautern and Veldenz, the palatinate of Deux-Ponts, Heſſe-Caſſel, Heſſe-Darmſtadt, Hersfeld or Hirſchfeld, and Sponheim, the margraviates of Nomeny, Salm with Kirburg, Naſſau-Weilburg, Naſſau-Uſingen, Naſſau-Idſtein, Naſſau-Saarbrucken, and Otweiler, together with thoſe of Waldeck, Hanau-Munzenberg, Hanau-Lichtenburg, Solms-Hohenſolms, Solms-Braunfels, Solms-Ruddheim, Solms-Laubach, and the electorate of Mentz on account of Konigſtein, that of Stolberg on account of the ſame, thoſe of Iſenburg-Birſtein, Iſenburg-Badingen, Waſhterſbach, and Mucholz, Grewiler, Grunbach, Dhaun, Leinengin-Hartenburg, Leinengin-Weſterburg, and Grunſtadt, Munzfelden, Witgenſtein of Witgenſtein, Witgenſtein-Berleburg, Falkenſtein, Reipolzkirchen, Creange, Wartenburg, Bretzenheim, Dachſtuhl, and Ollbruck, and the imperial cities of Worms, Spire, Francfort, Friedburg, and Wetzlar. The biſhop of Worms, and the elector palatinate for the duchy of Simmern, were ſummoning princes of this circle. The diets of the circle of the Upper Rhine were formerly held at Worms, but in the laſt century at Francfort; but the chancery circle of the archives belonging to it were kept at the directory at Worms. This circle, with regard to religion, was reckoned among the mixed, and to the chamber judicatory actually preſented two aſſeſſors.

Rhine, *Lower*, one of the ten departments of the N.E. region of France, bounded on the N. by the departments of Mont Tonnerre and the Moſelle, on the E. by the Rhine, on the S. by the department of the Upper Rhine, and on the W. by the departments of the Voſges, the Meurthe, and the Moſelle, ſituated on the left bank of the Rhine, in N. lat. 48° 45′, containing 5695 kiliometres, or 288 ſquare leagues, and 444,858 inhabitants, and divided into four diſtricts, including 37 cantons, and 616 communes. The four diſtricts or circles are, Wiſſembourg, including 113,786 inhabitants, Saverne with 78,398, Straſbourg with 155,647, and Barr with 97,027 inhabitants. According to M. Haſſenfratz's ſtatement, its extent in French leagues is 30 in length, and 15 in breadth. The number of circles is 5, and of cantons 30, and its population 415,080. Its contributions to the land-tax, &c. in the 11th year of the French era, amounted to 3,609,442 francs; and its expences, adminiſtrative, judiciary, and for public inſtruction, amounted to 359,740 fr. 33 cents. The capital of this department is Straſbourg, and it comprehends that diſtrict which, before the revolution, was Lower Alſace. As it lies between mount Voſges and the Rhine, it is diverſified with eminences and plains, producing grain, wine, fruits, tobacco, ſaffron, and alſo with foreſts and plains.

Rhine, *Upper*, one of the ten departments of the N.E. region of France, bounded on the N. by the department of the Lower Rhine, on the S. by Switzerland, and on the W. by the departments of the Upper Saone and Voſges, ſituated on the left hand of the Rhine, in N. lat. 47° 40′, containing 6030 kiliometres, or 280 ſquare leagues, and 382,285 inhabitants, and divided into five diſtricts, or circles, including 39 cantons, and 703 communes. The five diſtricts are Colmar, comprehending 144,821 inhabitants; Altkirch, 83,515; Delemont, 35,779; Porentruy, 34,910; and Befort, 83,260. According to the ſtatement of M. Haſſenfratz, its extent in French leagues is 24 in length, and 14 in breadth: its circles are 3, its cantons are 25, and its population conſiſts of 283,252 perſons. Its contributions to the land-tax, &c. in the

the 11th year of the French era, amounted to 2,837,063 fr. and its expences, adminiſtrative, judiciary, and for public inſtruction, amounted to 354,279 fr. Its capital is Colmar, and it is compoſed of Upper Alſace, Sundtgaut, Porentruy, and a part of the biſhopric of Bâle. The ſoil is in ſome parts moderately fertile, and in others yields all ſorts of grain, wine, and paſtures. It has mines of ſilver, copper, lead, iron, and coal, with mineral ſprings.

RHINE, *Confederation of the*, now aboliſhed. See CONFEDERATION, &c.

RHINE *and Moſelle*, one of the thirteen departments of that region of France called the Reunited country, bounded on the N. by the department of the Roer, on the E. by the Rhine, on the S. by the departments of Mont Tonnerre and the Saone, and on the W. by the departments of the Sarre and the Roer; ſituated in N. lat. 50° 15′, and formed of a part of the electorate of Treves, S. of Roer, and on the left hand of the Rhine. Its territorial extent is 4860 kiliometres, or 290 ſquare leagues, and the number of inhabitants is 203,290. It is divided into three circles or diſtricts, including 30 cantons, and 675 communes. The diſtricts are Coblentz, containing 69,900 inhabitants; Bonn, 70,508; and Simmern, 62,882. According to Haſſenfratz, its extent in French leagues is 25 in length, and 12 in breadth: it contains 3 circles, and 30 cantons, and a population of 372,000 perſons. Its contributions to the land-tax, &c. in the year 11, amounted to 1,717,463 fr.; and its expences, adminiſtrative, judiciary, and for public inſtruction, were 239,883 fr. 33 cents. The capital of this department is Coblentz. Several tracts in it are hilly and wooded; and others, though but indifferently fertile, produce conſiderable crops of grain, flax, hemp, wine, fruits, and paſtures. It has mines of iron, quarries of marble, ſtone, &c.

RHINE, in *Ichthyology*, a name given by Ariſtotle, Appian, and moſt of the Greek writers, to that ſpecies of the ſqualus, which we uſually call the *ſquatina*: the *ſquatus* of Iſidore and Pliny. Artedi has diſtinguiſhed this from all the other ſpecies of the ſqualus, by the having no pinna ani, and the mouth in the extremity of the ſnout. See SQUALUS.

RHINE-GRAVE, in Germany, a count palatine of the Rhine. See GRAVE and PALATINE.

RHINE-LAND ROD, in *Fortification*, &c. a meaſure of two fathom, or twelve feet, uſed by the Dutch and German engineers, &c.

RHINENCHYTES, in *Surgery*, a ſyringe for the noſe.

RHINFELS, in *Geography*, a town and fortreſs of Germany, in the county of Catzenelnbogen, near St. Goar.

RHINGAU, or RHEINGAU, a tract of country along the Rhine, in the electorate of Mentz, extending from Baccharach to Mentz, celebrated for its excellent wine.

RHINGAU, in *Ichthyology*, the name given by ſome authors to the lavaretus, a ſmall fiſh caught in the German lakes, and ſent in pickle into many parts of the world.

RHINHEIM, in *Geography*. See REINHEIM.

RHINIUM, in *Botany*, a name given by Schreber, in his Genera, 701, to the *Tigarea* of Aublet, Lamarck Illuſtr. t. 826; but in his addenda, 833, referred to TETRACERA; ſee that article hereafter.

RHINOBATOS, in *Ichthyology*, the name of a flat cartilaginous fiſh, of the ſquatina or monk-fiſh kind, but differing from it in this, that the body is proportionably longer, and the head is more pointed; and the mouth is a great way below the end of the ſnout, and placed under the head. It is from three to four feet long, and is common in the Mediterranean, and brought to market in ſome parts of Naples. This is a ſpecies of ray in the Linnæan ſyſtem. See RAIA.

RHINOCEROS, in *Zoology*, a genus of the claſs Mammalia and order Bruta, of which the generic character is, horn ſolid, perennial, conic, placed on the noſe, not adhering to the bone. There are two

Species.

UNICORNIS; One-horned Rhinoceros. The one horn of this animal marks the ſpecies. It inhabits marſhy places between the tropics; lives on thorns and ſpinous plants; it may be tamed, and becomes mild, but when enraged it will overturn trees with its violence: its ſight is weak, but its hearing and ſmell are very acute.

In the year 1739 we had a young rhinoceros with one horn ſhewn in England, of which Dr. Parſons has given a very accurate account in the Philoſophical Tranſactions, N° 470. p. 523, &c. or Abridg. vol. ix. p. 94, &c.

The creature fed on rice, ſugar, and hay; his keeper uſed to mix the rice and ſugar in the following manner: ſeven pounds of rice and three pounds of ſugar made the proviſion for one day; he eat this at three meals; and beſides this he eat about a truſs of hay every week, and a large quantity of greens that were brought to him at different times, and of which he ſeemed more fond than of dried food. He drank often, and always ſwallowed a large quantity of water at a time.

He appeared very peaceable in his temper, and bore to be handled on any part of his body with great patience, except when he was hungry; but he was then always outrageous, as alſo when he was ſtruck. His moſt violent paſſions, even on the laſt occaſion, were however always immediately appeaſed by giving him victuals.

Notwithſtanding the lumpiſh aſpect and heavy make of this creature, he would jump about very nimbly in his fits of paſſion, and often leap to a great height; and one common mark of his fury was the ſtriking his head againſt the walls, or any thing elſe that was in the way, and this he would do with terrible violence. He was very apt to fall into theſe paſſions in a morning, before his rice and ſugar were given him, and from the whole he appeared quite untractable, and ſeemed able, in his paſſions, to have run ſo faſt, as that a man on foot could not have eſcaped him.

This creature was two years old, and did not exceed a young heifer in height, but was remarkably broad and thick. His head was very large; and the hinder part of it, near the ears, remarkably elevated above the reſt of the face, which was flat, and ſunk down in a remarkable manner in the middle, riſing again towards the origin of the horn, but in a much ſmaller degree.

The horn in this young animal did not riſe above an inch high from its tough baſis (though in full grown animals it is ſometimes three feet and a half long), and was black and ſmooth at the top, but ragged downwards; and the determination of its growth is backward, not ſtraight up; this is very evidently ſeen in the horns of old rhinoceroſes, which are always curved in a conſiderable degree that way. If we conſider the proportion of this animal's ſize to the length of its horn, and thence carry the proportion to that between the large horns we ſee in the muſeums of the curious, we muſt ſuppoſe the animal of a very ſtupendous ſize, when at its full growth.

The ſides of the under-jaw in this creature ſtand very wide aſunder, ſlanting outward to the lower edge, and backward to the neck; the edges turn outwards from this ſtructure of the bones, and the head neceſſarily looks very large. The rhinoceros has four cutting teeth, one on each corner

corner of each jaw, and ſix grinders in each; the firſt remote from the cutting teeth. That part of the head which reaches from the fore-part of the horn to the upper lip, may be called the noſe: this is very thick and bulky, and has a kind of circular ſweep down towards the noſtrils; on all this part there is a great number of rugæ or wrinkles.

The noſtrils are ſituated very low, in the ſame direction with the opening of the mouth, and not more than an inch from it; and, when viewed in a fore-view, the whole noſe, from the top of the horn to the verge of the lower lip, is ſhaped like a bell. The under lip is like that of an ox, but the upper more like that of a horſe, and he uſes it as that creature does, to gather up hay from the rack, or graſs from the ground; but with this ſuperior advantage, that this creature has a power of extending this lip to ſix or ſeven inches in length from the noſe, and there drawing it to a point: with this lip, thus extended, the creature is able to graſp a ſtick, or any ſmall ſubſtance, and hold it extremely faſt; and this power of prolonging the lip ſerves, in many purpoſes, to the ſame end as the trunk of that other unwieldy animal, the elephant.

The tongue of the rhinoceros is ſaid to be ſo rough as to be able to rub a man's fleſh off from the bones; but in this young ſubject it was ſo ſoft, that it reſembled that of a calf. It may poſſibly grow harder with age; but the ſtory of its effects ſeems of a piece with the many other falſe marvels reported of this animal. The eyes are dull and ſleepy, much like thoſe of a hog in ſhape; he ſeldom opens them entirely; and it is to be obſerved, that they are ſituated nearer the noſe than thoſe of any other known quadruped. The ears are broad and thin towards the top; the neck is very ſhort; the ſhoulders are thick and heavy; the body is thick, and juts out at the ſides, and has a hollow in the back; the belly hangs low; the legs are ſhort, thick, and ſtrong; the hoofs are divided into three parts, each pointing forward; the tail is ſlender, flatted at the end, and covered on the ſides with very ſtiff thick black hairs; the ſkin is naked, rough or tuberculated, lying about the neck in vaſt folds; there is another fold from the ſhoulders to the fore-legs, and another from the hind part of the back to the thighs. The ſkin is thick, and ſeems almoſt impenetrable, inſomuch that it will turn the edge of a ſcymitar, and reſiſt a muſket-ball; it feels like a piece of board of half an inch thick. It is covered in all parts, more or leſs, with a ſort of incruſtations, reſembling ſcales. Theſe are ſmall on the neck, and largeſt of all on the ſhoulders and hips; between the folds of this thick ſkin, the cuticle, which is left bare, is ſoft and eaſily penetrable. The ſcabby incruſtations of the ſkin have been called ſcales by ſome writers; but this is a very wrong term, for they have nothing of the nature of ſcales, nor any thing of regularity in them.

The creature is of the retromingent, and therefore probably of the retrogenerative kind. Thoſe animals that have been brought to Europe have been young and ſmall; but, according to Bontius, they equal the elephant in the bulk of their bodies, though they are lower, on account of the ſhortneſs of their legs. They inhabit Bengal, Siam, Cochinchina, Quangſi in China, and the iſles of Java and Sumatra. They are fond of ſhady foreſts, the neighbourhood of rivers, and marſhy places; and are fond of wallowing in the mud like the hog. The rhinoceros is a ſolitary animal, brings one young at a time; is quiet and inoffenſive, but furious when provoked; very ſwift and dangerous; and, though dull of ſight, has a moſt exquiſite ſmell. It grunts like a hog. The fleſh of this animal is eaten. The ſkin, fleſh, hoofs, teeth, and dung itſelf, are uſed in India medicinally. The horns are in great repute as an antidote

againſt poiſon, eſpecially thoſe of the virgin female, called abbada; cups of which are ſaid to communicate virtue to the liquor poured into them. Redi, who has been very ſagacious in diſcovering the falſity of many of the pretended medicines taken from animals, yet gives us, on the teſtimony of his own experience, an account of ſome very remarkable virtues in the parts of the rhinoceros. The blood, he aſſures us, is excellent in colics and in dyſenteries. The decoction of the ſkin, he aſſures us, is a grand ſtomachic antidote; and the horns are very valuable and alexipharmic.

This animal is the unicorn of ſcripture, and the Indian aſs of Ariſtotle, who ſays it has but one horn.

Bicornis; Two-horned Rhinoceros. This ſpecies inhabits Africa, but, according to Pallas, the bones of it are found buried in the north of Ruſſia. Its fleſh reſembles that of a hog; the viſcera thoſe of a horſe; the ſecond horn is ſhorter, and placed over the firſt; it has no gall-bladder, and no fore-teeth; the ſkin is without folds, granulated, and of a deep aſhen-grey; between the legs it is ſmooth, and fleſh-coloured; in other parts there are a few briſtles, but they are moſt numerous about the ears and end of the tail. This animal inhabits Africa only; and ſeems, in its manners, to agree with the former. The miſchief it does is more the effect of a ſenſeleſs impulſe than of rage; for, though its ſight is bad, its ſenſes of hearing and ſmelling are exquiſite, ſo that the leaſt noiſe or ſcent puts it in motion; and in running to the ſpot from which the alarm proceeds, it overturns and tramples on animals, or any thing elſe which it meets with in its way, but never ſtays or returns to renew the charge. There is a variety, but not often ſeen, that has three horns; the third being an excreſcence on one of the others.

Mr. Bruce's deſcription of the manner of feeding, as well as of ſome other particulars relative to the two-horned rhinoceros, ſeems highly worthy of notice. He informs us, that "beſides the trees capable of moſt reſiſtance, there are, in the vaſt foreſts within the rains, trees of a ſofter conſiſtence, and of a very ſucculent quality, which ſeem to be deſtined for his principal food. For the purpoſe of gaining the higheſt branches of theſe, his upper lip is capable of being lengthened out, ſo as to increaſe his power of laying hold with this, in the ſame manner as the elephant does with his trunk. With this lip, and the aſſiſtance of his tongue, he pulls down the upper branches which have moſt leaves, and theſe he devours firſt. Having ſtript the tree of its branches, he does not therefore abandon it; but, placing his ſnout as low in the trunk as he finds his horns will enter, he rips up the body of the tree, and reduces it to thin pieces, like ſo many laths; and when he has thus prepared it, he embraces as much of it as he can in his monſtrous jaws, and twiſts it round with as much eaſe as an ox would do a root of celery, or any ſuch pot-herb or garden-ſtuff.

"When purſued, and in fear, he poſſeſſes an aſtoniſhing degree of ſwiftneſs, conſidering his ſize, the apparent unwieldineſs of his body, his great weight before, and the ſhortneſs of his legs. He is long, and has a kind of trot, which, after a few minutes, increaſes in a great proportion, and takes in a great diſtance; but this is to be underſtood with a degree of moderation. It is not true, that in a plain he beats the horſe in ſwiftneſs. I have paſſed him with eaſe, and ſeen many worſe mounted do the ſame; and though it is certainly true that a horſe can very ſeldom come up with him, this is owing to his cunning, but not his ſwiftneſs. He makes conſtantly from wood to wood, and forces himſelf into the thickeſt part of them. The trees that are dry are broke down, like as with a cannon-ſhot, and fall behind him,

him, and on his ſide, in all directions. Others that are more pliable, greener, or fuller of ſap, are bent back by his weight, and the velocity of his motions; and, after he has paſſed, reſtoring themſelves like a green branch to their natural poſition, they ſweep the incautious purſuer and his horſe from the ground, and daſh them in pieces againſt the ſurrounding trees.

"The eyes of the rhinoceros are very ſmall, and he ſeldom turns his head, and therefore ſees nothing but what is before him. To this he owes his death, and never eſcapes, if there is ſo much plain as to enable the horſe to get before him. His pride and fury then make him lay aſide all thoughts of eſcaping, but by victory over his enemy. He ſtands for a moment at bay; then, at a ſtart, runs ſtraight forward at the horſe, like the wild boar, whom, in his manner of action, he very much reſembles. The horſe eaſily avoids him, by turning ſhort to a ſide; and this is the fatal inſtant: the naked man, with the ſword, drops from behind the principal horſeman, and, unſeen by the rhinoceros, who is ſeeking his enemy, the horſe, he gives him a ſtroke acroſs the tendon of the heel, which renders him incapable of further flight or reſiſtance.

"In ſpeaking of the great quantity of food neceſſary to ſupport this enormous maſs, we muſt likewiſe conſider the vaſt quantity of water which he needs. No country but that of the Shangalla, which he poſſeſſes, deluged with ſix months' rain, and full of large and deep baſons, made in the living rock, and ſhaded by dark woods from evaporation, or watered by large and deep rivers, which never fall low or to a ſtate of dryneſs, can ſupply the vaſt draughts of this monſtrous creature. But it is not for drinking alone that he frequents wet and marſhy places: large, fierce, and ſtrong as he is, he muſt ſubmit to prepare himſelf againſt the weakeſt of all adverſaries. The great conſumption he conſtantly makes of food and water neceſſarily confine him to certain limited ſpaces; for it is not every place that can maintain him. He cannot emigrate, or ſeek his defence among the ſands of Atbara."

The rhinoceros with two horns was the ſpecies deſcribed by Martial, under the name of *rhinoceros cornu gemino*, who relates its combat with the bear.

"Namque gravem gemino cornu ſic extulit urſum,
Jactat ut impoſitas taurus in aſtra pilas."
Spect. Epig. 22.

The Romans, who procured their rhinoceroſes from Africa, repreſent them with double horns. That figured in the Preneſtine pavement, and that in a coin of Domitian, have two horns; that which Pauſanias deſcribes (ix. 9.) under the name of Ethiopian bull, had one horn in the noſe, and another leſſer higher up; and Coſmas Ægyptius (tom. ii. 334.), who travelled into Æthiopia, in the reign of Juſtinian, alſo attributes to it the ſame number. Auguſtus introduced a rhinoceros (probably of this kind) into the ſhows, on occaſion of his triumph over Cleopatra. Dion Caſſius, lib. ii. Phil. Tranſ. abr. vol. ix. ubi ſupra. Id. vol. lvi. p. 32, &c.

M. Geoffroy of France thinks there are, or at leaſt have been, no leſs than five different ſpecies of the rhinoceros; *viz.* 1. The rhinoceros africanus, cornu gemino of Camper, who has given a figure of the ſkull in the Peterſburgh Tranſactions for 1777. 2. The ſpecies found foſſile in Siberia, which M. Geoffroy contends is different from the common two-horned rhinoceros, though of that diviſion of the genus. 3. That of which the ſkull is figured by Camper, and deſcribed by him in a letter to Dr. Pallas, in the Peterſburgh Tranſactions. This is a ſingle-horned ſpecies, and has been often confounded with the common rhinoceros. 4. The common ſingle-horned Aſiatic rhinoceros. And, 5. The Sumatran rhinoceros, deſcribed by Mr. Bell in the Phil. Tranſ. of the Royal Society of London.

Rhinoceros *Avis*, in *Ornithology*, the rhinoceros-bird, a name given by authors to a ſpecies of Indian raven, called by others *corvus Indicus cornutus*; the beak of which is frequently brought over into Europe. This, in the Linnæan ſyſtem, is a ſpecies of *Buceros*; which ſee.

It is a very ugly bird, and of a very rank ſmell. It much exceeds the European raven in bigneſs, and its head and neck are very thick. Its eyes are very large, and its beak of a very remarkable figure, having a large and thick horn-like protuberance on its upper part. The whole beak is bent like a bow, not hooked at the end like the beaks of the hawk, &c. It is of a yellowiſh-white below, and on the upper part towards the head is of a fine gay red, and the reſt of a yellowiſh-white; the upper chap is ſerrated. The horn grows out from the head with this, and runs along it, and bends up at its extremity; its upper and under part are red, its middle yellow. The bird feeds on carrion.

Rhinoceros, in the *Hiſtory of Inſects*, a ſpecies of beetle, ſo called, becauſe it has a kind of horn upon its head.

RHINOCOLURA, or Rhinocorura, in *Ancient Geography*, a town of Syria, 22 miles from Raphia, and which formed a kind of boundary between Syria and Egypt. Strabo attributes it to Phœnicia; and Pliny calls the ſea, on a ſtrait of which this place is ſituated, the "Sea of Phœnicia." Diodorus Siculus ſays, that this town, ſituated on the confines of Egypt and Syria, near the ſea, was deſtitute of all the conveniencies of life; that its water was bitter and noxious, and that it was ſurrounded with ſalt marſhes. It was in the vicinity of this place that the Iſraelites were nouriſhed with quails.

RHINOMACER, in *Entomology*, a genus of inſects of the order Coleoptera. The generic character is, antennæ ſetaceous, ſeated on the ſnout; it has four feelers, growing thicker towards the end; the laſt joint is truncate. There are three ſpecies, none of which are found in this country.

Species.

Curculioides. This is grey and downy; the antennæ and legs are black. It inhabits Italy. It reſembles a curculio. The antennæ are ſetaceous and black, and as long as the thorax; the laſt joint is ſharp; the ſnout is flat, and impreſſed in the middle.

Attelaboides. This is piceous-downy; the antennæ and legs are teſtaceous. It is found in divers parts of Sweden. The ſnout is elevated and projected; the body is cinereous.

Cæruleus. This ſpecies is of a blueiſh colour, and it is ſubvillous; the baſe of the antennæ and legs are yellow. It inhabits Calabria, and has been thought to be a ſpecies of the *Attelabus*; which ſee.

RHINOPTES, a word uſed by the ancients to expreſs a perſon, who, from an ulcer in the great canthus of the eye, laying open the paſſages to the noſe, can ſee through his noſtril.

RHINOW, in *Geography*, a town of the Middle Mark of Brandenburg, on the Rhine; 20 miles N. of Brandenburg.

RHINSBERG. See Reinsberg.

RHINSBERGERS, in *Eccleſiaſtical Hiſtory*. See Collegians.

RHIPÆI Montes, in *Ancient Geography*. See Riphæan *Mountains*.

RHIPSALIS, in *Botany*, Gærtn. t. 28. (See Cactus, ſp. 25.) It is curious to obſerve how the repreſentation of the fructification of this plant, in Miller's Illuſtration of the Linnæan ſyſtem, is made to anſwer to the generic character of *Caſſytha*, for which it had been erroneouſly taken.

RHIPTASMOS, a word uſed by the ancients to expreſs

preſs a reſtleſſneſs and frequent toſſing about, a very common ſymptom in fevers.

RHISOPHAGI, in *Ancient Geography*, a people of Ethiopia, in the vicinity of the iſle of Meroe, upon the banks of the rivers Aſtaboras and Aſtapas, according to Diodorus Siculus.

RHISPIA, a town of the Higher Pannonia, at a diſtance from the Danube, and ſituated between Savaria and Vincendria. Ptolemy.

RHISUS, a town of Greece, on the coaſt of Theſſaly, according to Strabo and Steph. Byz. Pliny mentions a town of this name in Magneſia.

RHITHYMNA, a town ſituated on the northern coaſt of the iſle of Crete. Ptolemy.

RHITIA, a town of Africa, in Mauritania Cæſarienſis; placed by Ptolemy in the interior of the country between Arina and Victoria.

RHITTIUM, a town of Lower Pannonia, upon the banks of the Danube, between Acumincum Legio and Taururum, according to Ptolemy.

RHIUM, a promontory on the N.E. part of Achaia: it formed with Anti-Rhium, another promontory oppoſite to it, and more northerly, the ſtrait by which the Ionian ſea communicated with the gulf of Corinth.—Alſo, a town of the Peloponneſus, in Meſſenia, upon the gulf of Thuriates, oppoſite to the promontory Tanarus, according to Strabo. —Alſo, a promontory on the E. ſide of the iſland of Corſa, between mount Rhætius and the town Urcipium. Ptolemy.

RHIUSIAVA, a town of Germany, on the banks of the Danube, between Aræ Flaviæ and Alcimænis. Ptolemy.

RHIW-ABON, or Ruabon, in *Geography*, a market-town in the cwmwd of Maelor Gymraeg, cantref of Uwch-Nant, (now called the hundred of Bromfield,) county of Denbigh, North Wales, is ſituated on riſing ground, at the diſtance of four miles S.S.W. from the town of Wrexham. The market-day here is Monday, weekly; beſides which, there are fairs on the laſt Friday in February, the 22d of May, and the 20th of November. The petty ſeſſions for the Ruabon diviſion of the hundred are held in this town. The church is an ancient ſtructure, but is in good repair, and contains ſeveral monumental erections. One, to the memory of the firſt ſir Watkin Williams Wynne, diſplays a figure of the deceaſed in a looſe robe. On one ſide is a figure of his ſon, and on the other that of his daughter, both in kneeling poſtures. This monument was erected by Ryſbrack. Near it ſtand thoſe of the late ſir Watkin Williams Wynne, bart., and his lady; both of them the workmanſhip of Nollekens, and worthy of his chaſte and claſſic chiſſel. The latter exhibits lady Wynne in the character of Hope, ſtanding, and reclining her arm on an urn; the whole being placed upon a pedeſtal, made in the ſhape of a Roman altar. The other principal monuments commemorate Henry Wynne, eſq., tenth ſon of ſir John Wynne of Gwidir, who died in 1671; ſir John Wynne of Wynſtay, and his wife Jane; and another ſir John Wynne, ſon of the above, with his wife, the heireſs of Watſtay. In a chapel, on the ſouth ſide of the communion table, is likewiſe an altar tomb, ſupporting the recumbent figures of a man in armour, and a female habited in a mantle. From an inſcription round the edge of the entablature, it appears that theſe repreſent John ap Ehs Eyton, eſq., who died in 1526, and Elizabeth Caſſley, his wife, who died in 1524.

Rhiw-Abon is noted as the birth-place of Dr. David Powell, who tranſlated into Engliſh the Hiſtory of Wales, written by Caradoc of Llancarfan, with the Continuation by Humphrey Llwyd; and who likewiſe firſt edited the works of Giraldus Cambrenſis, and publiſhed a treatiſe, entitled "De Britannica Hiſtoria recte intelligenda." He died in 1590. This pariſh is very extenſive, and contains five townſhips. The town conſiſts, according to the population returns of 1811, of 263 houſes, and 1137 inhabitants. The pariſh abounds with collieries, the produce of which is conveyed to different parts of the country, by means of the Elleſmere canal, which paſſes near the town, and forms a junction with the canals that penetrate Wales on the one ſide, and communicate with the Grand Trunk Navigation on the other. Adjoining Rhiw-Abon is Wynnſtay-hall, the ſeat of ſir Watkin Williams Wynne, bart. The houſe is large, but, owing to the heterogeneous and patched character of its architecture, it poſſeſſes little elegance of external appearance. The apartments in the interior, however, are grand and ſpacious, and contain ſeveral good portraits of the Wynnes, the Williamſes, and the Seymours, painted by Vandyke, ſir Godfrey Kneller, and other eminent artiſts. Cloſe to the houſe is a building, originally fitted up as a theatre, but now appropriated for an annual agricultural meeting, auxiliary to the ſociety at Wrexham. A ſhow of cattle takes place on the occaſion of each meeting, at which premiums are adjudged for the beſt ſpecimen of every ſpecies of ſtock, and alſo for other huſbandry improvements. This eſtate was anciently the reſidence of Madoc ap Gryffydd Maelor, lord of Bromfield, and founder of Valle-Crucis abbey. From the circumſtance of the ancient rampire, called Watt's Dyke, running through the park, it was long denominated Watſtay-park, in alluſion thereto. It extends above eight miles in circumference, and is ornamented with plantations, a fine lake, and various buildings. Among the objects of the laſt mentioned kind is a column, 100 feet high, built of free ſtone, from a deſign by the late Mr. Wyatt. It was erected as a tribute of maternal affection, in memory of ſir Watkin Williams Wynne, father to the preſent baronet. In another part of the grounds is a tower, or rotunda, intended to commemorate the heroes of the Cambrian legion, who fell in the cauſe of loyalty, under ſir Watkin, during the late rebellion in Ireland. The ſpot on which this tower is ſituated commands an extenſive view of mountains, woods, and the meanderings of the Dee. The valley, watered by that river here, diſplays the moſt pictureſque and romantic ſcenery, whoſe beauties peculiarly excited the admiration of the celebrated lord Lyttelton. The turnpike-road from Rhiw-Abon to Oſweſtry, which croſſes this valley, is formed for nearly two miles on the embankment of Offa's Dyke. It is here ten feet high, and broad enough for two carriages to run abreaſt. Near this road is a remarkable tumulus, ſuppoſed to be the burying-place of ſome chieftain ſlain in a battle, fought in this neighbourhood, about the year 1161, between Owain Cyfeiliog, prince of Powys, and the Engliſh, and terminated in favour of the ancient Britons. This victory gave riſe to the beautiful poem, called "Hirlas Owain," or the Drinking-Horn of Owain, compoſed by the prince himſelf; which, according to Mr. Pennant, ranks with the beſt Pindaric ode of the Grecian ſchool. About three miles northward from Rhiw-Abon is Erdigg, or Erddig, the ſeat of Simon Yorke, eſq. The houſe, which has been lately modernized, contains ſome valuable paintings; and the library is the depoſitory of many curious Welſh MSS., including the Seabright collection. The grounds are laid out with much taſte, but the efforts of art are too apparent. The continuation of Watt's Dyke extends acroſs theſe grounds, running along one ſide of a bank between the two vallies, by which the domain is bounded. Not far from hence are the fragments of a cemented wall, and various foundations of buildings, ſurrounded by a triple intrenchment of a pentagonal form.

Theſe

Thefe are fuppofed by fome to be of Roman origin, but others conceive that they mark the fcite of a Saxon fort, conftructed by the Mercians to defend their line of demarcation, as fixed by the great Offa. This laft opinion is rendered the more probable, by the fact of there being fome veftiges of a fimilar fort more to the northward, and on the fame line. Philip Yorke, efq., anceftor to the prefent proprietor of Erddig, was author of "The Hiftory of the five royal Tribes of Wales;" a work abounding with fo much information, that it is greatly to be lamented that he did not favour the world with his intended Stemmata, or Fifteen Tribes.

The diftrict in the vicinity of Rhiw-Abon, particularly towards Wrexham, abounds with valuable mines. The iron ore, found in the adjacent mountains, is exceedingly rich, and affords excellent iron. The principal works carried on are thofe of Brymba and Berfham. The latter, which are fituated at Pont-y-Penca, confift of forges, flitting, rolling, and ftamping mills, &c. with an extenfive cannon foundery, inferior only to that on the banks of the Carron, in North Britain. Befides cannon, thefe works produce wheels, cogs, bars, pipes, cylinders, rollers, columns, piftons, &c.; alfo furnace boilers, fteam caiffons, and various other articles which were formerly made of copper. Carlifle's Topographical Dictionary of Wales, 4to. 1813. A Tour round North Wales, by the Rev. W. Bingley, B.A., F.L.S., 8vo. 2 vols. 1800.

RHIZAGRA, in *Surgery*, an inftrument for extracting the ftumps of the teeth.

RHIZANA, in *Ancient Geography*, a town placed by Ptolemy in the interior of Dalmatia.—Alfo, a town of Afia, in Gedrofia, upon the fea-coaft near Coiamba. Ptol.—Alfo, a town placed by Ptolemy in Arachofia, between Alexandria and Arbaca.

RHIZINIUM, or RHISINUM, or *Rhifon*, a town of Dalmatia, on a gulf to which it gave the name of Rhifonicus Sinus. Ptol.

RHIZIUM, RHIZÉ, a town of Afia, in the Colchide, on the coaft of the Euxine fea, and W. of the mouth of the fmall river "Rhizius."

RHIZOBOLUS, in *Botany*, a name of Gærtner's, from ῥίζα, *a root*, and βαλλω, *to throw*, or *caft*, becaufe the plant is remarkable for throwing out a number of roots. —Schreb. 369. Mart. Mill. Dict. v. 4. Gærtn. t. 98. (Caryocar; Linn. Mant. 154. Willd. Sp. Pl. v. 2. 1243. Pekea; Aublet. Guian. v. 1. 594. Juff. 249. Lamarck Illuftr. t. 486.)—Clafs and order, *Polyandria Tetragynia*. Nat. Ord. *Sapindi*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, fleffy, cloven half way down into five, roundifh, concave fegments. *Cor.* Petals five, ovate, rounded, concave, fleffy, inferted below the fegments of the calyx, and much larger. *Stam.* Filaments very numerous, thread-fhaped, longer than the corolla, inferted into the receptacle; anthers roundifh. *Pift.* Germen fuperior, fquare, in the bottom of the calyx; ftyles four, thread-fhaped, longer than the corolla; ftigmas obtufe. *Peric.* Drupas four, kidney-fhaped, compreffed, inferted by their wedge-fhaped inner edge into the conical receptacle, of one cell, with a fleffy covering, and a foft pulp like butter. *Seed.* Nuts folitary, kidney-fhaped; kernels folitary, kidney-fhaped.

Eff. Ch. Calyx five-cleft half way down. Petals five. Germen four-fided, fuperior. Nuts four, fingle-celled and fingle-feeded.

1. R. *butyrofus*. Leffer Suwarrow Nut. (Caryocar butyrofum; Willd. n. 1. Pekea butyrofa; Aubl. Guian. t. 238.)—Fruit fmooth. Leaves digitate, fmooth on both fides.—Native of woods in Guiana, and cultivated at Cayenne; where it flowers in June and July, and bears fruit in September. This lofty *tree* rifes to the height of eighty feet, or more, and is much branched at the fummit; the inner branches erect; the outer horizontal or declining. *Trunk* three feet in diameter, with a grey *bark*, and reddifh, compact *wood*. *Leaves* oppofite, digitate; leaflets entire, oval, pointed. *Flowers* white, in large bunches, at the extremities of the branches. *Fruit* yellowifh.

2. R. *tuberculofus*. Large, or Common, Suwarrow Nut. (Caryocar tomentofum; Willd. n. 2. C. nuciferum; Linn. Mant. 247. Pekea tuberculofa; Aubl. Guian. t. 239.)—Fruit tubercled. Leaves digitate, downy beneath.—Native of Guiana, producing fruit in July. This *tree* differs from the preceding in having thicker *leaves* which are downy beneath, and afh-coloured. *Fruit* larger and tubercled, the pulp dry, not buttery. The *nut* is fweet and palatable, containing a rich oil. Not unfrequent in our fruiterers' fhops, and known by the name of Suwarrow Nut. It is figured in Cluf. Exot. 27. f. 1, by the name of Amygdala guianenfis.

RHIZOMA, an appellation beftowed, by feveral late authors, on the tuberous *caudex*, or body, of fome roots; as that of *Iris Germanica*, and many other of the natural order of *Enfatæ* of Linnæus and Gawler. See ROOT.

RHIZOMORPHA, fo called from its refemblance to the branching fibrous roots of various plants, is a genus of fungi, eftablifhed by Perfoon, in his Synopfis, 704. One of its fpecies, *R. fubcorticalis*, figured by Micheli, Nov. Gen. t. 66. f. 3, is called by that author, p. 125, Agaricum nigrum reticulatum compreffum, e mortuis arboribus inter corticem et lignum, interdum in ipfo ligno innafcens, ac late fe diffundens. Ray, Vaillant, and others, have likewife confidered this fubftance as a fungus. Perfoon's generic character is

"Creeping, rigid, fmooth, with a villous pith."

He enumerates two fpecies befides the above; *fubterranea*, found among wet timber-work, in mines; and *fetiformis*, found among dead leaves in woods. This laft is figured in Dill. Mufc. t. 13. f. 11, b. They are all, to us, very obfcure, and perhaps imperfect productions.

RHIZOPHORA, a Linnæan genus, whofe name is derived from ῥίζα, *a root*, and φερω, *to bear*, or *carry*; the feed germinating before it falls from the branches, and fending down a remarkably long cylindrical root into the earth.—Linn. Gen. 236. Schreb. 317. Willd. Sp. Pl. v. 2. 843. Mart. Mill. Dict. v. 4. Juff. 213. Lamarck Dict. v. 6. 187. Illuftr. t. 396. Gærtn. t. 45. Loureir. Cochinch. 296. (Mangles; Plum. Nov. Gen. t. 15. Bruguiera; Lamarck Illuftr. t. 397.)—Clafs and order, *Dodecandria Monogynia*. Nat. Ord. *Holeraceæ*, Linn. *Caprifolia*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, fpreading, cloven into four, or more, oblong, acuminate, permanent fegments. *Cor.* Petals four or more, oblong, fomewhat fhorter than the calyx. *Stam.* Filaments fcarcely any, alternately fhorter; anthers from four to twelve, fmall, pointed. *Pift.* Germen fuperior, roundifh; ftyle awl-fhaped, cloven half way down, grooved at each fide; ftigmas acute. *Peric.* fleffy, nearly ovate, including only the bafe of the feed. *Seed* folitary, oblong-club-fhaped, pointed, fleffy at the bafe.

Obf. The number in the parts of the flower varies.

Eff. Ch. Calyx four or five-cleft. Corolla of four or five petals. Seed folitary, very long, fleffy at the bafe.

1. R. *conjugata*. Linn. Sp. Pl. 634. Fl. Zeylan. 81. —Leaves ovate-oblong, rather obtufe, entire. Calyx feffile. Fruit cylindrical, awl-fhaped.—Native of India. All that is known of this fpecies may be gathered from the *Flora Zeylanica*, where it is defcribed as a *tree* whofe *leaves* are ftalked, fmooth. *Calyxes* twin. *Fruit* very long, pendent.

2. R. *gymnorhiza*. Linn. Sp. Pl. 634. (Mangium celsum; Rumph. Amboin. v. 3. 102. t. 68.)—Leaves ovato-lanceolate, entire. Root lying upon the ground.—Found in many parts of the East Indies, and in the islands of the South seas.—A middling-sized *tree* with a lofty, erect *trunk*, covered with a thick brown-red *bark*. *Leaves* on stalks, smooth, scattered, sometimes heaped together at the top. *Flowers* solitary, scattered, red, having usually from ten to thirteen petals, and twice as many stamens.

The bark of this tree is useful in dyeing a rufous or chesnut colour, which may easily be changed into a fine permanent black, as Loureiro informs us.

3. R. *Candel*. Linn. Sp. Pl. 634. (Tsjerou-Candel; Rheede Hort. Malab. v. 6. 63. t. 35.)—Leaves obtuse. Flower-stalks in forked pairs, longer than the leaf. Fruit awl-shaped. Native of the East Indies in shallow salt water. A *tree* about seven feet high. *Leaves* opposite, on short stalks, rather long, with round edges. *Flowers* composed of five or six thick, reflexed, white, slightly fragrant petals. *Fruit* very like that of the following species.

4. R. *Mangle*. Mangrove-tree. Linn. Sp. Pl. 684. Jacq. Amer. 141. t. 89. Browne Jam. 211.—Leaves pointed. Fruit slender-club-shaped. Found in moist situations, both in the East and West Indies. A *tree* about fifty feet high, with white *wood*, and a rusty-coloured *bark*. *Leaves* ovate, ribbed, entire, shining, coriaceous, dotted beneath. *Stalks* axillary, solitary, two or three-flowered, slightly triangular. *Flowers* white, having mostly eight petals.

Jacquin and Browne each give an elaborate and curious description of the fruit of this tree and the mode in which the seed germinates. From it's growing usually near the sea, the lower branches frequently become a support to the American oyster, and this circumstance doubtless gave rise to an ancient fabulous opinion, that shell-fish sometimes grew on trees, like fruit.

5. R. *cylindrica*. Linn. Sp. Pl. 635. (Cari-Candel; Rheede Hort. Malab. v. 6. 59. t. 33.)—Fruit cylindrical, obtuse.—Native of salt marshes in Malabar. This species is closely allied to *gymnorhiza*, of which indeed Gærtner considers it to be a variety. It is rather taller, and not so much branched. *Leaves* much smaller, and on shorter stalks. *Fruit* green when young, but afterwards reddish-blue.

R. *corniculata*. See Ægiceras.

R. *cafeolaris*. See Sonneratia.

We dare not venture to adopt *R. fexangula* of Loureiro, without further information than is furnished by that author respecting it.

RHIZUS, in *Ancient Geography*, a port of Cappadocia, near Trebizond, between the town of Pitiusa and the promontory of Athenæ. Ptolemy.

RHO, in *Geography*, a town of Italy, in the department of the Olona; eight miles W. of Milan.

RHOARA, in *Ancient Geography*, a town of Asia, in Parthia, between Casipraca and Semina. Ptolemy.

RHOAS, a river of the Colchide, according to Pliny.

RHOBASCI, a people of Scythia, on this side of the Imaus, placed by Ptolemy near the most easterly sources of the river Rha.

RHOBODUNUM, a town of Germany, upon the banks of the Danube, between Phelicia and Andupedum. Ptolemy.

RHOBOGDIUM, a promontory placed by Ptolemy in the northern part of Hibernia.

RHOBONDA, a town of Africa, in Mauritania Cæsariensis, between Tupusuptus and Ausum. Ptolemy.

RHOCAS, the watery eye. See Epiphora.

RHODA, or Rhode, *Rosas*, in *Ancient Geography*, a town of Hispania Anterior, belonging to the Indigetes, and N. of a small gulf. It is said to have been built by the Rhodians on the banks of a small river which flowed from the Pyrenées, and called by Pomponius Mela "Thicis." But Cellarius conjectures that it was founded by the inhabitants of Emporiæ, who came thither from the town of Rhodes, in the island of that name.—Also, a town of Gallia Narbonnensis, at the mouth and on the banks of the Rhone, according to Pliny; who adds, that it was built by the Rhodians. St. Jerome intimates that the Rhone took its name from this town.

RHODANNUS, or Rodannus, a small river which had its source in the palatinate of Pomerania, and discharged itself into the Vistula at Dantzick.

RHODANUS Fluvius. See Rhone.

RHODE, a river of the European Sarmatia, in the vicinity of the Axiaces. Pliny.

Rhode *Island*, in *Geography*, one of the United States of America, situated between 41° 17′ and 42° N. lat. and between 71° 6′ and 71° 52′ W. long. Its north line is 29 miles long and its west line 49. The coast west of the bay measures 22 miles, the mouth of the bay 16, and the coast east of the bay 5, in all 43; while the greatest width measured on a parallel is 37 miles. Rhode island contains about 1580 square miles; of which about 190 are water, and about 90 are included in the islands. It is bounded N. and E. by the Massachusetts, S. by the Atlantic, and W. by Connecticut. It is divided, according to the following statement, into five counties and thirty-one townships.

Counties.	No. of Towns.	Population. 1790.	1800.	1810.	Chief Towns.
Providence	10	24,391	25,854	30,769	Providence.
Newport	7	14,300	14,845	16,294	Newport.
Washington	7	18,075	16,135	14,968	S. Kingston.
Kent	4	8,848	8,487	9,834	Warwick.
Bristol	3	3,211	3,801	5,072	Bristol.
Totals	31	68,825	69,122	76,937	

This state sends two representatives to congress. The tribe of Indians who inhabited Rhode island at the time of its settlement, was the Narraganfetts, who were a brave and powerful people. The first settlement in this state was made by Roger Williams, and a party of malecontents from Massachusetts, in 1635; and in 1643 a charter was obtained for the whole colony by sir Henry Vane. The charter, on which the present constitution is founded, was obtained of Charles II. in 1663. In May 1789, Rhode island adopted the federal constitution. The inhabitants of this state are chiefly of English descent. Agreeably to the charter just mentioned, the legislature is composed of a council of 12, including the governor and deputy governor, all chosen annually, and a house of representatives, consisting of deputies from the several towns, chosen twice a-year. There is one supreme court, which sits twice a-year in each county, and an inferior court of common pleas and general sessions of the peace for each county, sitting also twice a-year. The militia of this state amount to between 7000 and 8000 men, organized and disciplined in a manner similar to the rest of the New England militia. The settlement of Rhode island is said to have originated in a religious dispute; and some of its first settlers were exiles from the Massachusetts, on account of their religious opinions. The prejudice and animosity thus excited were never thoroughly removed; but they were long cherished by the descendants of the first occupiers; and even to this day, there has never been a congregational minister settled on the west side of the bay,

bay, except in Providence. The mafs of the people, it is faid, on the weft fide of the bay, has generally been ignorant, irreligious, and loofe in their morals. The tone of religious fentiment and of morals, in Providence, Newport, and Briftol, and other towns adjoining thefe on the eaft of the bay, has been much raifed by the emigrants from Maffachufetts and Connecticut, and the eftablifhment of religious inftitutions. The traveller fees few of the improvements in agriculture, roads, manufactures, or mode of living, which he finds in the neighbouring ftates; and meets with little of that civility for which other parts of New England are remarkable. The miffionary labours, however, have not been without their good effects. With refpect to the religious profeffion of this ftate, the Baptifts are the moft numerous; moft of whom are Calviniftic; fome are Arminians, and a few of them are feventh-day Baptifts. A ftill fmaller number confifts of thofe who claim peculiar fanctity, and are denominated Separate Baptifts. The other denominations are Congregationalifts, who have eight miniffers; Epifcopolians, who have four, one of whom is the bifhop of the eaftern diocefe; Moravians, and Jews. In this ftate religion is not fupported by law; but the clergy are maintained by the voluntary contributions of their people. The number of clergy, as they have no ftated falary, enforced by law, is extremely fmall; but the ftate of religion and morals, in a great part of the ftate, is lamentably low. Literature has of late been encouraged. Brown univerfity at Providence, deriving its prefent name from Nicholas Brown, efq., who gave the inftitution 5000 dollars, was founded in 1764 at Warren, and removed to Providence in 1770. (See COLLEGE.) Academies are eftablifhed at Providence, Newport, Briftol, Warren, Eaft-Greenwich, and South-Kingfton. Schools are kept during the winter-months in moft towns of the ftate, though not provided for by the laws; and upon the whole the ftate of fociety is improving. In this ftate there are 13 banks. The chief exports are flax-feed, lumber, horfes, cattle, beef, pork, fifh, poultry, onions, butter, cheefe, barley, grain, fpirits, and cotton and linen goods. More than 600 veffels enter and clear annually at the feveral ports. In 1804 the amount of exports was 1,735,671 dollars, and in 1810, 1,331,576 dollars. The imports confift of European and Weft India goods, and logwood from the bay of Honduras. The inhabitants, particularly thofe of Newport and Briftol, were, not long fince, largely concerned in the flave trade, even in defiance of the laws of the ftate. A turnpike road paffes from Providence, W.S.W., through Scituate and Coventry, meeting a fimilar road in Lifbón, Connecticut, which leads through Windham to Hartford; its length is about 25 miles. Another road ftrikes the Connecticut line S. of this, and paffes through Norwich, New London, to New Haven and New York; this is the great fouthern road from Bofton to New York; but the roads in this ftate have been much neglected. This ftate is reckoned as healthy as any country in America. The winters in the maritime parts of the ftate are milder than in the inland country; and the fummers are delightful: the extreme heats that occur in other parts of America, being allayed by cool and refrefhing breezes from the fea. The rivers and bays fwarm with various kinds of fifh; and this ftate produces corn, rye, barley, oats, and in fome parts wheat, fufficient for home confumption, and the various forts of graffes, fruits, and culinary roots and plants in great abundance and perfection. Cyder is made for exportation. The north-weftern parts of the ftate are rocky and barren, and of courfe thinly inhabited. The tract of land lying between North and South Kingfton on the eaft, and Connecticut on the weft, called "Shannock" country, or "Purchafe," is excellent grazing land, and inhabited by a number of wealthy farmers, who rear fome of the fineft neat cattle in New England; they keep large dairies, and make butter and cheefe of the beft quality, and in large quantities for exportation. Iron ore is found in great plenty in feveral parts of the ftate; fo that the moft confiderable manufactures of this ftate are thofe of iron; and alfo abundance of lime-ftone, which furnifhes lime for exportation. In this ftate are feveral mineral fprings; and one in particular near Providence, to which many people refort for bathing, and for drinking the water.

RHODE *Iland*, is an ifland from which the American ftate takes its name, near the coaft of Maffachufetts, about 40 miles S.W. from Bofton. It is about 15 miles from N. to S., and on an average $3\frac{1}{2}$ miles wide, and is divided into three townfhips, *viz.* Newport, Portfmouth, and Middleton. This ifland is pleafant and falubrious, and is a noted place of refort for invalids from fouthern climates. Between 30,000 and 40,000 fheep are fed on the ifland, befides neat cattle and horfes. N. lat. 41° 25′. W. long. 71° 20′.

RHODE *River*, the weftermoft water of the N.W. branch of Cape Fear river, in North Carolina.

RHODEN, a town of Germany, in the county of Waldeck; 24 miles N.N.W. of Waldeck.

RHODES, *Iland of*, in *Ancient* and *Modern Geography*, an ifland of Afia, fituated in the Mediterranean, very near the coaft of Caria or Natolia, and N.E. of the ifland of Crete, but much larger than this ifland. Pliny ftates its circuit at 125 miles; but Ifidore makes it 103 miles. According to Sonnini, it is much longer than it is broad; its greateft length, in a direction from N. to S., being about 12 leagues, and breadth 6; and its circuit is commonly eftimated at 44 leagues. Its form is nearly triangular, whence it obtained the name of "Trinacria;" and it was alfo known formerly by the names of Ophiufa, Afteria, Æthrea, Cerymbia, Poeffa, Atabyria, Marcia, Oloeffa, Stadia, Telchinis, Pelagia, and Rhodus. The latter appellation has prevailed in later ages; and its etymology has been fought in the Greek Rhodon, fignifying a rofe, with which flower the ifland abounded. In confirmation of this etymology it has been alleged that feveral Rhodian coins are ftill extant, exhibiting, on one fide, the fun, and on the reverfe a rofe. Diodorus Siculus deduces the origin of its name from Rhoda, the daughter of Apollo by Venus. Others, however, have preferred the etymology of Bochart, who, availing himfelf of one of its ancient names, *viz.* Ophiufa or Snake ifland, given to it on account of the numerous fnakes with which it was infefted, when it was firft inhabited, fays that the Phœnicians alfo called it Snake ifland, which, in their language, fignified "Gefirat Rhod," the latter word meaning a fnake, whence the Greeks afterwards formed the name of Rhodes, which the ifland has fince preferved. Another name by which it was diftinguifhed, in common with the ifland of Cyprus, was Macaria, or fortunate, referring to the nature of the climate and of the foil. But it is faid to furpafs Cyprus, if not with refpect to the fertility of the land, at leaft by its milder and more agreeable temperature. In this ifland the heat is not exceffive, fo that long droughts do not burn the plants, dry up the waters, or caufe the inhabitants to fuffer. The fertility and productivenefs of its foil gave occafion to the fable, embellifhed by the poets, of thofe golden fhowers which they pretended to have once fallen upon it. It formerly produced, in great plenty, all forts of delicious fruits, and wines of fo exquifite a flavour, that they were ufed by the Romans chiefly in their facrifices, and thought to be, as Virgil informs us, (Georg. l. ii.) too good for mortals. Although the heat is not fcorching, yet the air is fo ferene, that no day ever paffes without fun-fhine; whence the poets feigned Phœbus

to

to be in love with this iſland, which, as they ſay, was a mere marſh, altogether uninhabitable, till it was loved by Phœbus and raiſed out of the waters by his powerful influence. To this purpoſe Sonnini deſcribes its temperate climate, pure air, and fine ſprings, which at all times ſupply the wants of its inhabitants, and render it agreeable; its vallies of a rich and fertile ſoil, covered by plentiful harveſts, and clothed with rich paſtures, ſhaded by trees bearing precious fruits, ſuch as the olive, the orange, and the fig-tree, with flowers that embelliſh with their luſtre, and perfume with their ſweet emanations; ſloping hills on which the vine is cultivated, or which preſent to numerous flocks a luxuriant and odoriferous herbage; mountains on which grow the moſt beautiful trees, whoſe verdure is perennial; all which would ſtill render it one of the moſt delightful abodes in the world, did not the iron hand of the Turks efface a part of the colours of this ſmiling picture. A gloomy nakedneſs, ſays the ſame author, diffuſes melancholy over places formerly adorned by the riches of nature and induſtry; and the men who are called thither by an agreeable and truly happy country, are driven back by the terror inſpired by a horde of ſpoilers. Happineſs no longer inhabits an iſland formerly "fortunate," and the golden ſhower, which the poets of antiquity cauſed to fall there, as an emblem of its riches and brilliant advantages, is converted into a ſtorm of deſolation.

In the time of Homer the iſland of Rhodes had three cities, *viz.* Lindus, now *Lindo*, Camirus or *Camiro*, and *Ialyſus*, the moſt ancient city in the whole iſland; to which in after ages was added a fourth, bearing the name of the iſland. (See each reſpectively.) Theſe three cities were built, according to Diodorus, by Tlepolemus, the ſon of Hercules, before the Trojan war. But Strabo and Cicero inform us, that they were founded by the Heliades, or grandſons of Phœbus, Ialyſus, Camirus, and Lindus, who gave each of them his own name. Other writers ſay, that they were built by the Dorians not long after their migration; and hence Athenæus reckons them among the Dorian colonies. Herodotus ſays, they were founded by the daughters of Danaus, who landed in this iſland, after having put to death the ſons of Ægyptus, their huſbands. In the city of Lindus was a magnificent temple, built, according to Plutarch, in honour of the Lindian Minerva, a ſtatue of which, together with the mother of Jupiter Dodonæus, both of exquiſite workmanſhip, were found in the rubbiſh of the city, after it had been accidentally reduced to aſhes, and removed to Conſtantinople. In this temple there were alſo ſeveral pictures by Parrhaſius, Zeuxis, and other great maſters. Lindus and Ialyſus were well fortified in the time of the Peloponneſian war, as we learn from Thucydides; but Camirus was without walls. The three cities now mentioned were, as Strabo informs us, three different republics, independent of each other, governed by their own laws, till the inhabitants abandoned them, and removed to the city of Rhodes.

This iſland was firſt peopled, according to Diodorus Siculus, by the Telchinæ from Crete; but dreading a deluge, they abandoned their habitations, and made way for the Heliades, or grand-children of Phœbus, who took poſſeſſion of it, after Apollo had cleared it of the mud, with which it had been covered by the deluge. The Heliades, being infeſted with ſerpents, ſent for Phorbas from Theſſaly, upon the ſuggeſtion of the oracle at Delos, who brought with him a number of Theſſalians, ſettled on the iſland, deſtroyed the ſerpents, and after his death was honoured as a demi-god. A colony of Cretans afterwards ſettled at Camirus, in this iſland, under the conduct of Althæmenes, ſon of Catreus, king of Crete; and by direction of the oracle, he was honoured after his death as a hero or demi-god. Not long before the Trojan war, Tlepolemus, the ſon of Hercules, in compliance with the inſtruction of the oracle, which he conſulted, left Argos, and ſettled in Rhodes. He here planted a colony, which he governed as king of the iſland with great equity. Diodorus ſays, theſe were the firſt inhabitants of Rhodes. After the Trojan war, the beſt part of the iſland was taken poſſeſſion of by the Dorians, who expelled the ancient proprietors, and the Doric dialect was commonly uſed throughout the whole iſland.

The Rhodians applied themſelves, at an early period, to trade and navigation, and for many ages were ſovereigns of the ſea: their laws being the ſtandard by which all controverſies relating to maritime affairs were decided. Theſe laws and conſtitutions were ſo juſt, that they were afterwards incorporated into the Roman pandects, and followed in all the provinces of the Roman empire.

The government of Rhodes was originally monarchical; and ſeveral kings are ſaid to have reigned there long before the Trojan war; but of theſe we have no account. Among the eminent writers of this iſland, we have an enumeration of the following, whoſe names we can only mention: *viz.* Ariſtophanes, Eudemus, Hieronymus, a Peripatetic philoſopher, Leonidas, Piſander, Panetius, Apollonius Molon, Timocreon, Præciphanes, Anthæas, &c. The authors of the Univerſal Hiſtory (ubi infra) have given a brief account of ſome of them, and referred for an ampler detail to Meurſius's learned treatiſe on the iſland of Rhodes, printed at Amſterdam in 1675, and publiſhed with thoſe on Crete and Cyprus by the ſame author.

In the time of the Trojan war, and after that epoch, the kings who reigned in this iſland were, Tlepolemus, Dorieus, Damagetus, Diagoras, Evagoras, Cleobulus, Eraſtides, Damagetus II., and Diagoras II. The laſt of theſe ſovereigns proved conqueror in the Olympic, Iſthmian, Nemæan, and Argian games, and on that account is celebrated by Pindar. His three ſons were alſo victors in the Olympic ſports. Upon the death of Diagoras II. ſome extraordinary revolution muſt have happened; as another family had poſſeſſion of the throne. After the death or expulſion of the laſt king, the republican government prevailed over the whole iſland; during which the Rhodians engaged in trade and navigation, became very powerful by ſea, and planted ſeveral colonies in diſtant countries; *viz.* Rhodus in Spain, and Parthenope in the country of the Opici. At this time they were maſters of the Balearic iſlands, then called the Gymnaſian iſlands. During the Peloponneſian war the Rhodians firſt joined the Athenians, revolted from them to the Lacedæmonians, and afterwards joined the former. At this time the republic of Rhodes was rent into two factions, the people favouring the Athenians, and the nobles the Lacedæmonians; but the latter at laſt prevailed; democracy was aboliſhed, and an ariſtocracy introduced in its room. Under this form of government the ſtate enjoyed a profound tranquillity, until the third year of the 105th olympiad, which was the third year of the reign of Philip the ſon of Amyntas, when the Social war broke out, which, after it had laſted five years, was concluded by a treaty, very little to the honour of Athens. By this treaty, Rhodes, Chios, Cos, and Byzantium, were to enjoy full liberty, and be quite independent of Athens. The Rhodians, however, did not remain long unmoleſted; but they were oppreſſed by Mauſolus, king of Caria, who had aſſiſted them in throwing off the Athenian yoke. After ſuffering for ſome time, they equipped a fleet, invaded Caria, and regained their liberty. Artemiſia, the queen of Mauſolus, by an act of treachery, poſſeſſed herſelf of the city of Rhodes, and put to death the chief citizens

citizens who had planned the Carian expedition. In this ſtate of diſtreſs, the Rhodians recurred to the Athenians, and either by their aſſiſtance, or by exertions on their own part, after the death of Artemiſia, were reſtored to their ancient liberty. From this time till the reign of Alexander the Great the Rhodians enjoyed undiſturbed tranquillity; and as they delivered their cities and harbours to his cuſtody, they were on that account highly favoured by that prince. Diodorus indeed tells us, that Alexander depoſited his laſt will in the archives of the city of Rhodes, and ſhewed, on all occaſions, a greater value for the Rhodians than for any other of the Greek nations. But they no ſooner had heard of his death, than, taking up arms, they drove out the Macedonian garriſons, and once more became a free people. About this time Rhodes, the capital city, ſuffered very much from an inundation, accompanied by a tempeſt and hailſtones of an extraordinary ſize, which demoliſhed many houſes, and killed a great number of the inhabitants. The Rhodians ſoon repaired the damage which they had ſuſtained, by a renewed and very ſedulous application to trade and navigation, the only ſources of their wealth and power. Although they were in amity with the neighbouring princes, and were deſirous of obſerving a ſtrict neutrality, by which prudential caution they were become one of the moſt opulent ſtates of Aſia; yet their inclination, concurring with their intereſt, they ſecretly attached themſelves to Ptolemy: the moſt advantageous branches of their commerce ſpringing from Egypt. When Antigonus, who had engaged in a war with Ptolemy for the iſland of Cyprus, demanded ſuccours of them, and they heſitated in declaring againſt their ancient friend and ally, his anger was excited, and he immediately ordered one of his admirals to ſail with his fleet to Rhodes, and ſeize all the ſhips that ſailed out of the harbour for Egypt. The Rhodians, finding their harbour blocked up by the fleet of Antigonus, equipped a great number of gallies, attacked the enemy, and obliged him, with the loſs of many ſhips, to quit his ſtation; Antigonus was incenſed, and threatened to beſiege their capital with his whole army. They remonſtrated, but with little effect, and the only terms of accommodation they could obtain, were, that they ſhould declare war againſt Ptolemy, that they ſhould admit Antigonus's fleet into their harbour, and that 100 of their chief citizens ſhould be ſurrendered as hoſtages for the performance of theſe articles. The Rhodians applied to their allies, and particularly to Ptolemy, for aſſiſtance; and after great preparations on both ſides, Demetrius put himſelf at the head of a large body of troops, increaſed by pirates and mercenaries, who wiſhed to plunder Rhodes of its riches, and having laid waſte the country round the city, approached the city itſelf with his powerful forces, and fortified his camp with ſtrong ramparts and a triple paliſade. The Rhodians adopted every poſſible meaſure for a vigorous defence. After repeated aſſaults on the part of Demetrius, which were repulſed with great ſlaughter, he brought forward a newly invented machine, called "helepolis," with a variety of other engines, and he employed in the management of them about 30,000 men. The beſieged, in the mean while, raiſed a new wall, within that which the enemy intended to batter with the helepolis. The city was furiouſly aſſaulted on all ſides, both by ſea and land; and an honourable capitulation on the part of the Rhodians being refuſed by Demetrius, the attack was renewed, and a breach made in the wall; but the beſieged fought in the breach with ſuch intrepidity, that the enemy, after ſeveral unſucceſsful attempts, were forced to abandon the enterpriſe and retire. A ſeaſonable ſupply of proviſions arriving ſafe at Rhodes, the beſieged gained new courage, and determined to ſet fire to the enemy's engines. In the execution of this project a great number of Demetrius's troops fell victims, and the conflagration was ſo great, that Demetrius thought it moſt prudent to move off his machines, leſt they ſhould be utterly deſtroyed. Whilſt the Rhodians were thus, with equal valour and perſeverance, defending themſelves and annoying the enemy, an embaſſy arrived at the camp of Demetrius from Athens, and the other cities of Greece, ſoliciting him to make peace with the Rhodians. A ceſſation of arms was agreed upon, and terms were offered by Demetrius, which were rejected by the Rhodians. The aſſault was renewed, and a breach having been made, it was entered by a detachment of Demetrius's men; which occaſioned great confuſion in the city: but the Rhodians fought like men in the utmoſt deſpair, and animated by their leaders, who encouraged one another, they propoſed a laſt effort for the defence of their city and country, which was that of breaking into the very centre of the enemy's battalion, in the execution of which meaſure they killed both their commanders. After their death, the reſt were eaſily thrown into diſorder, and all to a man were either killed, or taken priſoners. The Rhodians alſo, on this occaſion, loſt many of their braveſt commanders. At length the helepolis was rendered uſeleſs, by the ſtratagem of a Rhodian engineer, and this misfortune, it is ſaid, induced Demetrius to conclude a peace. Thus the ſiege, after it had continued a whole year, was raiſed (B.C. 303); and the Rhodians amply rewarded all thoſe who had diſtinguiſhed themſelves in the defence of their country. One inſtance of laudable conduct on the part of Demetrius during the ſiege deſerves to be recorded. At this time Protogenes, a celebrated painter, who was a native of Cannus, a city of Caria, reſided at Rhodes. His houſe was in the ſuburbs; and he could not be prevailed upon to quit it. The prince, ſurpriſed at this reſolution, aſked him why he did not, like the other inhabitants, ſecure himſelf within the walls? Protogenes replied, that he was under no apprehenſion, ſince he was ſenſible that Demetrius had declared war againſt the Rhodians, and not againſt the arts. The prince was ſo pleaſed, that he took the painter under his protection, and placed a guard round his houſe, to preſerve him from the inſults of the ſoldiery. The chef-d'œuvre of this Protogenes was the picture of Ialyſus, ſuppoſed by the Rhodians to have founded their city. The Rhodians having concluded a peace upon advantageous and honourable terms, devoted themſelves again to trade and navigation; by which they not only became maſters of the ſea, but the moſt opulent and flouriſhing ſtate of all Greece. Their next war was with the Byzantines; and about the time of its termination the famous Coloſſus of Rhodes was overturned by an earthquake, which did other conſiderable damage. In the year B.C. 203, the Rhodians joined Attalus, king of Pergamus, againſt Philip, king of Macedon; and a triple alliance was formed between the Romans, Attalus, and the Rhodians. In proceſs of time, the fidelity of the attachment of the Rhodians to the Romans, of which they had once and again exhibited unequivocal evidence, was ſuſpected; and this ſuſpicion was confirmed when they engaged with Perſes, the ſon of Philip, to ſtand neuter. The Roman ſenate was incenſed, and the Rhodians ſent meſſengers to appeaſe their wrath, but their efforts were unavailing. At length, however, in the year B.C. 166, they were admitted to an alliance with Rome and favoured by the ſenate. From this period, to the breaking out of the Mithridatic war, the Rhodians enjoyed their liberties, while all the other ſtates and colonies of Greece were brought under the Roman yoke, and became provinces of that republic. In the civil war between Cæſar and Pompey, they aſſiſted the latter with a numerous fleet; but after the death of Pompey they

they ſided with Cæſar, which drew upon them the diſpleaſure of C. Caſſius, who advanced to their iſland with a powerful fleet, and demanded the ſurrender of their fleet, with which demand they refuſed to comply. The conſequence was a ſea-engagement, in which the Rhodians were defeated; and it has been obſerved, that this was the firſt time in which they were fairly overcome in a ſea-fight. Caſſius proceeded to take poſſeſſion of Rhodes and to plunder it. He alſo ordered fifty of the chief citizens to be put to death, and others were proſcribed. He ſtripped them of all their money, and even the temples of all their valuable furniture, veſſels and ſtatues. He announced, by a public cryer, that any perſon who ſhould diſcover any hidden treaſures ſhould receive a tenth part by way of recompence; and the reſult was, that he thus extorted from private perſons above 8000 talents. He then fined the city in 500 more, and leaving L. Varus, with a ſtrong garriſon to exact the fine, without any abatement, he returned to the continent.

After the death of Caſſius, Marc Antony reſtored the Rhodians to their ancient rights and privileges, beſtowing upon them the iſlands of Andros, Naxos, Tenos, and the city of Myndus. But theſe the Rhodians ſo oppreſſed and loaded with taxes, that Antony, though a great friend to the Rhodian republic, was obliged to diveſt her of the ſovereignty over thoſe places, which he had, a little before, ſo liberally beſtowed upon her. From this time to the reign of the emperor Claudius, we find no mention made of the Rhodians. That prince deprived them of their liberty for having crucified ſome Roman citizens. However, he ſoon reſtored them to their former condition, as we read in Suetonius and Tacitus. The latter adds, that they had been as often deprived of, as reſtored to, their liberty, by way of puniſhment or reward for their different behaviour, as they had obliged the Romans with their aſſiſtance in foreign wars, or provoked them with their ſeditions at home. Pliny, who wrote in the beginning of Veſpaſian's reign, ſtyles Rhodes a beautiful and free town. But this liberty they did not long enjoy, the iſland being ſoon after reduced, by the ſame Veſpaſian, to a Roman province, and obliged to pay a yearly tribute to their new maſters. This province was called the province of the iſlands. The Roman prætor, who governed it, reſided at Rhodes, as the chief city under his juriſdiction; and Rome, notwithſtanding the eminent ſervices rendered her by this republic, thenceforth treated the Rhodians not as allies but vaſſals.

Under Conſtantine this iſland remained part of the Eaſtern empire; but the puſillanimity and vices of the princes who ſucceeded, ſhook it to its foundation. In the twelfth year of the reign of Conſtans, Moawiah, Othman's lieutenant, made himſelf maſter of Rhodes. At length the Greek emperors expelled the Mahometans, and kept poſſeſſion till the time of Baldwin, who, having made himſelf ſovereign of Conſtantinople, ſent a prefect to Rhodes. Some time after it was conquered by Ducas. Then the brave warriors, known by the name of the knights of St. John, attacked, and, after a bloody battle, took it; in which heroiſm triumphed over numbers and valour. Mahomet II. tarniſhed the luſtre of his laurels, by beſieging this place, defended by a ſmall band of heroes. In the year 1523, Soliman ſaw a numerous army periſhing under its walls; and if this redoubtable conqueror of Hungary and Perſia did at length ſubdue Rhodes, attacked on all ſides by the forces of the Turks, the greater was the ſhame of the Chriſtian princes, who did not ſend a ſingle veſſel to the aid of its intrepid defenders. Deſtroyed, rather than vanquiſhed, they were almoſt buried under the ruin of their forts. Soliman could not enter the town without wading through the blood of his ſoldiers; and in it he found nothing but heaps of ruins, defended by a ſmall company of knights, covered with wounds, who afterwards removed to Malta. (See MALTA). The governor-general of this iſland is a pacha, who has abſolute power. The Greeks and Jews have a chief, named the Moutevali, who is their intendant-general, and has the regulation of the tax, called carach,—a capitation tax impoſed by the grand ſeignior on all his ſubjects who are not Mahometans, but is paid only by the men.

The ſoil of the iſland is dry and ſandy, but watered by its numerous ſprings. It is very fertile: corn thrives well; and its yellow and heavy grain affords flour as white as ſnow, which makes excellent bread. It needs only cultivation to raiſe an ample ſupply, not only for its own conſumption, but for a large exportation. The number of families in the whole iſland is eſtimated at 4700 Turks, 2500 Greeks, and 100 Jews, in all 7300, or about 36,000 inhabitants. N. lat. 36° 26′. E. long. 27° 32′.

RHODES, the capital city of the iſland above deſcribed, as well as the chief ſeat of its government, is ſituated to the N.E. of the iſland, at the foot of a hill of gentle aſcent, and in an agreeable plain, environed at ſome diſtance with ſeveral hills full of ſprings, and covered with all kinds of fruit-trees. This ſtately city was built by the ſame architect whom the Athenians had employed in building the Piræus, or part of Athens; *viz.* Hippodamus, a native of Miletus, and eſteemed one of the beſt architects Greece ever produced. It was built, according to Strabo and Ariſtides, in the form of an amphitheatre, ſurrounded with walls like thoſe of Munichia, embelliſhed with moſt ſtately buildings, ſtraight and broad ſtreets, pleaſant avenues, fine groves, large ſquares, &c. Dio Chryſoſtom ſays, that moſt of the Pagan deities had temples in this city; among which that of the Sun, called by the Dorians Halcium, was one of the moſt noble ſtructures of antiquity. Strabo mentions the temple of Bacchus, enriched with a great number of pictures by Protogenes. Heſychius, Appian, and Suetonius, ſpeak of the temples of Iſis, of Ocridian, and Diana, as maſter-pieces of art. Each of theſe temples contained immenſe treaſures, the offerings of votaries from all parts of Greece, Aſia, and Italy. In the Dionyſium, or temple of Bacchus, was a ſtatue of Pluto of maſſy gold, and an incredible number of other ſtatues and pictures. Pliny informs us, that, in his time, there were in the city of Rhodes above 3000 ſtatues, moſt of them executed with great taſte; and Ariſtides ſays, that there were more valuable ſtatues and pictures in this ſingle city than in all the other cities of Greece. The pictures of Menander, king of Caria, and of Anæus, the ſon of Neptune, by Apelles, and thoſe of Perſeus, Hercules, and Meleager, by Xeuxis, are highly extolled by Pliny, and other ancient writers. That of Meleager was there ſcorched by lightning, as Pliny tells us, but that accident did not in the leaſt deaden the luſtre and brightneſs of its colour.

In the Roman times this city was famous for the ſtudy of all ſciences, and reſorted to by ſuch of the Romans as were deſirous of improving themſelves in literature; ſome of the ancients repreſenting it as equal to Athens itſelf. It had a very convenient harbour, at the entrance of which were two rocks; and on theſe rocks, though 50 feet aſunder, the famous coloſſus is ſuppoſed to have ſtood. See COLOSSUS.

The city of Rhodes is ſtill a place of conſiderable note; being pleaſantly ſituated on the ſide of a hill, three miles in compaſs, and fortified with a treble wall; but its ramparts partake of the ſame neglect and decay of every thing that is in the poſſeſſion of the Turks. The ſtreets are wide, ſtraight, and well paved; and the houſes built after the Italian taſte. The chief haven is now very different from what it is ſaid to have been in its ancient ſtate. It is no longer

longer that basin, whose deep waters afforded a commodious shelter to ships of every size; nor are the quays enlivened by the activity of a flourishing trade. It is now little frequented except by Greek boats, and by a few merchant vessels which put in there; it is half choked up, and ships of war are obliged to cast anchor without, where they are but indifferently protected from the winds and waves by some points of land and some shoals. The entrance of the harbour is defended, on the one side, by a square tower, constructed by a grand master of the order; inscriptions and other marks recall to mind the period of its foundation. The Turks still call it St. John's tower, although the Greeks have changed this name into that of St. Nicholas, more generally adopted in the Levant. On the other side is a tower, not so high, nor so strong, which is named St. Angelo's or St. Michael's tower. The harbour is as if divided into two by a small mole, which projects within it, and forms an inclosure, into which boats alone can enter, and which, on that account, is called Boat harbour. Independently of the large harbour, there was another on each side; the one was the harbour for gallies, where they can no longer enter at this day; the other is choked up, and almost entirely dry. Every thing, says Sonnini, is destroyed; every thing is annihilated under a government, which knows only to enjoy, or rather to abuse the present, and to which the most simple calculations of foresight are unknown. Yards for shipbuilding, which might, with so much reason, be called workshops of dilapidation, are established at Rhodes for the Ottoman navy; the timber is brought from the fine and vast forests of Caramania, and even from those of the island. But the construction of ships is so slow, and the timber so injudiciously selected, that they are sometimes half-rotten before they are entirely finished.

In several places of the city of Rhodes are still to be seen marks of the ancient possession of the order of St. John of Jerusalem; a long street preserves the name of Rue des Chevaliers; it is perfectly straight, and formed of old houses, in which remain the armorial bearings of the members of the order. The ancient church of St. John is become the principal mosque; the hospital has been transformed into public granaries; and the palace of the grand master, falling into ruins, is almost entirely deserted. N. lat. 36° 25'. E. long. 27° 45'.

Rhodes, a town of Africa, in the kingdom of Tunis, situated on an eminence, between the lake of Tunis and the sea, at a distance from some hills, where Hanno was defeated by Regulus.

Rhodes, *Colossus of*. See Colossus.

Rhodes, *Straits of*. See Malta.

RHODEZ. See Rodés.

RHODIA, in *Botany*. See Rhodiola.

RHODIGINUS, Cœlius, in *Biography*, a learned Italian, whose proper name was Ludovico Celio Richeri, was born at Rovigo about the year 1450. He studied at Ferrara and Padua, and then travelled into France, in which country he resided a considerable time. On returning to Italy, he filled the office of public professor in his native place from 1491 to 1497, and again obtained the same appointment in 1503; after this he opened a school at Vicenza, where he continued till 1508, when he was invited to Ferrara by duke Alfonzo I. In the year 1515, Francis I. nominated him to the chair of Greek and Latin eloquence in Milan, as successor to Demetrius Chalcondylas. He returned in 1521 to Padua, and in 1523 he was re-admitted to the council of his native city, and deputed from it to Venice, to congratulate the new doge. So great was his loyalty, or his gratitude, that, in 1525, he died of grief, on account of the defeat and capture of Francis at the battle of Pavia. He was author of various works; of these, the principal is entitled "Antiquæ Lectiones," of which he published sixteen books, and fourteen more were added after his death. It was printed at Basil in 1566, and again at Franckfort in 1666. It has been characterised as a miscellany of profound erudition, in which abstruse words in Greek and Latin are explained, obscure passages in the best authors are elucidated, and corrupt ones rectified; recondite histories and ancient rites are narrated, and many arcana of the deepest philosophy, especially of the Platonic school, are brought to light; "whence," says the learned Vossius, "I am often moved with wonder, and indeed with indignation, in observing that the precious labours of such a man are so little in the hands of the youth of the present time." By Julius Scaliger he was denominated "the Varro of the age." Gen. Biog.

RHODIOLA, in *Botany*, from ῥόδον, *a rose*, because the root of this plant, when dried, has a rose-like smell. Rhodiola is literally the diminutive of Rhodia, a name applied by ancient writers to the wood or root of some plant (suspected by Linnæus to be a *Convolvulus*) possessing a similar fragrant property.—Rose-Root.—Linn. Gen. 526. Schreb. 693. Willd. Sp. Pl. v. 4. 807. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 1082. Ait. Hort. Kew. v. 5. 397. Juss. 307. Lamarck Illustr. t. 819.—Class and order, *Dioecia Octandria*. Nat. Ord. *Succulentæ*, Linn. *Sempervivæ*, Juss.

Gen. Ch. Male, *Cal.* Perianth inferior, four-cleft, concave, erect, obtuse, permanent. *Cor.* Petals four, oblong, obtuse, erect, spreading, twice as long as the calyx, deciduous. Nectaries four, erect, emarginate, shorter than the calyx. *Stam.* Filaments eight, awl-shaped, longer than the corolla; anthers simple. *Pist.* Germens four, superior, oblong, acuminate; styles and stigmas obsolete. *Peric.* abortive. *Seeds* none.

Female, *Cal.* Perianth as in the male. *Cor.* Petals four, generally imperfect, of a coarse texture, erect, obtuse, equal with the calyx, permanent. Nectaries as in the male. *Pist.* Germens four, superior, oblong, acuminate, ending in simple, straight styles; stigmas obtuse. *Peric.* Capsules four, corniculate, opening inwardly. *Seeds* numerous, roundish.

Obs. Schreber says (in his Appendix, 839), that professor Dahl having seen specimens of Rhodiola with perfect flowers, *viz.* with ten stamens and five pistils, the genus should properly be united to Sedum. Linnæus, however, in his *Flora Lapponica*, mentions a specimen found in Lapland with perfect flowers; but, at the same time, he tells us, that such flowers are barren, none being fertile, except those true female flowers, on a separate plant, which have no stamens, and but imperfect petals. Hence it appears, that the present plant is truly dioecious in habit, although it may occasionally incline to the perfect structure of Sedum.

Ess. Ch. Male, Calyx in four parts. Petals four. Nectaries four, notched.—Female, Calyx and nectaries like the male, but somewhat smaller. Petals of a coarse texture. Capsules four, many-seeded.

1. R. *rosea*. Rose-root. Linn. Sp. Pl. 1465. Engl. Bot. t. 508. Fl. Dan. t. 183.—Found in the clefts of Alpine rocks, and sometimes on rocks by the sea-shore, in different parts of Great Britain; flowering in May and June. —*Root* perennial, fleshy, white or greyish, when dried emitting a fragrance like that of rose-water. *Stems* perfectly simple, erect, a span high, thickly beset with leaves. *Leaves* imbricated, sessile, obovate, acute, fleshy, glaucous, smooth, toothed towards the top, in the male tipped with red. *Cyme* terminal, sessile, much branched, composed of numerous yellow flowers, the female ones dotted with red.

—It ſhould be remarked, that the odour of the root is greatly impaired by culture.

Miller cultivated a variety of this plant for many years at Chelſea, which was ſmaller in all its parts, and had purpliſh flowers.

We can by no means admit *Rhodiola biternata*, Loureir. Cochinch. 627, becauſe that author had never ſeen the female flowers; and his deſcription of its twining ſtem, and doubly-compound leaves, renders it in habit ſo totally unlike the original *Rhodiola*.

Rhodiola, in *Gardening*, compriſes a plant of the low herbaceous, odoriferous, ſucculent, perennial kind, of which the ſpecies cultivated is the common, or yellow roſewort (R. roſea).

Of which there is a variety, in which the roots are ſmaller; the ſtalks ſmall, and not above five inches long; the leaves ſmall, ending with a purple point; the petals are purpliſh, and the ſtamens little longer than the petals. It flowers later than the common ſort.

Method of Culture.—This plant may be increaſed by planting cuttings of the ſtalks in the beginning of April, ſoon after they come out from the head, in a ſhady border; covering them cloſe down with a glaſs, and keeping them dry, when they moſtly put out roots in about ſix weeks; but the cuttings ſhould be laid in a dry room at leaſt a week before they are planted out, otherwiſe they are apt to rot and be deſtroyed. They may alſo be raiſed by parting the roots in the beginning of autumn, when the ſtalks begin to decay; and when the fleſhy parts are cut or broken, they ſhould be laid to dry a few days before they are planted. They require a ſhady ſituation, and a dry undunged ſoil, in which they will continue many years. They afford variety in the borders, clumps, &c.

RHODITES Lapis, the *Roſe-ſtone*, in *Natural Hiſtory*, the name given by authors to a kind of aſtroites, or ſtar-ſtone, in which the figures more repreſent roſes than ſtars; they are in both owing to coralloide bodies immerſed in the ſtone; which, according to their various ſpecies, afford a different figure, when cut tranſverſely, in cutting the ſtone into plates for uſe.

RHODIUM, in *Chemiſtry*, a new metal, found in crude platina, ſo called from the roſe-colour of a dilute ſolution of the ſalts containing it, by Dr. Wollaſton, to whoſe inquiries we are indebted for proof of its exiſtence, and an account of its properties. This metal is thus procured: ſome crude platina being digeſted in moderately dilute nitro-muriatic acid, a browniſh-red ſolution is obtained; from this the platina is to be ſeparated, for the moſt part, by muriate of ammonia, and the reſidual liquor is to be heated with zinc; by this treatment a black powder will be obtained, and the ſupernatant fluid will conſiſt of the muriates of zinc and iron. This black powder, by digeſtion in very dilute nitric acid, will be freed from the copper and lead which it uſually contains, and the reſidue is to be digeſted in dilute nitro-muriatic acid, till every thing ſoluble is taken up. To this ſolution a little common ſalt is to be added, and the whole evaporated to dryneſs; after which, by repeatedly waſhing with warm alcohol, the ſoda-muriates of platina and palladium will be diſſolved, leaving behind a pure ſoda-muriate of rhodium.

This ſalt is readily ſoluble in hot water, and depoſits on cooling rhomboidal cryſtals of a bright roſe-colour. Sal ammoniac occaſions no turbidneſs in the ſolution; but if a few drops of muriate of platina are added to the mixture, an immediate yellow precipitate is thrown down. Neither pruſſiat of potaſh, nor hydro-ſulphuret of ammonia, nor the carbonated alkalies, produce any precipitate; but the pure alkalies throw down a yellow oxyd, ſoluble either in alkalies or acids. The muriate of this metal is an uncryſtallizable ſalt of a roſe-colour, and ſoluble in alcohol; with nitre, or the muriates of ammonia or ſoda, are formed cryſtallizable triple ſalts inſoluble in alcohol.

Nitrate of rhodium is alſo uncryſtallizable. It appears not to be decompoſable by ſilver, but is ſo by copper, mercury, and moſt of the other metals.

The ſoda-muriate of this metal affords a black powder by digeſtion with zinc; which, when heated with borax, acquires a white metallic luſtre, but is infuſible by any heat that has hitherto been applied. It is, however, fuſible, either with arſenic or ſulphur, and may be again ſeparated from thoſe ſubſtances by heat, but it does not acquire by this treatment any degree of malleability. It combines with moſt metals, and with ſilver and gold forms very malleable alloys, which are unaltered by a high heat, but become encruſted with a black oxyd when ſlowly cooled; an alloy of ſix parts of gold and one of rhodium differs but little in colour from fine gold, but is much more difficultly fuſible. The ſpecific gravity of rhodium appears to be ſomewhat more than 11. That of an alloy conſiſting of one part rhodium and about two parts lead, was 11.3; which is ſo nearly that of lead itſelf, that each part of this compound may be conſidered as having about the ſame ſpecific gravity. Phil. Tranſ. for 1804, vol. xciv. pt. 2. See Palladium and Platina.

Rhodium *Lignum*. See Aspalath.

Rhodium *Marmor*, a name given by the ancients to a marble brought from Rhodes; it was a good white, but inferior to the Parian, and was uſed by the Romans in their public buildings, and ſometimes in ſtatuary.

RHODIUS, in *Geography*, a river of European Turkey, which takes its ſource N.E. of mount Ida; and after receiving ſome rivulets which flow from the neighbouring mountains, and traverſing a ſpace of twelve or fifteen miles, diſcharges itſelf into the Helleſpont, by the ſide of the caſtle of Dardanelles. Its waters, which are far from being abundant in ſummer, are kept back and employed in the irrigation of the lands; but in winter, ſwelled by the rains which are frequent in that ſeaſon, it occupies a bed ſufficiently large to deſerve the name of river. The inhabitants of the Dardanelles, built on its banks, have conſtructed a wooden bridge, at ſome diſtance from its mouth, in order to be able to croſs at all times to the left bank, and repair to the fields which they cultivate beyond it. Behind the caſtle, between the town and the river, is a tolerably extenſive walk, naturally turfed, and ſhaded by very tall plane-trees. This river waters an extremely fertile valley, formed by a plain to the eaſt of the town. In this town are reckoned ſcarcely 4000 inhabitants, Greeks, Muſſulmans, and Jews. Its poſition is agreeable, its territory is fertile, and its productions are very diverſified. To the N.E. is a riſing ground, covered with vines; and at the extremity of the fore-mentioned valley are found indications of a volcano; among others are to be ſeen conſiderable blocks of granite, the quartzoſe part of which is almoſt converted into glaſs. A little farther on is a fertile and circular bottom of ſmall extent, ſurrounded by mountains covered with wood.

In the territory of the Dardanelles are cultivated cotton, ſeſamum, various kitchen-garden plants, the vine, the olive-tree, and ſeveral ſpecies of fruit-trees. The orange-trees begin to grow here in the open air; and a tolerable large quantity of grain is collected here. The neighbouring mountain furniſh the "velanida," (ſee Quercus *Ægilops*,) and gall-nut uſed in trade. Olivier.

Rhodius, in *Ichthyology*, the Acipenser *Sturio*. See Sturgeon.

RHODODENDRA, in *Botany*, a natural order of plants, named after its principal genus, (ſee the next article,) and

and conſtituting the fiftieth in Juſſieu's ſeries, or the ſecond of his ninth claſs; for the characters of which claſs ſee ERICÆ and GUAIACANÆ. The following are the marks of the order in queſtion.

Calyx divided, permanent. *Corolla* inſerted into the bottom of the calyx; ſometimes of one petal, and lobed; ſometimes almoſt polypetalous, the limb being ſo very deeply divided. *Stamens* definite, diſtinct; in the monopetalous genera inſerted into the corolla; in the reſt into the baſe of the calyx. *Germen* ſuperior; ſtyle one; ſtigma ſimple, often capitate. *Capſule* ſuperior, of ſeveral cells, and ſeveral valves, both margins of each valve inflexed, and connected with the central axis, (or *columella*,) ſo that each forms a cell, containing numerous minute ſeeds. *Stem* ſhrubby, more or leſs loſty. *Leaves* alternate, or more rarely oppoſite; the young ones, in many inſtances, revolute at the margin.

Section 1. *Corolla monopetalous.*

Kalmia, Rhododendrum, and *Azalea*; all Linnæan genera; to which is to be added MENZIESIA; ſee that article.

Sect. 2. *Corolla imperfectly polypetalous.*

Rhodora, Ledum, Befaria, (now more correctly written *Bejaria*, by Ventenat and others; the Spaniards having pointed out the error, which originated in a miſtake of Linnæus, in reading Mutis's manuſcript,) and *Itea*; all likewiſe Linnæan genera.

Juſſieu conſiders the *Rhododendra* as eſſentially diſtinguiſhed from his *Ericæ*, by the want of horns to the anthers, and eſpecially by the inflexed margins of the valves of the capſule. It does not appear to us that theſe characters are, either of them, ſtrictly abſolute. Mr. Saliſbury has long ago obſerved, that the leaves of the *Rhododendra* have always a remarkable glandular tip.

RHODODENDRUM, from ῥόδον, *a roſe*, and δενδρον, *a tree*, a name adopted by Linnæus from Dioſcorides, whoſe ῥοδοδενδρον however is but a ſynonym to his νηριον, our *Nerium*, or Roſe-bay; the ῥοδοδάφνη of the modern Greeks.—Linn. Gen. 218. Schreb. 294. Willd. Sp. Pl. v. 2. 603. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 49. Purſh v. 1. 297. Juſſ. 158. Lamarck Illuſtr. t. 364. Gærtn. t. 63. —Claſs and order, *Decandria Monogynia*. Nat. Ord. *Bicornes*, Linn. *Rhododendra*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, in five deep ſegments, permanent. *Cor.* of one petal, widely funnel-ſhaped; its limb ſpreading, with five rounded unequal ſegments. *Stam.* Filaments ten, thread-ſhaped, about the length of the corolla, declining; anthers incumbent, oval, abrupt, of two cells, opening by two terminal pores. *Piſt.* Germen with five angles, abrupt; ſtyle thread-ſhaped, the length of the corolla; ſtigma obtuſe. *Peric.* Capſule ovate, ſomewhat angular, of five or ten cells, formed by the inflexed margins of the valves, which finally ſeparate from the five or ten-angled central column. *Seeds* numerous, minute.

Eſſ. Ch. Calyx inferior, in five diviſions. Corolla of one petal, ſomewhat funnel-ſhaped, irregular. Stamens declining. Capſule of five or ten cells; partitions from the inflexed margins of the valves.

1. R. *ferrugineum*. Ruſty-leaved Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 1. Ait. n. 1. Jacq. Obſ. faſc. 1. 26. t. 16. Auſtr. t. 255.—Leaves ſmooth; ruſty beneath. Cluſters terminal. Corolla with a cylindrical leprous tube. Calyx fringed.—Native of heathy plains on the alps of Switzerland, Savoy, Auſtria, Siberia, and the Pyrenees, flowering in Auguſt. It is not difficult of culture with us, in bog earth, on an open border, and is one of the moſt elegant of ſhrubs. The *ſtem* is about two feet high, very buſhy. *Leaves* evergreen, ſtalked, alternate, elliptic-oblong, an inch or an inch and a half in length; convex, ſmooth, and dark ſhining green above; ruſty beneath, but deſtitute of all pubeſcence. *Flowers* above half an inch long, in terminal roundiſh cluſters; their *corolla* of a peculiarly rich and beautiful crimſon, externally dotted with white. Haller ſays there is a rare white-flowered variety. The plain of mount Cenis glows with the rich bloſſoms of this plant in July and Auguſt, exhibiting one of the moſt lovely ſcenes in nature. See Smith's Tour on the Continent.

2. R. *hirſutum*. Hairy Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 4. Ait. n. 3. Jacq. Auſtr. t. 98. (Ledum alpinum; Cluſ. Hiſt. v. 1. 82. Ger. Em. 1290. Balſamum alpinum Geſneri; Lob. Ic. 367.)—Leaves elliptic-obovate, ſharpiſh, fringed; dotted beneath. Corolla with a cylindrical leprous tube.—Native of the Swiſs and Auſtrian alps. Cultivated, like the former, in this country; flowering rather earlier. This is moſt nearly related to *R. ferrugineum*, next to which therefore we prefer placing it. The chief diſtinction conſiſts in the *leaves* being fringed with rigid hairs; their form more obovate and flat, and their under ſide leſs ruſty. We never could perceive much difference in the *flowers*, except perhaps thoſe of *hirſutum* being rather paler, and more of a pink hue.

3. R. *dauricum*. Daurian Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 2. Ait. n. 2. Pall. Roſſ. v. 1. t. 32. Curt. Mag. t. 636. Andr. Repoſ. t. 4. (Chamærhododendros folio glabro majuſculo, amplo flore roſeo; Amm. Ruth. 181. t. 27.)—Leaves elliptic-oblong, dotted, naked. Corolla nearly wheel-ſhaped.—Native of Siberia, in mountainous ſituations. It ſucceeds in our gardens with the ſame treatment as the two foregoing, but flowers much earlier, and though evergreen in its own country, is leſs perfectly ſo with us; requiring moreover ſome ſhelter for its bloſſoms, during the ſeverity or uncertainty of our winter or early ſpring. The *leaves* are dotted on both ſides with minute ſcales, and their midrib is, when young, a little downy. *Flowers* roſe-coloured, nearly ſeſſile; their corolla widely expanded, with ſcarcely any tube, its outſide ſlightly hairy, not leprous. Mr. Andrews ſeems to have printed "*petiolis longiſſimis*," by miſtake for "*breviſſimis*," as the *footſtalks* are in fact very ſhort.

4. R. *camtſchaticum*. Barberry-leaved Rhododendrum. Pall. Roſſ. v. 1. p. 1. 48. t. 33. Willd. n. 3. (Chamærhododendros berberis folio, flore amplo roſeo; Gmel. Sib. v. 4. 126.)—Leaves obovate, fringed, ſmooth, reticulated with veins. Corolla wheel-ſhaped. Found by Steller, in mountainous ſpots in Beering's iſland, and the north-eaſt part of Kamtſchatka, flowering in July and Auguſt. The ſhrubby *ſtems* are procumbent, branched, about a foot long. *Leaves* ſtalked, obovate, an inch or more in length, blunt, with a very ſmall point, fringed at the margin, but ſmooth on both ſides, deſtitute of dots or ſcales, of a thin texture, ſtrongly and copiouſly reticulated with interbranching ribs and veins. *Flowers* roſe-coloured, larger than the laſt, being nearly two inches wide, each on a long, ſolitary, hairy, terminal ſtalk. *Segments* of the calyx flat, oblong, obtuſe, ribbed and veiny, ſometimes very hairy externally, ſometimes only fringed at the edges. This very ſhowy plant is mentioned in Mr. Aiton's Epitome of Hort. Kew. 373, as having come into the hands of our cultivators in 1799, but we have never met with it in any garden.

5. R. *Chamæciſtus*. Thyme-leaved Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 5. Ait. n. 4. Jacq. Auſtr. t. 217. Curt. Mag. t. 488. (Ledum foliis ſerpilli, ad margines cilii inſtar piloſis, flore purpureo; Mich. Gen. 225. t. 106. Ciſtus humilis auſtriaca Cluſii; Ger. Em. 1278.)—Leaves obovate, acute, fringed, poliſhed, almoſt veinleſs. Corolla

wheel-ſhaped.—Native of the alps of Auſtria, Carniola, and the north of Italy. Firſt raiſed from ſeed in England, in 1786, by the ſkilful Mr. Loddiges of Hackney. A ſhrubby nearly procumbent plant, much ſmaller than the laſt, and differing eſſentially in the more thick and coriaceous texture of its *leaves*, which are of a dark green, and highly poliſhed, with ſcarcely any viſible veins. The elegant purpliſh *flowers* are not above an inch broad. Their *calyx* has hairy, convex, not flat, ſegments. Anthers deep purple.

6. R. *caucaſeum*. Caucaſian Rhododendrum. Pall. Roſſ. v. 1. p. 1. 46. t. 31. Willd. n. 6. Ait. n. 5. Curt. Mag. t. 1145.—Stem decumbent. Leaves rugged above; downy and ruſty beneath. Umbels terminal. Corolla nearly wheel-ſhaped.—Native of the loftieſt ſummits of mount Caucaſus, near perpetual ſnow, where, according to Pallas, nothing elſe, beſides Whortle-berries and Juniper, grow. Introduced at Kew, by ſir Joſeph Banks, in 1803. Mr. Loddiges finds it flower more freely under his care than the following. A low ſhrub, ſpreading on the ground, but of a ſtouter habit, with larger more coriaceous foliage, than any of the foregoing. The *leaves* are elliptical, ſtalked, three or four inches long; convex and of a dark ſhining green, with a rugoſe ſurface, above; concave, veiny, and covered with fine ruſty down, underneath. *Footſtalks* alſo downy. *Flowers* large, moderately concave; white or pale fleſh-coloured within, their upper ſegments dotted about the baſe with green; the outſide crimſon. They form terminal *umbels*, with large, oblong, concave, permanent *bracteas* at the baſe.

7. R. *chryſanthum*. Yellow Rhododendrum. Linn. Suppl. 237. Willd. n. 7. Ait. n. 6. Pall. Roſſ. v. 1. p. 1. 44. t. 30. (R. officinale; Saliſ. Parad. t. 80. Andromeda, n. 9; Gmel. Sib. v. 4. 121. t. 54.)—Stem decumbent. Leaves reticulated, ſmooth on both ſides; paler beneath. Umbels terminal. Corolla nearly wheel-ſhaped. Native of the mountains of Siberia, Kamtſchatka, and Beering's iſland. Introduced by Mr. Joſeph Buſh, in 1796, into our gardens, where it flowers, though rarely in the middle of ſummer, like the laſt. Some have imagined theſe two ſpecies to be varieties of each other; but the preſent differs eſſentially in having the *leaves* quite ſmooth and naked beneath, not to mention the uniformly yellow colour of the *flowers*. An infuſion of the young leaves is much celebrated in Ruſſia as a cure for the rheumatiſm. This medicine is taken internally, to promote perſpiration. Some have recommended it for venereal complaints. Willdenow juſtly obſerves, that this ſhrub is altogether different from *R. dauricum*, to which the younger Linnæus, by ſome ſtrange miſtake, compares it.

8. R. *ponticum*. Purple Rhododendrum. Linn. Sp. Pl. 562. Willd. n. 8. Ait. n. 7. Jacq. Ic. Rar. t. 78. Pall. Roſſ. v. 1. p. 1. 43. t. 29. Curt. Mag. t. 650. Andr. Repoſ. t. 379. (Chamærhododendros pontica maxima, folio lauroceraſi, flore cæruleo-purpuraſcente; Tourn. Voyage, v. 2. 99.)—Leaves oblong, ſmooth and even on both ſides. Corymbs terminal. Segments of the calyx oval, obtuſe. Corolla bell-ſhaped, ſpreading.—Native of the Levant, in moiſt ſhady places. Common in the European gardens, where it blooms magnificently in the open ground in June, and, by forcing in a pot, may be had much earlier, as almoſt every window and balcony in London evinces. This ſhrub is uſually five or ſix feet high, with brown ſpreading *branches*. The *leaves* are evergreen, a ſpan in length, elliptic-lanceolate, or oblong, more or leſs acute; ſhining, dark green, even and ſmooth above; equally ſmooth, but paler beneath, contrary to Willdenow's definition. The large purple *flowers* grow, many together, in large, terminal, corymboſe cluſters. The gardeners obtain mule varieties, ſome of them with deciduous leaves, between this plant and the Azaleas. Tournefort thought the poiſonous quality of the honey about Pontus, mentioned by ancient authors, might be partly owing to this plant; at leaſt this ſeems to be what produced a ſort of honey called *Moenomenon*, becauſe, as Pliny relates, it took away the reaſon of thoſe who ate it. What is generally reported of the honey of Pontus appears, however, by what Tournefort has collected, to belong to that yielded by *Azalea pontica*, our beautiful yellow Azalea; and this is confirmed by what the Turks told him of the dangerous effluvia of the flowers of this laſt mentioned plant.

9. R. *arboreum*. Indian Tree Rhododendrum. Sm. Exot. Bot. v. 1. 9. t. 6.—Leaves elliptic-lanceolate; ſmooth and ſhining above; downy beneath. Corymbs terminal. Capſule of ten cells. Stem arboreous.—Found by lieutenant-colonel Hardwicke, in the Sewalic chain of mountains, which ſeparates the plains of Hindooſtan, from the Himmaleh mountains. It generally grows in foreſts of oak, in elevated ſituations, where the ſoil is black vegetable mould, on a ſtony bed. The flowers appear in March and April; the ſeeds are ripened in May or June. The natives know this tree by the name of *Boorans*, and uſe the wood for the ſtocks of muſquets. The *ſtem* is truly arboreous, riſing in a columnar form to the height of twenty feet; its diameter being from ſixteen to twenty-four inches. The *bark* is light as cork, flaking off in large portions. *Branches* aſcending, crooked and brittle, leafy at their extremities. *Leaves* ſhaped much like the laſt, but diſtinguiſhed by the denſe, white, ſilky downineſs of their under ſurface. *Flowers* in large terminal cluſters, of a rich deep crimſon, of little fragrance and ſhort duration, their *corolla* ſhaped much like the laſt, but we do not find it ſpotted within. Segments of the *calyx* ſhallow. *Germen* elliptical, white and downy, with ten furrows. *Capſule* of the ſame ſhape, with ten cells, an unique inſtance, as far as we know, in the preſent genus; but certainly, all things conſidered, not authoriſing any generic ſeparation of this ſpecies from the reſt. We know not whether the ſeeds of this noble tree have vegetated in England. It would probably ſucceed in the moderate warmth of a conſervatory.

10. R. *maximum*. Laurel-leaved Rhododendrum. Linn. Sp. Pl. 563. Willd. n. 9. Ait. n. 8. Purſh n. 1. Curt. Mag. t. 951. (R. foliis nitidis ovalibus, &c.; Trew Ehret. t. 66. Kalmia foliis lanceolato-ovatis, &c.; Mill. Ic. t. 228.)—Leaves oblong; convex and reticulated above; ſmooth and pale beneath. Corymbs ſurmounted by the branches. Segments of the calyx oval, obtuſe. Corolla bell-ſhaped, ſpreading.—Native of mountainous ſituations in North America, near rivulets and lakes, flowering from June to Auguſt. *Purſh*. Though, according to Mr. Aiton, introduced by Peter Collinſon in 1736, twenty-ſeven years before the *ponticum*, it is beyond compariſon leſs common in our gardens. Botaniſts have not very clearly defined the ſpecific difference between theſe two ſpecies. The *leaves* of the preſent are moſt convex, and more ſenſibly reticulated with minute ſunk veins, on their upper ſide, while the under is ſtill more pale, than in *ponticum*. The *flowers* of the *maximum* are more delicately coloured, having the red and white tints of an apple-bloſſom, while the green and yellow dots on their upper ſegment are ſtrikingly conſpicuous. All their ſegments are more elliptical, concave, and far leſs dilated and wavy than in *ponticum*. The *inflorescence* moreover is almoſt umbellate, and more denſe, ſtanding between two branches of the preſent year, which always riſe conſiderably above it. There are mule varieties in the gardens between theſe ſpecies. Mr. Purſh mentions two American varieties, or perhaps ſpecies: one with flatter *leaves*, and ſmaller

ſmaller whitiſh flowers: the other much taller, even twenty feet high, with large purple *flowers*, and much larger *leaves*, whoſe two ſides are more alike in colour than the common *maximum*. This laſt variety, which we too have ſeen in Mr. Vere's curious garden at Kenſington Gore, merits further examination, having certainly more reſemblance to *ponticum* than to *maximum*, except its gigantic ſtature, which far exceeds both.

11. R. *punctatum*. Carolina Dotted-leaved Rhododendrum. Willd. n. 10. Ait. n. 9. Purſh n. 2. Andr. Repoſ. t. 36. Venten. Jard. de Cels, t. 15.—Leaves elliptic-oblong, acute; ſmooth above; ſprinkled with minute reſinous dots beneath. Umbels ſurmounted by the branches. Segments of the calyx rounded, very ſhort. Corolla funnel-ſhaped, leprous externally.—Native of the mountains of South Carolina, from whence it was brought to England by the late Mr. John Fraſer, in 1791. It ſucceeds well in our gardens on a peat border, flowering early in the ſummer. This is a much humbler ſhrub than any of the varieties of the *maximum*, though its mode of inflorescence accords with that ſpecies. The *corolla* is roſe-coloured, dilated and wavy as in *R. ponticum*, but ſmaller; its outſide rough or glandular, as in the *ferrugineum*. The *leaves* are elliptical, coriaceous, acute at both ends; dark green and very ſmooth above; paler, ſomewhat ruſty, and very thickly beſprinkled with glandular reſinous dots, beneath.

12. R. *catawbienſe*. Catawba Rhododendrum. Michaux Boreal-Amer. v. 1. 258. Purſh n. 3. Ait. Hort. Kew. Epit. 373. Curt. Mag. t. 1671.—Leaves oval, rounded at each end, ſmooth, paler beneath. Umbels ſurmounted by the branches. Segments of the calyx elongated. Corolla bell-ſhaped.—Native of the high mountains of Virginia and Carolina, particularly on the head waters of the Catawba river, flowering in May and June. *Purſh*. Mr. Fraſer introduced it here in 1809, and brought a report of the *flowers* being ſcarlet; but they have ſince proved of a pale purpliſh roſe-colour, with very ſlight traces of thoſe green dots within, which make ſo great a part of the beauty of *R. maximum*. The *ſhrub* is of a very humble ſize, hardly three feet high, and flowering before it attains even that height; but all its parts are large. The *leaves* are broad, coriaceous, rounded and blunt at both ends; paler beneath, and very obſcurely dotted on the veins. The ſegments of the *calyx* are ſaid to be remarkably elongated, an eſſential mark of diſtinction, which ought to have been ſhewn in the, otherwiſe excellent, figure. We cannot help wiſhing alſo that the uncouth name, given by Michaux, had not been retained; but who ſhall cleanſe the Augean ſtable of modern botanical nomenclature?

Rhododendrum, in *Gardening*, contains plants of the hardy, deciduous, and evergreen, flowering, ſhrubby kinds, the dwarf roſe-bay, of which the ſpecies cultivated are, the ruſty-leaved rhododendrum (R. ferrugineum); the hairy rhododendrum (R. hirſutum); the dwarf rhododendrum, or roſe-bay (R. chamæciſtus); the purple rhododendrum (R. ponticum); and the broad-leaved rhododendrum (R. maximum).

Method of Culture.—Theſe plants may be increaſed by ſowing the ſeeds, which are very ſmall, as ſoon as poſſible after they are procured, either in a ſhady border, or in pots filled with freſh loam, having them very lightly covered with a little fine mould, and plunging the pots up to their rims in a ſhady border, and in hard froſt covering them with bell or hand-glaſſes; taking them off in mild weather. When they are ſown early in autumn, the plants come up the following ſpring, when they muſt be kept ſhaded from the ſun, eſpecially the firſt ſummer, and duly refreſhed with water; in the autumn following removing them to a ſhady ſituation, on a loamy ſoil, covering the ground about the roots with moſs, to guard them from the froſt in winter and keep the ground moiſt in the ſummer ſeaſon. They may alſo be increaſed from ſuckers or offsets, which they produce plentifully where they grow naturally, but ſeldom in this climate.

And they are very ornamental in the border, clumps, and other parts of ſhrubberies.

Rhododendrum *Cryſanthemum*, golden-flowered rhododendrum, in the *Materia Medica*. The leaves of this ſpecies are uſed in medicine. They are inodorous, and have an auſtere, aſtringent, bitteriſh taſte. Water extracts their virtue either by infuſion or decoction. Theſe leaves are reckoned ſtimulant, narcotic, and diaphoretic. Upon being taken, they firſt increaſe the arterial action and heat of the body, producing diaphoreſis, which effects, according to Dr. Home, are followed by a proportional diminution of excitement: the pulſe in one caſe having been reduced 38 beats. In large doſes, they produce nauſea, vomiting, purging, delirium, and all the ſymptoms of violent intoxication. The plant and its effects were firſt deſcribed by Gmelin and Steller in 1747, as a Siberian remedy for rheumatiſm; but it was not much noticed till after 1779, when Kœlpin ſtrongly recommended it in this diſeaſe, and alſo in gout and lues venerea. It has not been much uſed in this country; but from the reſult of ſome trials of it in Scotland, it obtained a place in the Edinburgh Pharmacopeia. It has been given in the form of decoction, made by boiling ʒiv of the leaves in f℥x of water, in a cloſe veſſel, over a ſlow fire, for 12 hours. The doſe of the ſtrained liquor is from f℥j to f℥ij given twice a day, and generally increaſed. Woodv. Med. Bot. Thomſon's Lond. Diſ.

RHODOLÆNA, in *Botany*, from ῥοδον, *a roſe*, and χλαινα, *a cloak*, or *outer covering*; a genus ſo named by Aubert du Petit-Thouars, in his *Plantes des Iſles d'Afrique*, faſc. 3, becauſe of the fine roſe colour of the flowers, which are ſaid to be very large and ſplendid. *De Theis*.

RHODOMAN, Lawrence, in *Biography*, a learned German, was born, in 1546, at Saſſowerf, in Upper Saxony. He ſtudied at the college of Ilſfield, and acquired ſuch a knowledge of claſſical literature, that he became an able inſtructor both in public and private. He taught in ſeveral ſeminaries of learning, and was profeſſor of Greek at Jena ſeven years, and of hiſtory at Wittemberg for four years. He died in 1606, at the age of 60. He was deeply learned in the Greek language; but his chief ſervice to literature was by his Latin verſion of Diodorus Siculus: he was author of a hiſtory of Martin Luther, in Greek verſe, and many other pieces. Bayle.

RHODOMELON, a name given by the ancients to a confection made of roſes, quinces, and honey, uſed as a grateful aſtringent and detergent in many caſes.

RHODON, in *Pharmacy*, from ῥοδον, *roſa*, a name applied to ſome compoſitions, where roſes are the chief ingredient, as *diarrhodon*, &c. Hence alſo *rhodoſaccharum*, *i. e. ſugar of roſes*. See Rose.

RHODOPE, in *Biography*, a famous courtezan and player on the flute, in antiquity, was born in Thrace. She was at firſt a ſlave in the ſame houſe as Æſop. Charaxus, the brother of Sappho, was violently enamoured of her, and having purchaſed her, gave her her liberty. She eſtabliſhed herſelf at Mucrates, where ſhe became a courtezan, and amaſſed immenſe riches. Pliny ſays that ſhe built, at her own expence, the moſt beautiful of the Egyptian pyramids; but Herodotus, and Bayle from his authority, reject this tale; nor do they give any more credit to the following ſtory.

One day, when ſhe was bathing, and her attendants watching

watching her clothes, an eagle pounced upon one of her ſhoes, and carrying it away, flew with it to Memphis, where he let it fall near king Pſammiticus. This prince, admiring the beauty of the ſhoe, ordered the officers of his houſehold to ſeek, throughout all Egypt, the perſon to whom the ſhoe appertained. She was found and brought to him; and he eſpouſed her. But how are we to reconcile this fact with her being married to Æſop? It is, however, certain, ſay the Encyclopædiſts, that this fabuliſt, notwithſtanding his deformity and uglineſs, had the art to make himſelf beloved by her.

RHODOPUS GALLINULA, in *Ornithology*, a name given by ſome authors to the bird more uſually known by the name *tringa*.

RHODORA, in *Botany*, ſo called by Linnæus, from ῥόδον, *a roſe*, in alluſion to the colour of its flowers, and probably, at the ſame time, to preſerve an analogy with its near relation *Rhododendrum*.—Linn. Gen. 218. Schreb. 294. Willd. Sp. Pl. v. 2. 603. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 49. Purſh v. 1. 298. Juſſ. 159. Lamarck Illuſtr. t. 364. Claſs and order, *Decandria Monogynia*. Nat. Ord. *Bicornes*, Linn. *Rhododendra*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, minute, of one leaf, with five teeth, permanent. *Cor.* Petals three, unequal; the two lowermoſt lanceolate, equal; the upper one wedge-ſhaped, aſcending, three-lobed, the middle lobe rather longeſt. *Stam.* Filaments ten, thread-ſhaped, declining, the length of the corolla; anthers rounded, two-lobed. *Piſt.* Germen ovate, furrowed, ſuperior; ſtyle thread-ſhaped, declining, rather longer than the ſtamens; ſtigma thickeſt, abrupt, convex. *Peric.* Capſule ovate-oblong, with five furrows, of five cells and five valves, the partitions from the inflexed margins of the valves. *Seeds* numerous, minute.

Eſſ. Ch. Calyx five-toothed. Corolla of three petals, unequal. Stamens declining. Capſule ſuperior, of five cells; the partitions from the inflexed margins of the valves.

1. R. *canadenſis*. Canadian Roſe-bloſſom. Linn. Sp. Pl. 561. Willd. n. 1. Ait. n. 1. L'Herit. Stirp. v. 1. 141. t. 68. Curt. Mag. t. 474. (Chamærhododendros; Duham. Sem. Append. 10. t. 27. f. 2, 3.)—Native of Canada and Newfoundland; very hardy in our gardens, except that, flowering in April and May, its bloſſoms are often injured. Curtis ſays it bears gentle forcing remarkably well. Sir Joſeph Banks brought this ſhrub to England in 1767; but it flowered at Paris, for the firſt time, in March 1756. Duhamel ſuggeſted the propriety of eſtabliſhing it as a new genus, which Linnæus adopted and named; but afterwards, having never ſeen the plant, he ſtruck it out, nor did he aſſign any reaſon for this meaſure. The accuracy of Duhamel is, at length, confirmed, and the *Rhodora* re-eſtabliſhed. The *ſtem* is buſhy, erect, two or three feet high, with round, ſmooth, grey or reddiſh branches, never quite ſtraight. *Leaves* deciduous, alternate, ſtalked, elliptical, acute, entire, veiny, hairy, ſlightly glaucous, about an inch and half long, and half an inch wide. *Flowers* appearing before the leaves, in terminal ſolitary umbels, four or five in each umbel, of a bright elegant roſe colour, with violet *anthers*, inodorous. *Petals* ſpreading, each an inch long. *Capſule* clothed with ruſty down.

RHOE, in *Ancient Geography*, a river of Aſia Minor, in Bithynia.

RHŒADEÆ, in *Botany*, the 27th natural order, among the *fragmenta* of Linnæus; of which there is no explanation in his *Prælectiones*, publiſhed by Giſeke. The genera referred hither, at the end of the Gen. Pl., are *Argemone*, *Chelidonium*, *Papaver*, *Podophyllum*, *Sanguinaria*, *Bocconia*. We place them according to the manuſcript corrections of the author, who has ſubjoined *Cytinus*, *Ariſtolochia*, and *Aſarum*.

This order, without the additions, which certainly do not belong to it, is equivalent to the firſt ſection of Juſſieu's PAPAVERACEÆ. (See that article.) Its name is taken from the Greek appellation of the field poppy, ῥοιάς, *Papaver Rhœas* of Linnæus; which was ſo called from ῥέω, *to fall off*, becauſe of the ſhort duration of its petals.

RHŒAS, in *Surgery*, a diminution of the caruncula lachrymalis from diſeaſe.

RHŒTICO, in *Geography*, a mountain of Germany, in the county of Pludentz; 6 miles S. of Pludentz.

RHŒTUM, or RHŒTIUM, in *Ancient Geography*, a town of Aſia Minor, in the Troade, on the coaſt of the Helleſpont. According to Strabo, it was built on an eminence near the tomb of Ajax. The promontory called "Rhœtium" was four miles diſtant from that of Sigæum.

RHŒXUS, a port of Aſia, on the coaſt of Cilicia, at the mouth of the river Sarus. Steph. Byz.

RHŒZIA, in *Geography*, a city of Perſia, in the province of Mingrelia, ſituated on the Hippus, the uſual reſidence of the princes of Mingrelia, but which they changed in ſummer for Taqueri, a very pleaſant ſpot, ſeven verſts S. of Ghoni. In Rhœzia much ſilk is cultivated; and all that is prepared in the other parts of Mingrelia is alſo carried thither, to be ſold or manufactured. The manufacture, however, of that commodity is not well underſtood, as they only make a poor ſort of handkerchiefs, or common taffeties.

RHOGE, in *Ancient Geography*, an iſland on the coaſt of Lycia, placed by Pliny in the vicinity of that of Cyprus. Steph. Byz.

RHOGME, in *Surgery*, a rupture or fracture.

RHOGMOI, in *Ancient Geography*, a port of Aſia, on the coaſt of Cilicia. Steph. Byz.

RHOGOMANIS, or RHOGONIS, a river of Aſia, in the Perſide. Ptolemy places the mouth of this river in the ſouthern part of the Perſide, on the Perſian gulf. According to Nearchus, it was a ſmall river, 200 ſtadia from the river Granis.

RHOITES, the name of a medicine among the ancients, which is a ſort of rob of the juice of pomegranates. Dioſcorides deſcribes it as the ſimple juice of the fruit, evaporated over the fire to the conſiſtence of an extract; but Paulus Ægineta gives the receipt to be three parts juice of pomegranate, and one part honey, boiled to the evaporation of a third part. So that the rhoites of Dioſcorides was a true rob of pomegranates; the other rather honey of pomegranates, like our honey of roſes.

RHOMB. See RHOMBUS.

RHOMBITES, in *Ancient Geography*, a river of Aſiatic Sarmatia. Ptolemy.

RHOMBO, in *Ichthyology*, the name of a peculiar fiſh of the rhombus, or turbot kind, called *rhombus aculeatus* by Aldrovand, Geſner, and other writers. It is a large fiſh, of an aſh-coloured green on the back, and white on the belly. It has no ſcales; but the ſkin of its back is divided by lines, ſomething in the manner of the ſkins of ſnakes. The mouth is very large, and is well furniſhed with teeth; and the palate has a number of tubercles, armed alſo with a ſort of teeth. It feeds on fiſh, and its fleſh is very delicate. It is very common in the markets at Venice, and is caught in the neighbouring ſeas, and in many other places. See PLEURONECTES *Maximus*.

RHOMBOIDÆUS *Major* and *Minor*, in *Anatomy*, names given by Albinus to what he makes two muſcles, though Winſlow and others account it only one. What Winſlow

Winſlow calls the inferior portion of the rhomboidalis, Albinus calls rhomboidæus major; and what he calls the upper portion of that muſcle, Albinus calls rhomboidæus minor. See RHOMBOIDEUS.

RHOMBOIDALIS. See RHOMBOIDÆUS.

RHOMBOIDES, in *Geometry*, a quadrilateral figure, whoſe oppoſite ſides and angles are equal, but which is neither equilateral nor equiangular; or, it is an oblique-angled parallelogram.

Such is the figure N O P Q, *Plate* XII. *Geometry*, *fig.* 1. For the method of finding the area of a rhomboides, ſee RHOMBUS.

RHOMBOIDES, in *Ichthyology*. See CHÆTODON *Argus*, *Striatus*, *&c.*

RHOMBOIDEUS, in *Anatomy*, a muſcle of the ſhoulder, ſo called on account of its ſhape; dorſo-ſcapulien of Chauſſier.

It is a broad, flattened, quadrilateral muſcle, placed obliquely at the lower part of the neck and upper part of the back, and extending from the lower portion of the ligamentum nuchæ, and the ſuperior ſpinous proceſſes of the back, to the baſis of the ſcapula. The whole of its fibres go obliquely from the ſpine downwards and outwards to the ſcapula; thus as it is regularly quadrilateral, it has a correct rhomboid figure. Its poſterior ſurface is chiefly covered by the trapezius; the latiſſimus dorſi lies on a ſmall portion of it below; and between theſe two muſcles its fibres are covered by the ſkin only. The ſerratus ſuperior poſticus, ſplenius, longiſſimus dorſi, ſacrolumbalis, the ribs, and the external intercoſtal muſcles, are covered by its anterior ſurface. Its upper edge goes from the lower part of the ligamentum nuchæ, obliquely outwards and downwards, to the baſis of the ſcapula oppoſite to the commencement of the ſpine of the bone. In great part of its extent this edge is in contact with the levator ſcapulæ. The lower margin reaches from the ſpinous proceſs of the fourth or fifth dorſal vertebra to the inferior angle of the ſcapula. The two edges are nearly of equal length, and parallel to each other. The internal edge is attached to the lower portion of the ligamentum nuchæ, to the laſt cervical ſpinous proceſs, to the four or five ſuperior dorſal ſpines, and to the interſpinal ligaments of thoſe bones. The outer edge is fixed to the baſis of the ſcapula, from its inferior angle to above the origin of the ſpine, between the ſupra and infra ſpinatus behind, and the ſerratus magnus in front.

The rhomboideus is partly muſcular, partly aponeurotic. Its inner edge is attached by aponeurotic fibres, having the ſame direction as the fleſhy one, ſhort above, and longer below. It is fixed to the upper part of the ſcapula by ſhort aponeuroſes; its inſertion in the remainder of the baſis is by an aponeuroſis attached only at its upper and lower extremities, leaving a paſſage between theſe points for branches of the tranſverſalis colli artery. The muſcular fibres are all directed obliquely from within outwards, and from above downwards.

The muſcle is generally divided into two portions, united by cellular tiſſue to a ſuperior ſmaller, and an inferior larger one: theſe are called the rhomboideus minor and major.

By drawing the baſis of the ſcapula obliquely upwards and backwards, the rhomboideus carries the inferior angle towards the ſpine, and makes the anterior angle of the bone, conſtituting the ſhoulder, roll forwards and downwards. Thus it reſtores the ſcapula to its ſituation after the ſhoulder has been raiſed. It concurs in this action with the levator ſcapulæ.

RHOMBOIDIA, in *Natural Hiſtory*, the name of a genus of ſpars, given them from their being of a rhomboidal form. They owe this figure to an admixture of particles of iron, and conſiſt of ſix planes.

Of this genus there are only two known ſpecies, *viz.* a white thin one with very thin cruſts, and a whitiſh-brown thick one with thicker cruſts. They are both found in the foreſt of Dean in Glouceſterſhire, and in other places, where there are iron-ores. Hill.

RHOMBUS, Ῥόμβος, is formed of ῥόμβος, of ῥομβεῖν, *to encompaſs* or *turn round*, in *Geometry*, an equilateral rhomboid; or a quadrilateral figure, whoſe ſides are equal and parallel, but the angles unequal; two of the oppoſite ones being obtuſe, and the other two acute. Such is the figure A B C D, *Plate* X. *fig.* 11.

To find the Area of a Rhombus, or Rhomboides.—Upon C D, which is here aſſumed as a baſe, let fall a perpendicular A E, which will be the altitude of the parallelogram: multiply the baſe by the altitude, the product is the area. Thus, if C D be = 456, and A E = 234, the area will be found 106704.

For it is demonſtrated, that an oblique-angular parallelogram is equal to a rectangle upon the ſame baſe C D, and of the ſame altitude A E (ſee PARALLELOGRAM). But the area of a rectangle is equal to the factum of the baſe into the altitude; therefore the area of an oblique-angular parallelogram is equal to the ſame. See RECTANGLE.

The area of a parallelogram, rhombus or rhomboides, may be found by means of the following proportion: As radius, *i. e.* ſine of 90° or tangent of 45°, is to the ſine of any angle of a parallelogram, ſo is the product of the ſides including the angle to the area of a parallelogram: that is, A D × D C × nat. ſine of the angle D = the area. For having drawn the perpendicular A E, the area, by the firſt rule, is A E × D C; but as rad. 1 (ſin. < E) : ſin. < D :: A D : A E = ſin. < D × A D; therefore A E × D C = D C × ſin. < D × A D is the area; or, 1 : ſin. < D :: A D × D C : ſin. < D × A D × D C = the area of the parallelogram.

N.B. As the angles of a ſquare and rectangle are each 90°, whoſe ſine is 1, this rule is the ſame as the former.

E. G. 1. What is the area of a rhomboides, whoſe length is 36 feet, ſlope-height 25.5 feet, and one of the leſs angles 58°? Here rad. or 1 : .8480481 (nat. ſine of 58°) :: 918 (= 25.5 × 36) : 778.5081558, the area. Or, by uſing the logarithms, rad. (10.0000000) : ſin. 58° (9.9284205) :: log. of 918 (2.9628427) : 778.5081, the number correſponding to the log. (2.8912632).

2. What is the area of a parallelogram whoſe angle is 90°, and the including ſides 20 and 12.25 chains? Anſ. 245 acres.

3. What is the area of a rhombus, each of whoſe ſides is 21 feet 3 inches, and each of the leſs angles 53° 20′? Anſ. 362.208757 feet.

4. How many acres are in a rhomboides whoſe leſs angle is 30°, and the including ſides 25.35 and 10.4 chains? Anſ. 13 acres 29.12 perches.

The area of either of the forementioned figures may alſo be had by the following rule, which is common to all quadrilaterals. As radius is to the ſine of the angle which the interſecting diagonals of a parallelogram make with each other, ſo is the product of the diagonals to double the area: that is, $\frac{A C \times B D \times \text{nat. ſine of the angle R}}{2}$ = the area.

N. B. Becauſe the diagonals of a ſquare and rhombus interſect at a right angle, whoſe ſine is 1, half the product of their diagonals is the area; that is, $\frac{1}{2} A C^2$ in the ſquare and $\frac{1}{2} A C \times B D$ in the rhombus is the area.

E. G.

E. G. 1. How many acres are in a piece of land, in the form of a rhombus, whose diagonals are 30 and 20 chains? Ans. 30 acres.

2. How many yards of painting are in a rectangle, whose diagonals, intersecting in an angle of 30°, are each 32 feet? Ans. 28⅓.

3. What is the area of a rhomboides, whose diagonals, making an angle of 60°, are 30 and 25 feet? Ans. 324.7595 feet. Hutton's Mensuration.

RHOMBUS, *Solid*, two equal and right cones joined together at their bases.

RHOMBUS, in *Ichthyology*, a species of the *Pleuronectes*; which see. See also PLEURONECTES *Maximus* and TURBOT, and P. *Passer*.

RHOMBUS, in *Conchology*, the name given by the generality of authors to a genus of the shell-fish, much more properly called by some *cylindrus*.

RHOMBUS, among *Surgeons*, denotes a sort of bandage of a rhomboidal figure.

RHON, in *Ancient Geography*, a river of India, among the people called Gandarii. Steph. Byz.

RHONDE, in *Geography*. See RONDE.

RHONE, a river of France, formed by the union of three springs, which rise in mount Susberg, a part of the Grimsell, at the eastern extremity of the Valais. It passes through the lake of Geneva to Seissel, &c. and thence to Lyons, where it joins the Sâone, and after watering Vienne, Valence, Viziers, Avignon, Arles, &c. discharges itself by several mouths into the Mediterranean.

RHONE, *Mouths of the*, *Bouches de Rhône*, one of the twelve departments of the S.E. region of France, bounded on the N. by the county of Venaissin, on the N.E. by the department of the Lower Alps, on the E. by the department of the Var, on the S. by the Mediterranean, and on the W. by the department of the Gard: 5315 kiliometres in extent, or 269 square leagues, and containing a population of 320,072 persons. It is divided into three circles or districts, including 26 cantons and 108 communes. The circles are, Marseilles, having 142,058 inhabitants; Aix, 97,938; and Tarascon, 80,076. According to M. Hassenfratz, its extent in French leagues is 30 in length and 20 in breadth; its circles are 5, its cantons are 40, and its population consists of 446,643 persons. It is a portion of Lower Provence, and lies in N. lat. 43° 40′. Its capital is Aix. Its contributions to the land-tax, &c. amounted, in the 11th year of the French era, to 3,612,199 fr.; and its expences, administrative, judiciary, and for public instruction, to 354,531 fr. 33 cents. Many of the hills in the northern districts are bare rocks, destitute of soil and verdure. The chief productions of the department are grain, wine, silks, olives, fruits, and pastures. It has mines of iron, alum, vitriol, with quarries of marble, &c. Pools and marshes are dispersed near the coast.

RHONE, or *Rhone and Loire*, one of the eleven departments of the E. region of France, bounded on the N. by the department of the Sâone and Loire, on the E. by the departments of the Ain and the Isere, on the S. by the departments of the Ardêche and the Upper Loire, and on the W. by the departments of the Puy de Dôme and the Allier: to the E. it is bounded by the river Rhine, and the Loire passes nearly through its centre from N. to S. Its extent is 2935 kiliometres, or 147 square leagues, and its population consists of 345,644 persons. It is divided into 2 circles, 25 cantons, and 261 communes. Its circles are Villefranche, including 106,262 inhabitants, and Lyons, having 239,382. According to Hassenfratz, its extent in French leagues is 20 in length, and 9 in breadth; its circles are 2, its cantons 32, and its population is 323,177. It lies in N. lat. 46° between Ain and Loire, and comprehends the provinces formerly called Lyonnais and Beaujolais. Its capital is Lyons. The plains yield scanty crops of grain and pasture; the gentle eminences are covered with vineyards, and the summits of the mountains are clothed with pines. This department has mines of copper, lead, coal, quarries of marble, freestone, &c.

RHOPALA, in *Botany*, a name altered by Schreber from the *Roupala* of Aublet, which, being of barbarous origin, and unexplained by the publisher, he contrived, by the above alteration, to derive from ῥοπαλον, *a club*, or *stake*. This may very well apply to the size and nature of the woody stem, which rises to the height of three or four feet, before it sends off any branches. Vahl and Willdenow have contrived to retain the barbarism, without adding any thing to the sense.—Schreb. 62. Brown. Tr. of Linn. Soc. v. 10. 190. (Roupala; Aubl. Guian. v. 1. 83. Juss. 79. Lamarck Illustr. t. 55. Gærtn. suppl. t. 217. Rupala; "Vahl Symb. v. 3. 20." Willd. Sp. Pl. v. 1. 536.)—Class and order, *Tetrandria Monogynia*. Nat. Ord. *Proteaceæ*, Juss. Brown.

Gen. Ch. *Cal.* none. *Cor.* Petals four, spatulate, regular, concave, recurved at the extremity. Nectary of four glands, separate or combined, at the base of the germen. *Stam.* Filaments four, short, inserted above half way up the petals; anthers oblong, two-lobed, projecting beyond their recurved extremities. *Pist.* Germen superior, ovate, with rudiments of but two seeds; style awl-shaped, permanent, the length of the corolla; stigma vertical, club-shaped, undivided. *Peric.* Follicle ovate, somewhat woody, of one cell. *Seeds* two, bordered, winged at each end, the kernel central.

Ess. Ch. Calyx none. Petals four, regular, recurved. Stamens inserted into the middle of each petal. Nectary of four glands. Stigma vertical, club-shaped. Follicle of one cell. Seeds two, bordered, winged at each end.

The habit of the genus is arborescent. *Leaves* alternate, rarely whorled; simple, entire or toothed, rarely pinnate, or ternate, on the same branch. *Spikes* axillary, sometimes terminal, racemose, the *flowers* in pairs with a single *bractea* to each pair.

1. R. *montana*. (Roupala montana; Aubl. Guian. v. 1. 83. t. 32. Lamarck t. 55. Rupala montana; Willd. n. 1.)—Leaves alternate, entire, ovate, folded, short-pointed, reticulated with veins. Spikes axillary, solitary, longer than the leaves. Flower-stalks, petals and germen clothed with rusty down.—Native of the Serpent Mountain in Guiana, flowering in August. *Aublet.* A small *tree*, seven or eight feet high; its trunk three or four feet. *Bark* wrinkled and cracked, whitish, as well as the *wood*. Both exhale, when cut, a strong fetid scent, like that of the serpents of the same country. *Leaves* smooth, of a firm dry texture, about three inches long. *Footstalks* an inch long, inflated at the base. *Flowers* about eight or ten alternate sessile pairs, in each lax *spike*.

2. R. *media*. Brown n. 2.—Leaves alternate, entire, ovate, flat, pointed, running down the footstalk, with depressed veins. Clusters axillary, solitary, longer than the leaves. Partial flower-stalks and petals somewhat hairy. Germen downy.—Gathered in the same country by Von Rohr, who sent specimens to sir Joseph Banks. This seems very nearly related to the foregoing.

3. R. *nitida*. Br. n. 3. (Ropala nitida; Rudge Guian. v. 1. 26. t. 39.)—Leaves alternate, entire, elliptical, short-pointed, flat. Clusters axillary, solitary, about the length of the leaves. Partial flower-stalks, petals and germen smooth.—Gathered by Joseph Martin in Guiana. *Brown.*

4. R. *moluccana* Br. n. 4.—Leaves alternate, entire, elliptical, flat, finely veined, somewhat reticulated, longer than the clusters. Partial flower-stalks and petals smooth.—Gathered in the Molucca islands, by the late Mr. Christopher Smith. *Herb. Banks.*

5. R. *cochinchinensis.* Br. n. 5. (Helicia cochinchinensis; Lour. Cochinch. 83, on the authority of a specimen seen by Mr. Brown, in sir Joseph Banks's collection, from the author.)—Leaves alternate, elliptic-ovate, short-pointed, flat, somewhat serrated above half way down. Clusters axillary, solitary, about the length of the leaves. Partial flower-stalks, petals and germen smooth.—Native of woods in Cochinchina. (See HELICIA.) Mr. Brown observes, that what Loureiro describes as a four-cleft *calyx*, are really the nectariferous glands, united at their base, and remaining after the petals are fallen. Such a mistake might well render his description unintelligible, without a sight of the plant.

6. R. *serrata.* Br. n. 6.—Leaves alternate, broadly elliptical, scarcely pointed, serrated; somewhat contracted and entire at the base; paler beneath. Clusters axillary, solitary, shorter than the leaves. Partial flower-stalks, petals and germen downy.—Gathered by Mr. Christopher Smith in the Molucca isles.

7. R. *dentata.* Br. n. 7.—Leaves alternate, ovato-lanceolate, folded, toothed, tapering at each end; with a linear point. Clusters axillary, solitary, rather longer than the leaves. Petals and germen downy.—Gathered by Mr. Alexander Anderson in Guiana. *Herb. Banks.*

8. R. *peruviana.* Br. n. 8. ("Embothrium monospermum; Fl. Peruv. et Chil. v. 1. 63. t. 98.")—Leaves alternate, ovate, serrated, woolly; rusty beneath. Clusters axillary, solitary, longer than the leaves.—Native of the colder mountains of Peru.

9. R. *diversifolia.* Br. n. 9. ("Embothrium pinnatum; Fl. Peruv. et Chil. v. 1. 63. t. 99.")—Leaves alternate, simple or pinnate, very veiny; downy beneath. Clusters axillary, solitary, longer than the leaves. Follicles cimeter-shaped, downy.—Native of waste ground, and the borders of fields, in Peru.

10. R. *sessilifolia.* Br. n. 10. (Roupala sessilifolia; Richard Act. Soc. Hist. Nat. Par. v. 1. 106. Poiret in Lamarck Dict. v. 6. 316. Rupala sessilifolia; Willd. n. 2. Ropala hameliæfolia; Rudge Guian. v. 1. 22. t. 31.)—Leaves four in each whorl, nearly sessile, oblong, somewhat wedge-shaped, slightly pointed, entire. Clusters terminal, umbellate. Flowers whorled.—Native of Guiana. The *leaves* are, in the figure, precisely obovate, tapering at the base, a span long. *Clusters* about the same length, erect, stalked, forming an umbel at the top of the branch or stem; their partial stalks hairy, imperfectly whorled, very numerous.

RHOPALIC VERSES, among the *Ancients*, a kind of verses which began with monosyllables, and were continued in words growing gradually longer and longer to the last, which was the longest of all.

They had their name from the Greek ῥόπαλον, *a club*, which, like them, begins with a slender tip, and grows bigger and bigger to the head. Such is that verse of Homer:

Ω μακαρ Ατριδη μοιρηγενες, ολβιοδαιμων.

And this Latin one of Ausonius:

"Spes deus æternæ stationis conciliator."

RHOPALOSIS, a distemper of the hair described by the ancients, and seeming to be the same with what we call the *Plica Polonica*; being a sort of matting together of the hair into long and thick tresses.

RHOPE, formed of ῥέπω, *to preponderate*, a word used by the Greek writers to express a violent tendency of the humours to any particular part of the body.

RHOPIUM, in *Botany*, from Ῥωπιον, *a slender shoot*, the flower-stalks of this plant having a delicate, twiggy appearance.—Schreb. 608. Willd. Sp. Pl. v. 4. 150. (Meborea; Aubl. Guian. 826. Juss. 437. Lamarck Illustr. t. 731.)—Class and order, *Gynandria Triandria.* Nat. Ord. *Euphorbiæ*, Juss. See MEBOREA.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, permanent, cloven into six, lanceolate, acute segments, each having a little bordered cavity at the base. *Cor.* none. *Stam.* Filaments none; anthers three, cloven, each adhering to a single style under the stigma, with distant cells, bursting transversely. *Pist.* Germen superior, roundish or triangular; styles three, erect, approximated; stigmas flat, acute, bent down over the anthers. *Peric.* Capsule composed of three obtuse-angled lobes, with six cells, and six valves: partitions from the middle of the valves. *Seeds* two, one adhering to each side of the partition, ovate.

Ess. Ch. Calyx six-cleft. Corolla none. Anthers three, with remote cells, and placed in the middle of the styles. Styles three. Capsule three-lobed, of three cells, each with two seeds.

1. R. *citrifolium.* Willd. (Meborea guianensis; Aubl. Guian. t. 323.)—Native of woods in Guiana, where it flowers and bears fruit in January. The *stem* of this shrub is from three to four feet in height, branched towards the summit. *Leaves* alternate, ovate, acute, smooth, entire, nearly sessile. *Stipulas* twin, small, deciduous. *Flowers* corymbose, axillary and terminal, of a yellowish-green colour, each standing on a long, slender stalk, which is furnished with a scale at its base.

RHOPOGRAPHI, Ῥοπογραφοι, formed of ῥοπος, *toys* or *odd ware*, and γραφω, *I paint*, in *Antiquity*, an appellation given to certain painters, who confined themselves to low subjects, such as animals, plants, landscapes, &c.

The same appellation has been also given to such as cut figures of men, &c. in box, phillyrea, yew, &c. in gardens.

RHOSOLOGIA, in *Ancient Geography*, a town of Asia, in Galatia, in the country of the Teitsages, between Venzala and Sarmalia. Ptolemy.

RHOSOS, a town situated on the gulf of Issus, at the eastern extremity of the Mediterranean sea, between two defiles, one of which led to Syria, and was called the "gates of Syria;" and the other formed by mount Amanus and the sea-coast, communicating with Cilicia, and called the "Amanic gates." Ptolemy places this town in Syria, and Strabo places it in Cilicia. After the death of Seleucus Nicator, Demetrius caused the statue of Fortune to be conveyed hither. It was famous for the manufacture of earthen vessels, mentioned by Cicero, when he was governor of Cilicia, in a letter to Atticus. Sapor, king of Persia, burnt this city, after he had taken prisoner the emperor Valerian, A.D. 260. It was pillaged under the reign of Arcadius, in the year 404, by the Isaurians, a savage people, who inhabited the mountains. Jupiter was worshipped in this town; and the statue of this deity was engraven on the medals of Rhosos.

RHOSSICUS SCOPULUS, a promontory of Asia, in Syria, near the gulf of Issicus.

RHOT, in *Geography*, a river of Switzerland, which runs into the Aar, 5 miles W. of Zossingen.

RHOTANUM, in *Ancient Geography*, a river of Corsica, the mouth of which is placed by Ptolemy on the eastern side, between Valeria Colonia and the port of Diana.

RHOX, a word uſed by ſome authors to expreſs the tunica uvea of the eye.

RHUBARB, Rhabarbarum, in *Botany*. See Rheum.

Rhubarb, *Rheum Palmatum*, in the *Materia Medica*. The rhubarb, called the rhabarbarum officinale, was ſuppoſed, in the year 1732, to be ſupplied by ſome plants ſent from Ruſſia, to Juſſieu of Paris, Rand at Chelſea, and Linnæus at Upſal. Accordingly theſe plants were adopted by Linnæus, in his firſt edition of the Species Plantarum, under the name of rheum rhabarbarum. This, however, was not very generally received as the genuine rhubarb plant. But in order to aſcertain this matter more completely, Kauw Boerhaave procured, from a Tartarian rhubarb merchant, the ſeeds of thoſe plants, which he annually ſold, and which were admitted at Peterſburgh to be the true rhubarb. Theſe ſeeds were ſoon diſcovered by de Gorter to produce two diſtinct ſpecies; *viz.* the R. rhabarbarum of Linnæus, or R. undulatum, as it has been ſince called; and another ſpecies, declared by Linnæus to be a new one, and firſt mentioned in the ſecond edition of the Species Plantarum, in 1762, under the name of R. palmatum. But before this time, de Gorter had repeatedly ſent its ſeeds to Linnæus, and the young plants conſtantly periſhed: at length he obtained the freſh root, which ſucceeded very well at Upſal, and enabled the younger Linnæus to deſcribe this plant in the year 1767. However, two years antecedent to this, Dr. Hope's account of the rheum palmatum, as it grew in the Botanic garden near Edinburgh, had been read before the Royal Society at London; and of the great eſtimation in which this plant was held by him we have the following proof. "From the perfect ſimilarity of this root with the beſt foreign rhubarb in taſte, ſmell, colour, and purgative qualities, we cannot doubt our being at laſt poſſeſſed of the plant which produces the true rhubarb, and may reaſonably entertain the agreeable expectations of its proving a very important acquiſition to Britain." (See Phil. Tranſ. for the year 1765.) But from the relation above given, it appears that the ſeeds of both R. undulatum and R. palmatum were tranſmitted to Peterſburgh as thoſe of the true rhubarb: we are therefore to conclude, that the former ſpecies has an equal claim to this importance with the latter; and from further inquiries made in Ruſſia, there is the beſt authority for believing that the R. compactum alſo affords this very uſeful drug. Bergius ſays, "Rheum palmatum producit *rhabarbarum* in officinis *Sibiricum* appellatum: certe e ſeminibus a Bucharis e montoſis Tibeti in Ruſſiam apportatis, et poſtea ſatis hocce rheum palmatum enatum eſt." (Vide Pallas Reiſe, &c. vol. iii. p. 157.) "*Rhabarbarum* vero *Chinenſe* ex alia ſpecie rhei deſumptum eſſe videtur." (Vide Georgi Reiſe, &c. vol. i. p. 211.) The ſeeds of the rheum palmatum were firſt introduced into Britain in 1762, by Dr. Mounſey, who ſent them from Ruſſia, and were ſuppoſed to be a part of thoſe already mentioned; and ſince their proſperous cultivation by the late profeſſor of botany at Edinburgh, the propagation of this plant has been gradually extended to moſt of our Engliſh gardens, and with a degree of ſucceſs which promiſes in time to ſuperſede the importation of the foreign root. The R. rhaponticum is a different ſpecies from either of theſe. This is ſuppoſed to be the rhabarbarum of the ancients. It is well known that the ancient rhubarb had not the purgative virtues of the modern. Two ſorts of rhubarb are uſually imported into this country for medical uſe, *viz.* the Chineſe and the Tartary rhubarb. Mr. Bell informs us, in his travels, that the beſt rhubarb grows in that part of the Eaſtern Tartary called Mongallia, which ſerves as a boundary between Ruſſia and China; or, on the chain of mountains in Tartary, which ſtretches from the Chineſe town Selin to the lake Kokonor, near Thibet. This plant, he ſays, does not run and ſpread itſelf like docks, but grows in tufts at uncertain diſtances, as if the ſeed had been dropped with deſign. As the Mongalls do not think it worth cultivating, the marmots, which burrow under the ſhade of its ſpreading leaves, and probably feed on its leaves and roots, contribute to its increaſe, partly by the manure which their dung affords it, and principally by caſting up and looſening the earth, into which the ripe ſeeds, blown by the wind, fall, and where they immediately take root. After digging and gathering the rhubarb, the Mongalls cut the large roots into ſmall pieces, in order to make them dry the more readily. The roots are taken up in autumn, according to Mr. Bell's account; but according to Pallas, in April and May: and after being cleaned, and cut tranſverſely into pieces of a moderate ſize, theſe pieces are placed on tables, and turned three or four times a day for five or ſix days. In the middle of every piece they ſcoop a hole, through which a cord is drawn, in order to ſuſpend them in a convenient place, but ſheltered from the ſun, and expoſed to the air and wind; and by this practice they deſtroy ſome of the beſt part of the root.

The proper exſiccation of this root is certainly attended with great difficulty, and the cultivators of rhubarb in this country have not yet agreed as to the beſt mode of accompliſhing it. The recent root, in this proceſs, according to the experiment of ſir William Fordyce, loſes nearly nine-tenths of its weight; and as others ſay, ſeven-eighths. In China the roots are not dug up till winter; and the cultivators, after cleaning, ſcrape off the bark, and cutting them, dry the ſlices by frequently turning them on ſtone ſlabs, heated by a fire underneath; after which, the drying is completed by hanging them up in the air, expoſed to the greateſt heat of the ſun. Part of the Tartarian rhubarb is carried to Turkey through Natolia; but the greateſt part is conveyed by the Bucharians to Kiachta, on the Ruſſian frontier, where it is examined by a Ruſſian apothecary, and the beſt pieces only are ſelected and ſent to Peterſburgh. The Chineſe is conveyed to Canton, and there purchaſed by the agents of the Eaſt India Company.

Of the two ſorts of rhubarb above mentioned, the Chineſe is chiefly obtained in the province of Xenſi or Shenſee, under the name "Taihoung." It comes immediately from the Eaſt Indies, in oblong pieces, flattiſh on one ſide, and convex on the other; compact, hard, heavy, internally of a dull red colour, variegated with yellow and white; and when recently powdered, appears yellow; but on being kept, becomes gradually redder. The ſecond is the moſt valuable, and is brought to us from Turkey and Ruſſia, in roundiſh pieces, with a large hole through the middle of each; it is more ſoft and friable than the former ſort, and exhibits, when broken, many ſtreaks of a bright red colour. This ſort, unleſs kept very dry, is apt to grow mouldy and worm-eaten; the other is leſs ſubject to theſe inconveniences. Some of the more induſtrious artiſts are ſaid to fill up the worm-holes with certain mixtures, and to colour the outſide of the damaged pieces with powder of the finer ſorts of rhubarb, and ſometimes with cheaper materials. The marks of the goodneſs of rhubarb are, the livelineſs of its colour when cut, its being firm and ſolid, but not flinty or hard; its being eaſily pulverable, and appearing, when powdered, of a fine bright yellow colour; its imparting to the ſpittle, on being chewed, a deep ſaffron tinge, and not proving ſlimy or mucilaginous in the mouth. Its taſte is ſubacrid, bitteriſh, and ſomewhat ſtyptic; the ſmell is ſlightly aromatic.

Turkey

Turkey rhubarb is generally preferred to the East India sort, though the latter is more astringent, but has something less of an aromatic flavour. Tinctures made from both, with equal quantities of rectified spirit, have nearly the same taste; on drawing off the menstrua, the extract left by the tincture of the East India rhubarb proves in taste considerably stronger than the other. They seem both, says Dr. Lewis, to be the produce of the same climate, and roots of the same species of plant, taken up probably at different seasons, or cured in a different manner. Lewis's Mat. Med.

The Russian rhubarb and Turkey rhubarb, sometimes distinguished in the shops, seem to be the root of the same species of plant, grown in the same place, and prepared in the same manner; but Mr. A. T. Thomson (Lond. Disp.) inclines to believe, that the East Indian is the root of a different species, very probably of the "undulatum;" and the mode of preparation appears to be evidently different, from the aspect of the pieces.

Good Russian or Turkey rhubarb, says Mr. Thomson, has a peculiar, somewhat aromatic odour, and a bitter, slightly astringent, subacrid taste; feels gritty between the teeth when chewed, and tinges the saliva of a bright yellow colour. It breaks with a rough hackly fracture, is easily pulverized, and affords a powder of a bright buff yellow colour. Water at 212° takes up 24 parts in 60; the infusion is of a brown colour, nearly clear, and reddens litmus paper. Alcohol extracts 2.7 from 10 parts, and gives a tincture of a rich golden colour, which reddens tincture of litmus; is not altered in its transparency by the addition of water; and strikes a blackish olive hue with solution of sulphate of iron, but no immediate precipitate falls. Sulphuric ether takes up 1.5 in 10 parts of this rhubarb; the tincture is of a golden yellow hue, and when evaporated on water, leaves a thin pellicle of yellow resin, and abundance of extractive dissolved in the water, combined, however, with tannin. East Indian or Chinese rhubarb has a stronger odour, and is more nauseous to the taste than the Turkey; breaks with a more compact and smoother fracture; and affords a powder of a redder shade. Water takes up 30 parts in 60; the infusion is not so deep coloured as that of Russian rhubarb, more turbid, and reddens also litmus paper. Alcohol extracts 4 parts in 10; the tincture is of a much deeper colour, and brownish; gives a deeper red to litmus tincture; is rendered slightly turbid by the addition of water; and strikes a green, not black, olive with sulphate of iron, which it also quickly and copiously precipitates. Ether takes up 2 parts in 10; the tincture is deeper coloured, and when evaporated on water, affords the same results as the former kind, except that the compound of tannin and extractive is more soluble.

The infusion of Chinese rhubarb is more copiously precipitated by solution of isinglass than that of the Russian. Infusion of yellow cinchona throws down a copious greenish precipitate from infusion of Russian rhubarb, and a less copious, but more dense, bright yellow precipitate from that of Chinese rhubarb.

The following tables shew the effects of re-agents on the aqueous infusion of the two varieties of rhubarb.

TABLE I.—Precipitates formed by Acids, Alkalies, and Neutral Salts.

Variety of Rhubarb.	Sulphuric Acid.	Nitric Acid.	Muriatic Acid.	Oxymuriatic Acid.	Solution of Potass.	Solution of Subcarbonate of Potass.	Lime Water.	Muriate of Barytes.	Silicated Potass.
Russian.	copious, greenish-yellow.	scanty, flocculent, pale yellow.	scanty, very slowly formed, yellow.	slowly formed, pale olive.	none, but strikes a deep lake colour.	none, but strikes a reddish-brown.	scanty, slowly formed, brown.	scanty, olive-green.	none, but strikes a deep brown.
Chinese.	more copious, brownish-yellow.	less scanty, pale yellow.	scanty, quickly formed, brownish-yellow.	slowly formed, orange-yellow.	none, a deeper lake.	none, but renders it turbid, and deep reddish-brown.	copious, quickly formed, brown.	less scanty, orange-yellow.	none, but strikes a deep brown.

TABLE II.—Precipitates formed by Solutions of Metallic Salts.

Variety of Rhubarb.	Solution of Oxysulphate of Iron.	Solution of Nitrate of Silver.	Solution of Nitrate of Mercury.	Solution of Nitrate of Lead.	Solution of Muriate of Mercury.	Solution of Acetate of Lead.	Solution of Tartarized Antimony.
Russian.	copious, nearly black.	scanty, pale greenish-yellow.	copious, olive-yellow.	scanty, slowly formed, yellow.	scanty, slowly formed, pale olive.	scanty, greenish-yellow.	scanty, slowly formed, whitish.
Chinese.	copious, deep olive-green.	copious, orange-yellow.	copious, heavy, bright yellow.	scanty, slowly formed, deeper yellow.	copious, quickly formed, heavy yellow.	copious, yellow.	scanty, still more slowly formed.

When the residue, after the action of water, is digested in muriatic acid, and solution of ammonia added in excess, the liquid becomes milky, and deposits oxalate of lime. What remains consists of woody matter, a small portion of alumen, and silex. Of the specimens which we examined, one drachm of the Russian rhubarb yielded twenty-six grains of the oxalate, while the same weight of East Indian yielded only eighteen grains.

From the results of the above experiments, rhubarb appears to contain a large portion of extractive matter, a small portion of resin, mucus, tannin, gallic acid, a colouring matter, oxalate of lime, and minute proportions of alumen and silex. They shew that the two varieties differ from each other in several respects. The Russian contains more tannin, oxalate of lime, and resin; the Chinese more extractive and gallic acid. But the purgative principle is still unascertained, although it appears to be combined with the extractive, and hence is soluble in water.

The yellow colour of rhubarb, it is said, is much less destructible than many other vegetable yellows. Aqua fortis, and other acids which destroy the colour of saffron, turmeric, &c. make no change in that of rhubarb, or at most render it only turbid. Volatile spirits heighten the colour, and incline it to red. Fixed alkaline salts have this effect in a greater degree. Mr. Model affirms that a considerable quantity of selenites is contained in rhubarb. In one experiment he obtained six ounces of selenites from four pounds of rhubarb; and in the other, no less than an ounce of selenites from two ounces and five drachms of old rhubarb. Rozier's Journal for July, 1775.

Rhubarb is a mild cathartic, and commonly considered as one of the safest and most innocent of the substances of this class. Besides its purgative virtue, it has a mild astringent one, discoverable by the taste, and by its striking an inky blackness with chalybeate solutions: hence it is found to strengthen the tone of the stomach and intestines, to leave the belly costive, and to be one of the most useful purgatives in diarrhœas, dysenteries, and all disorders proceeding from a debility and laxity of the fibres: it is frequently given with a view to this stomachic and corroborating virtue, rather than to its producing any considerable evacuations. It tinges the urine of a high yellow colour. Rhubarb in substance purges more effectually than any preparation of it: the dose is from a scruple to a drachm. From ℈j to ʒß of the powdered root opens the bowels freely; and from grs. vi to grs. x may be given for a dose, when its stomachic properties only are required. By roasting it with a gentle heat, till it becomes easily friable, its cathartic power is diminished, and its astringency supposed to be increased. The purgative virtue of rhubarb is extracted more perfectly by water than by rectified spirit; the root remaining after the action of water is almost, if not wholly, inactive; whereas, after repeated digestion in spirit, it proves still very considerably purgative: when the rhubarb has given out to spirit all that this menstruum can extract, it still imparts a deep colour, as well as a purgative impregnation, to water. A drachm of the extract, formed by inspissating the watery infusion, is not more efficacious than a scruple of the root in substance; but half a drachm of the extract, formed from the spirituous tincture, proves moderately purgative, though scarcely more so than an equal quantity of the powder. The spirituous extract dissolves almost wholly in water; and hence the tincture, like the spirituous infusions of most other vegetables, does not turn milky on being mixed with aqueous liquors: of the watery extracts scarce above one-fourth is dissolved by rectified spirit, and the part that does not dissolve proves more purgative than that which does. Hence it appears, that rhubarb contains much more gummy or mucilaginous than resinous matter; and its purgative quality seems to reside chiefly in a combination of gummy and saline matter.

"The qualities of this root," says Dr. Cullen (Mat. Med. vol. ii.), "are that of a gentle purgative, and so gentle that it is often inconvenient by reason of the bulk of the dose required, which in adults must be from half a drachm to a drachm. When given in a large dose, it will occasion some griping, as other purgatives do; but it is hardly ever heating to the system, or shews the other effects of the more drastic purgatives. The purgative quality is accompanied with a bitterness, which is often useful in restoring the tone of the stomach, when it has been lost; and for the most part, its bitterness makes it fit better on the stomach than many other purgatives do. Its operation joins well with that of neutral laxatives; and both together operate in a lesser dose than either of them would do singly.

"Some degree of stipticity is always evident in this medicine; and as this quality acts when that of the purgative has ceased, so in cases of diarrhœa, when any evacuation is proper, rhubarb has been considered as the most proper means to be employed. I must, however, remark here, that in many cases of diarrhœa, no further evacuation than what is occasioned by the disease is necessary or proper. The use of rhubarb in substance for keeping the belly regular, for which it is frequently employed, is by no means proper, as the astringent quality is ready to undo what the purgative had done; but I have found that the purpose mentioned may be obtained by it, if the rhubarb is chewed in the mouth, and no more is swallowed than what the saliva has dissolved. And I must remark, in this way employed it is very useful to dyspeptic persons. Analogous to this is the use of rhubarb in a solution, in which it appears to me that the astringent quality is not so largely extracted as to operate so powerfully, as when the rhubarb was employed in substance."

The operation of rhubarb is quickened by the addition of neutral salts and calomel, the purgative powers of which it also reciprocally augments; so that a compound, formed of small portions of rhubarb and a neutral salt or calomel, acts with more certainty, and quicker, than large doses of either separately taken. Rhubarb is particularly adapted for the greater number of cases of diarrhœa, as it evacuates any acrid matter that may be offending the bowels, before it acts as an astringent. As a stomachic and astringent, it is usefully given in dyspepsia, hypochondriasis, and in a weakened relaxed state of the bowels, combined with ginger, nutmeg, soda, or bitters. Externally its powder is sometimes sprinkled over ulcers, to assist their granulation and healing.

Its officinal preparations are as follow: *viz. Infusum rhei*, Lond. Pharm., infusion of rhubarb, prepared by macerating for two hours a drachm of rhubarb root, sliced, with half a pint of boiling water, in a lightly covered vessel, and straining it.

Infusum rhei palmati, Edinb. Pharm., infusion of rhubarb, prepared by macerating half an ounce of bruised rhubarb root with eight ounces of boiling water, in a covered vessel, for twelve hours, and then adding one ounce of spirit of cinnamon, and straining it. These infusions differ chiefly in their strength; but that of the Edinburgh dispensatory is rendered pleasanter by the addition of the spirit. The colour of both is a reddish-brown, much deepened by the addition of alkalies. The following substances either occasion precipitation,

precipitation, or alter the properties of this infusion, and are therefore incompatible in formulæ with it: *viz.* the strong acids and lime-water, solution of sulphate of iron, sulphate of zinc, nitrate of silver, oxymuriate of mercury, superacetate of lead, and tartarized antimony; infusions of catechu, cinchona, and cusparia.

These infusions are the best form in which rhubarb can be given, when they are intended for acting on the bowels. The dose of the former may be from f ℥ j to f ℥ iv, and of the latter half the quantity, united with neutral salts or aromatics, as circumstances may direct.

Extractum rhei, Lond. Pharm., extract of rhubarb, is obtained by macerating for four days, in a gentle heat, a pound of bruised rhubarb root, with a pint of proof spirit, and seven pints of water; then straining the solution, and setting it apart that the feculencies may subside. Pour off the clear liquor, and evaporate it to a proper consistence. The virtues of rhubarb are impaired during this process of inspissation, and the simple infusion is preferable. The dose is from grs. x to ʒ ß, given in the form of pills, or dissolved in peppermint water.

Tinctura rhei, Lond., tincture of rhubarb, is prepared by macerating for fourteen days two ounces of rhubarb root sliced, half an ounce of cardamom seeds bruised, two drachms of saffron, in two pints of proof spirit, and filtering. The Dublin pharmacopeia directs to take of rhubarb root sliced, two ounces; lesser cardamom seeds husked and bruised, and liquorice bruised, of each half an ounce; saffron, two drachms; and proof spirit, two pints: to digest for seven days, and then filter.

Tincture rhei palmati, Edinb., tincture of rhubarb, is prepared by digesting for seven days three ounces of rhubarb root sliced, half an ounce of lesser cardamom seeds bruised, in two pounds and a half of proof spirit, and filtering through paper.

Tinctura rhei composita, Lond., compound tincture of rhubarb, is prepared by macerating for fourteen days two ounces of rhubarb root sliced, half an ounce of liquorice root bruised, ginger root sliced, and saffron, of each two drachms, in a pint of water, and twelve fluid ounces of proof spirit, and then filtering.

Tinctura rhei et aloes, tincture of rhubarb and aloes, formerly *elixir sacrum*, or sacred elixir, Edinb., is prepared by digesting for seven days ten drachms of rhubarb root sliced, six drachms of soccotorine aloes powdered, half an ounce of lesser cardamom seeds bruised, in two pounds and a half of proof spirit, and filtering through paper.

Tinctura rhei et gentianæ, tincture of rhubarb and gentian, Edinb., formerly *tinctura rhei amara*, or bitter tincture of rhubarb, is obtained by digesting for seven days two ounces of rhubarb root sliced, half an ounce of gentian root sliced, in two pounds and a half of proof spirit, and filtering through paper.

All these tinctures of rhubarb are purgative and stomachic; but they are not generally used in the first intention, on account of the strength of the menstruum, and are therefore more usually employed as adjuncts to saline purgatives, for giving them warmth, and to stomachic infusions in dyspepsia, flatulent colic, diarrhœa, the costiveness of old people, and of cold phlegmatic habits. The dose for operating as a purgative is f ʒ vj, and from f ʒ j to f ʒ iij for producing their stomachic effects.

Pilulæ rhei compositæ, Edinb., compound rhubarb pills. See PILLS.

Vinum rhei palmati, Edinb., wine of rhubarb, is prepared by macerating for seven days two ounces of rhubarb root sliced, a drachm of canella bark bruised, in two ounces of proof spirit, and fifteen ounces of Spanish white wine, and filtering through paper. This wine, when newly prepared, has the same properties, and may be applied to the same uses, as the tincture; but it is liable to undergo decomposition. The dose is from f ℥ ß to f ℥ j, or more. Rhubarb is also an ingredient in a variety of compositions. Woodv. Med. Bot. Thomson's Lond. Disp.

The Indian rhubarb sown in our gardens has this peculiar property, that it yields a fine and clear gum. This is perfectly white and pellucid, and in the months of June and July is so plentiful, that an ounce may sometimes be gathered at a time from one plant of it. It exudates of itself from all parts of the stalks and ribs of the leaves, and sometimes from the under part of the leaves themselves. It stands in some places in large drops, and in others the stalks, &c. seem only to be covered with a thin layer of it; and the under part of the leaves in some have it in form of twisted wires or long icicles. The plant may always be seen wounded by a sort of caustic in the places where the germen makes its way out, and these may be followed with any pointed instrument through the skin. In some parts of the plant this juice is found to be turned gummy within it, and looks like clear ice. As this is the only known herbaceous plant that yields a true gum like that of trees, it would be worthy of observation, whether or not some of our own plants have some tendency of nature to form a juice of the same kind. It would be most proper to look for this in the plants of the same genus, and as nearly related to the rhubarb as we can. The docks, so common about our fields, are of the same genus; and the sorrel shews, by its taste, that it is particularly allied to the plant; for both are alike of the dock kind, and both alike sour. It would be proper to look carefully about the leaves of sorrel a little before it flowers, to see whether any thing like the same gum appears on it.

There is yet this farther analogy between this rhubarb and our common sorrel; that the husks of our sorrel, boiled in water, with a little alum, turn it to a fine red colour; and the husks of rhubarb do the same, and both the one and the other often turn red in decaying.

The juice of the roots of this rhubarb, extracted by bruising and steeping it in common water, when the liquor is strained and evaporated, becomes only a clear uninflammable gum, and melts in the flame of a candle. This gum, as well as that of the stalks and leaves, is of an insipid taste; and it is observable, that though the plant naturally yields it in so large a quantity, yet it will not flow from wounds made by art in any part of the plant. Upon the consideration of the insipid taste of this gum, and its solubility in water, we may found some probable conjecture, in regard to the different virtues of this plant in purging and binding.

The woody fibres have a strong taste; and, in all probability, are alone endued with the astringent quality. An infusion of rhubarb is said to purge, and a powder of it to bind: the reason is easily seen on this consideration. The water in infusion takes up all this gummy juice, and its other juices, but leaves the fibrose part behind, in consequence of which, it ought to purge without binding; but in case of giving the powder, the juices are in great part evaporated in the drying, and the woody part left almost alone; it therefore purges but little, and proves powerfully astringent. Phil. Transf. N° 224.

RHUBARB, in *Agriculture*, a plant of the thick, fleshy, tap-rooted, perennial kind, that may in some cases be probably cultivated in the field with advantage. There are two sorts, the *common*, and the *palmated* or true kind. In the first the root strikes to a great depth, and is thick and branching, having

having roundiſh ſmooth heart-ſhaped leaves, and an upright ſtrong ſtem, three feet in height; while, in the latter, the root is thick and fleſhy, and the leaves large and palmated, having the ſtem five, ſix, or more feet in height. Beſides the uſe of the roots as a drug, parts of the young ſtalks of the plants, as well as of the leaves, may be made uſe of, when cut, peeled, and prepared in the ſpring ſeaſon, as an article of food.

This plant is uſually raiſed by ſowing the well ripened ſeed in the autumn or early ſpring ſeaſons, as about September, or in February, on beds of rich, deep, well-manured earth, either in the drill or broadcaſt manner: the plants being afterwards kept clean from weeds, and properly thinned. But the autumn is ſaid to be the better, as the plants are more ſtrong for planting in the ſpring. When the plants have attained four or five inches in growth, they ſhould be planted out on hills, made at the diſtance of four feet, by digging out the earth to the depth of three feet, and filling in with well-rotten manure, and the mould taken out, ſo as to raiſe the plants a little above the natural ſurface of the land. Some, however, direct that a deep, rich, well prepared ſoil, that is neither too moiſt nor too dry, ſhould be choſen for this ſort of culture, the ſeeds being ſown upon it in the early autumn, ſo as to remain without tranſplanting, as by this means the plants ſuffer no check in their growth, and the roots become larger and more fair. The plants, in both modes, muſt be conſtantly kept clean and free from all ſorts of weeds, and in the latter they ſhould be ſet out in the different hoeings to the diſtance of ſix or eight inches at firſt, and afterwards to two or three feet, or more. When the leaves and ſtems decay in the autumn, the ground ſhould be well cleaned; and in the ſpring, on the plants protruding, be dug well, or hoed between them. In the third year the roots will, in moſt caſes, be in a ſtate to be taken up for uſe.

Another method has been ſuggeſted for raiſing theſe plants, as being more eaſy, ſecure, and expeditious, which is by planting the off-ſets, eyes, or buds, ſeparated from the upper parts of the roots, with a ſmall proportion of the old root, having ſome root fibres to them; theſe may be taken from the old roots of three or four years' growth. In this way a year is ſaved, and the plants leſs expoſed to danger from ſlugs, as well as more certain in growing, leſs tender, and the ſize of the roots equal. In Mr. Hayward's practice in this mode, the off-ſets were ſlipped from the heads of large plants in the ſpring, and ſet, by means of a dibble, at the diſtance of about a foot. And on further experience, when he took up his roots in the ſpring or autumn, he divided the head into many parts, which he planted directly at two feet diſtance, where intended for further removal, but if to remain for a crop, at four feet and a half.

It may be noticed, that in the culture of this root, a gentle declivity is the beſt ſituation; it ſhould not be too much ſhaded, either on the ſouth or weſt. But it is eſſential that there be a great depth and richneſs of ſoil, which is beſt when of the light loamy kind, and perfectly free from any ſtagnation of moiſture. Where the ſituation is flat, the land is beſt raiſed into ridges or beds, with deep furrows or trenches between them.

And when the ſeed-ſtems are removed in the autumn, the crowns of the plants ſhould be well covered over with mould, ſo as to form a ſort of hillock, as by this means the moiſture will be more effectually kept from the plants.

But where the tranſplanting method is practiſed, it is adviſed that great care ſhould be taken that the nurſery beds are well watered, and protected from inſects, as the ſtronger the plants are here, the better they ſucceed afterwards. In forming plantations, and filling up vacancies in them, the fineſt and moſt healthy plants are always to be made uſe of. Where the chief bud is deſtroyed, they never anſwer well.

The particular injuries to which theſe young plants are expoſed, are the attacks of ſlugs and inſects, and too much expoſure to froſt in their more early growth; but afterwards they are ſufficiently hardy.

In general the roots are proper for being taken up about the third or fourth year, or as ſoon as the plants have flowered perfectly. And the autumn is the beſt ſeaſon for the purpoſe, when the ſtems decay, when they ſhould be well dried, cleaned, and cut into thin pieces, ſtringing them upon packthread, and hanging them up to dry in a gradual manner.

It has been obſerved by the writer of the Perthſhire Agricultural Report, that it is ſurpriſing the culture of rhubarb has not claimed more attention, and been adopted on a more extenſive ſcale, as it is calculated to bring large profits.

The palmated rhubarb has been cultivated in Suſſex by the earl of Egremont, for medicinal purpoſes, who has it dried and cured in as good order and preſervation as any imported from abroad. It is taken out of the ground in autumn, after ſtanding ſeven or eight years, and then waſhed clean, and dried, either in the ſun, or on the flue of a hothouſe, after being cut into thin pieces. In uſing it, no difference is found between it and the foreign, and great ſaving might be made in this way in the importation of the article.

Rhubarb, *Monk's*, is a ſpecies of dock. See Rumex.

The root of this plant is more aſtringent than rhubarb, but is much inferior in its purgative virtue, though given, as uſually directed, in double its doſe; nauſeating the ſtomach, without producing any conſiderable evacuation. It communicates a deep yellow tincture, both to water and ſpirit. Lewis.

Rhubarb, *White*. See Mechoacan.

RHUBRA, in *Ancient Geography*, a town ſituated on the ſouthern coaſt of the iſland of Corſica, between the port of Syracuſe and the promontory Graniacum. Ptolemy.

RHUBRICATA, a town of Hiſpania, in the Tarragoneſe, in the country of the Lacetanians. Ptolemy.

RHUBUNA, a town of Africa, on the northern bank of the river Gira, between Artagira and Lynxama. Ptolemy.

RHUDA, a town of Aſia, in Parthia, between Paſacarta and Simpſimida. Ptolemy.

RHUDDLAN, or Rhyddlan, in *Geography*, a borough town in the cwmwd of Rhuddlan, cantref of Tegeing (now called the hundred of Rhuddlan), county of Flint, North Wales, is ſituated on the eaſtern bank of the river Clwyd, at the diſtance of five miles N. from the city of St. Aſaph, and 215 miles N.W. from London. It is a town of great antiquity, and, as appears from tradition, and likewiſe from the remains of its caſtle, was a place of conſiderable importance in early times. A large common in the immediate vicinity was the theatre of a dreadful battle fought between the Welſh, under prince Caradoc, and the Saxons, commanded by Offa, king of Mercia. In this action the Welſh were defeated, and their leader ſlain; and to add to their misfortunes, Offa put to death all the men and children who fell into his hands, but ſpared the women. The memory of the above tragical occurrence is commemorated in a ballad called "Morfa Rhuddlan," the air of which is characteriſed by Pennant as being "moſt tenderly plaintive." This town was conſtituted a free borough by king

Edward I., who held a parliament here in 1284, when the ſtatute of Rhuddlan was paſſed. At a private houſe is ſtill ſhewn a "Gothic window," which is ſaid to have been part of the building uſed on the occaſion of theſe parliamentary meetings. Another houſe is alſo pointed out as having been honoured by the reſidence of the monarch himſelf during his ſtay at Rhuddlan, but it is more likely that he occupied the caſtle; and certain it is, that queen Eleanor's accouchment of a daughter occurred there in 1283. A copy of the roll of the king's expences, while at Rhuddlan, is printed in the Archæologia, and exhibits ſeveral intereſting and curious particulars relative to the prices of proviſions and labour at that early period. Rhuddlan caſtle is built of a reddiſh free-ſtone, and is nearly ſquare in form. At two of the oppoſing corners were formerly two towers, though the other corners had only one each. Of theſe, the three on the north-weſt ſide of the fortreſs are tolerably entire, but the remainder is much diſlapidated. By whom this caſtle was originally built is uncertain; ſome writers attributing it to Llewellin-ap-Sitſyllt, about the commencement of the 11th century, and others to Robert de Rodelent, who lived towards the cloſe of the ſame century. Be this as it may, however, it was deſtroyed by Gruffydd-ap-Crinan in the reign of Henry II., and was ſubſequently re-erected and fortified by that monarch. In 1399 it was ſeized and garriſoned by the earl of Northumberland, previous to the depoſition of the unfortunate king Richard II., who dined here on his way to Flint caſtle. During the civil wars between king Charles I. and his parliament, Rhuddlan caſtle was at firſt occupied by the royaliſts, but, after a ſhort ſiege, the garriſon were forced to ſurrender to the parliamentary troops, commanded by general Mytton. This event happened in July 1646, and in the following December, the fortreſs was diſmantled by order of parliament. It was ſurrounded by a deep ditch, and had an additional one on the north ſide: both of theſe ditches are ſtill remaining. The walls are very ſtrong, and well calculated for defence. South from the caſtle is a fortification, commonly ſuppoſed to have been conſtructed by the parliamentary troops as a battery during the ſiege above-mentioned; but though it may have been uſed for that purpoſe, it is doubtleſs of much higher antiquity. Near this ſpot formerly ſtood a houſe of Black friars, which muſt have been founded previous to 1268, as it is recorded, that in that year, Anian de Schonan, one of its priors, was made biſhop of St. Aſaph. It ſuffered greatly in the wars between king Edward I., and prince Llewellin ab Gruffydd; but it recovered and ſubſiſted till the reign of Henry VIII. when it was diſſolved, and its buildings granted to Henry ap Harry. Tanner ſtates that there was another religious houſe in the immediate vicinity of Rhuddlan, as old as the year 1281, but no traces of its ſcite can now be diſcovered.

Edward I., in his charter conſtituting Rhuddlan a borough, appointed the conſtable of the caſtle mayor, and ordered that two bailiffs ſhould be choſen annually, as his aſſiſtants, from among the burgeſſes. Since the time of Oliver Cromwell, there having been no conſtable, there has conſequently been no mayor, ſo that the bailiffs are now the chief officers of the town. The burgeſſes contribute towards the new election of a repreſentative in parliament for the borough of Flint. The voters muſt either inhabit the town itſelf, or that part of the pariſh called Rhuddlan Franchiſe, which extends to the diſtance of a mile. At preſent no regular market is held here, but there are fairs for cattle on the 2d of February, 25th of March, and the 8th of September. The pariſh, according to the parliamentary returns of 1811, contains 131 houſes, and 831 inhabitants.

The river Clwyd, upon which Rhuddlan is ſituated, is only navigable for veſſels of about twenty tons burden as high up as the town; but about two miles below it is a port, into which veſſels of conſiderable magnitude can enter and remain with ſecurity. Carliſle's Topographical Dictionary of Wales, 4to. 1813. Pennant's Tour in Wales, 1770, Lond. 2 vols. 4to. 1778.

RHUDEN, or Ruthen, a town of Germany, in the duchy of Weſtphalia; 64 miles E. of Duſſeldorp.

RHUDIANA, in *Ancient Geography*, a country of Aſia, in Carmania. Ptolemy.

RHULA, in *Geography*, a town of Saxony, in the principality of Eiſenach, famous for its manufacture of knives; four miles S.S.E. of Eiſenach.

RHUMB, Rumb, or *Rum*, in *Navigation*, a vertical circle of any given place; or the interſection of a part of ſuch a circle with the horizon.

Rhumbs, therefore, coincide with *points* of the world, or of the horizon.

And hence the mariners diſtinguiſh the rhumbs by the ſame names as the points and winds. But we may obſerve, that the rhumbs are denominated from the points of the compaſs in a different manner from the winds: thus, at ſea, the north-eaſt wind is that which blows from the north-eaſt point of the horizon towards the ſhip in which we are; but we are ſaid to ſail upon the north-eaſt rhumb, when we go towards the north-eaſt.

They uſually reckon 32 rhumbs, which are repreſented by the 32 lines in the roſe, or card, of the compaſs.

Aubin defines a rhumb to be a line on the terreſtrial globe, ſea-compaſs, or ſea-chart, repreſenting one of the 32 winds which ſerve to conduct a veſſel. So that the rhumb a veſſel purſues is conceived as its route, or courſe.

Rhumbs are divided and ſubdivided like points. Thus, the whole rhumb anſwers to the cardinal point. The half rhumb to a collateral point, or makes an angle of 45° with the former. The quarter rhumb makes an angle of 22° 30′ with it. And the half-quarter rhumb makes an angle of 11° 15′.

Sometimes navigators divide the 32 points into four quarters, and call the rhumb next the eaſt the firſt rhumb, the next to that the ſecond rhumb, &c.

For a table of the rhumbs, or points, and their diſtances from the meridian, ſee Wind.

Rhumb-*Line*, *Loxodromia*, is a line prolonged from any point of the compaſs in a nautical chart, except the four cardinal points; or it is the line which a ſhip, keeping in the ſame collateral point, or rhumb, deſcribes throughout its whole courſe. See Loxodromy.

The great property of the rhumb-line, or loxodromia, and that from which ſome authors define it, is, that it cuts all the meridians under the ſame angle.

This angle is called the *angle of the rhumb*, or the loxodromic angle.

The angle which the rhumb-line makes with any parallel to the equator, is called the *complement of the rhumb*.

An idea of the origin and properties of the rhumb-line, the great foundation of navigation, may be conceived thus: a veſſel beginning its courſe, the wind with which it is driven makes a certain angle with the meridian of the place; and as it is ſuppoſed, the veſſel runs exactly in the direction of the wind, it makes the ſame angle with the meridian which the wind makes.

Suppoſing then the wind to continue the ſame, as each point

point or inſtant of the progreſs may be eſteemed the beginning, the veſſel always makes the ſame angle with the meridian of the place where it is each moment, or in each point of its courſe, which the wind makes.

Now a wind, *e. gr.* that is north-eaſt, and which, of conſequence, makes an angle of 45° with the meridian, is equally north-eaſt, wherever it blows, and makes the ſame angle of 45° with all the meridians it meets. A veſſel, therefore, driven by the ſame wind, always makes the ſame angle with all the meridians it meets with on the ſurface of the earth.

If the veſſel ſail north and ſouth, it makes an angle infinitely acute with the meridian, *i. e.* it is parallel to it; or rather ſails in it. If it run eaſt and weſt, it cuts all the meridians at right angles.

In the firſt caſe, it deſcribes a great circle; in the ſecond, either a great circle, *viz.* the equator, or parallel to it. If its courſe be between the two, it does not then deſcribe a circle; ſince a circle, drawn in ſuch a manner, would cut all the meridians at unequal angles, which the veſſel cannot do.

It deſcribes, therefore, another curve, the eſſential property of which is, that it cuts all the meridians under the ſame angle. This curve is what we call the *loxodromic curve*, *rhumb-line*, or *loxodromy*.

It is a kind of ſpiral, which, like the logarithmic ſpiral, makes an infinity of circumvolutions without ever arriving at a certain point, to which it yet ſtill tends, and towards which it approaches at every ſtep.

This aſymptotic point of the rhumb-line is the pole: at which, were it poſſible for it to arrive, it would find all the meridians conjoined, and be loſt in them.

The courſe of a veſſel then, except in the two firſt caſes, is always a rhumb-line; which line is the hypothenuſe of a right-angled-triangle, whoſe two other ſides are the ſhip's way or diſtance run in longitude and latitude. Now, the latitude is uſually had by obſervation, and the angle of the rhumb, with one or other of the two ſides, by the compaſs. See LATITUDE, and COMPASS.

All, therefore, that is required by calculation in ſailing, is the value of the length of the rhumb-line, or the diſtance run.

But as ſuch curve line would prove very perplexing in the calculation, it was neceſſary to have the ſhip's way in a right line; which right line, however, muſt have the eſſential porperty of the curve line, *viz.* to cut all the meridians at right angles. See CHART.

If P A, P F, P G, &c. (*Plate* II. *Navigation*, *fig.* 5.) be ſuppoſed meridians, A I the equator, and E B, K L, M N, parallels; A O will repreſent a rhumb-line, which makes equal angles with the meridians, and conſequently different from thoſe made by a great circle, which cuts the meridians at unequal angles; whence it follows that the rhumb is not a great circle of the ſphere. If a ſhip, therefore, be at firſt directed towards E, and conſtantly perſiſt in the ſame rhumb, it will never arrive at the place E, but at the place O, which is farther from the equator A I.

Hence, as on the ſurface of a ſphere the ſhorteſt way between A and O is an arc of a great circle between A and O; the rhumb-line is not the ſhorteſt way, or leaſt diſtance from one place to another.

RHUMB-*Lines*, *Uſe of the*. 1. If the meridians P A, P B, P C, P D, &c. (*fig.* 6.) be not very far apart, the rhumb-line A I H G is divided by the equidiſtant parallels L E, M F, N G, &c. into equal parts.

Hence, 1. The parts of the rhumb A I and A G are as the latitudes A L and A N of the places A and G. 2. Since the arcs A B, I K, H F, are equal in magnitude, and therefore unequal in number of degrees; the ſum of the arcs, called the *latus mecodynamicum*, or *miles of longitude*, is not equal to the difference of longitude A D of the places A and G.

2. The length of the rhumb-line A G is to the change or difference of latitude G D, in the ſame ratio as the whole ſine to the co-ſine of the angle of the rhumb.

Hence, 1. The rhumb ſailed on being given, together with the difference or change of latitude, turned into miles, the length of the rhumb-line, or the diſtance from the place A to the place G upon the ſame rhumb, is had by the rule of three. 2. The rhumb being given, together with the quantity of the ſhip's way on the ſame rhumb, *i. e.* the length of the rhumb A G; the difference of latitude D G is had, by the rule of three, in miles, to be converted into degrees of a great circle. 3. The difference of latitude D G being given in miles, as alſo the length of the rhumb-line A G, the angle of the rhumb, and conſequently the rhumb ſailed on, is had by the rule of three. 4. Since the co-ſine of an angle is to the whole ſine, as the whole ſine to the ſecant of the ſame angle; the difference of latitude G D is to the length of the rhumb-line A G, as the whole ſine to the ſecant of the angle of the rhumb.

3. The length of the rhumb-line, or of the ſhip's way in the ſame rhumb, A G, is to the latus mecodynamicum or mecodymanic ſide A B + I K + H F, as the whole ſine to the ſine of the loxodromic angle G A P.

Hence, 1. The rhumb, or angle of the rhumb, being given; as alſo the ſhip's way in the ſame rhumb-line A G, the mecodynamic ſide is had, by the rule of three, in miles, *i. e.* in the ſame meaſure in which the length of the rhumb is given. 2. In like manner, the mecodynamic ſide A B + I K + H F being given, as alſo the rhumb-line or ſhip's way A G, the rhumb ſailed is found by the rule of three.

4. The change of latitude G D is to the mecodynamic ſide A B + I K + H F; as the whole ſine to the tangent of the loxodromic angle P A G or A I B.

Hence the rhumb or loxodromic angle P A G, and the change of latitude G D being given, the mecodynamic ſide is found by the rule of three.

5. The mecodynamic ſide A B + I K + H F is a mean proportional between the aggregate of the rhumb A G, and the change of latitude G D, and their difference.

Hence the change of latitude G D, and the rhumb-line A G being given in miles, the mecodynamic ſide is found in the ſame meaſure.

6. The mecodynamic ſide A B + I K + H F being given, to find the longitude A D.

Multiply the change or difference of latitude G D by ſix, which reduces it into parts of ten minutes each; divide the mecodynamic ſide by this product, and the quotient gives the miles of longitude, anſwering to the difference of latitude in ten minutes; reduce theſe miles of longitude in each parallel into differences of longitude from a loxodromic table, and the ſum of theſe is the longitude required.

7. If a ſhip ſail on a north or a ſouth rhumb, it deſcribes a meridian; if on an eaſt or weſt rhumb, it deſcribes either the equinoctial, or a parallel to it. Wolfii Elem. Math. tom. iv. cap. 11.

1. *To find the rhumb between two places by calculation, or geometrically*, we have two canons, or proportions: the firſt, as the radius is to the co-ſine of the middle latitude, ſo is the difference of longitude to the whole departure from the meridian, in the courſe between the two places propoſed.

The second, as the radius is to the half sum of the co-sines of both latitudes, or (rather for geometrical schemes) as the diameter is to the sum of the co-sines of both latitudes, so is the difference of longitude to the departure from the meridian. For the application of these principles, see SAILING.

RHUN, PULO, in *Geography*. See POOLARON.

RHUNE, a river which rises in the New Forest, and runs into the Seine; two miles N.W. of Nordheim.

RHUS, in *Botany*, an ancient name, ῥοῦς, or ῥοῦς, of the Greeks, generally supposed of doubtful etymology. De Theis deduces this, and many similar words, which have a reference to a red colour, from the Celtic *rhudd* or *rub*, red. Hence, according to him, we have not only *Rubia*, but *Rosa*. The fruit of the original ῥοῦς of Dioscorides, *Rhus Coriaria*, well justifies this explanation.—Linn. Gen. 146. Schreb. 197. Willd. Sp. Pl. v. 1. 1477. Mart. Mill. Dict. v. 4. Sm. Prodr. Fl. Græc Sibth. v. 1. 206. Pursh 204. Ait. Hort. Kew. v. 2. 161. Juss. 369. Lamarck Illustr. t. 207. Gærtn. t. 44.—Class and order, *Pentandria Trigynia*. Nat. Ord. *Dumosæ?* Linn. *Terebintaceæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, erect, permanent segments. *Cor.* Petals five, ovate, moderately spreading. *Stam.* Filaments five, very short; anthers small, shorter than the corolla. *Pist.* Germen superior, roundish, as large as the corolla; styles scarcely any; stigmas three, heart-shaped, small. *Peric.* Berry roundish, of one cell. *Seed* solitary, roundish, bony.

Obs. Some species have dioecious flowers.

Ess. Ch. Calyx in five deep segments. Petals five. Berry superior, with one seed.

An extensive shrubby or arborescent genus, whose species are found in North America, Japan, China, the Cape of Good Hope, and a few in the south of Europe. Their qualities are of a caustic nature, in certain instances highly virulent, whence some species have acquired the name of Poison-trees. Others are celebrated for producing valuable resins for varnish. Willdenow has collected together the characters of thirty-three species; but many of them he had not seen, particularly those found by Thunberg at the Cape. The genus is divided into three sections, by the structure of the leaves, of which we shall give a few examples. Pursh has two species not in Willdenow. Twenty-one are cultivated in the English gardens. *Aiton.*

Section 1. *Leaves pinnate.* Thirteen species, to which the two described by Pursh are to be added; see hereafter.

R. *Coriaria.* Elm-leaved Sumach. Linn. Sp. Pl. 379. Willd. n. 1. Ait. n. 1. Sm. Fl. Græc. Sibth. t. 290, unpublished. Woodv. Med. Bot. t. 261. Ger. Em. 1474. (Rhus; Matth. Valgr. v. 1. 195.)—Leaves pinnate; leaflets oval, bluntly serrated, downy beneath; their common stalk winged in the upper part.—Native of the Levant. Frequent in our gardens and shrubberies, ever since the days of Gerarde, (though less common than the American *R. typhinum*,) flowering in July, and retaining its dense, branched, ample, upright *clusters*, of deep-red, rough, coriaceous *berries*, even till winter, after the leaves are fallen. The tree is of a dwarf bushy habit, with spreading, ascending, round, downy branches, of a soft spongy texture. *Leaves* from eight inches to a foot long, of about five pair of leaflets, with an odd one; paler, downy, and veiny beneath. *Flowers* greenish, each with a large hoary *germen*, which becomes a globular, crimson, hairy *berry*, the size of an Elder-berry. The taste of this fruit is very acid and astringent. It has been used in Greece, from the most remote antiquity, for tanning leather; as have also the leaves, to the present day. Both have likewise been employed in medicine, either for their tonic or cooling qualities, nor do they appear to possess any of the dangerous qualities for which some species of this genus are remarkable. Dr. Woodville's figure of this plant ought to have been quoted in Hort. Kew. as not cited by Willdenow, and being moreover an English publication.

R. *javanicum.* Java Sumach. Linn. Sp. Pl. 380. Willd. n. 3. Ait. n. 3. Thunb. Jap. 121.—Leaves pinnate, ovate, pointed, serrated; very downy and soft beneath.—Native of Japan, flowering in September. Introduced into the stoves at Kew, by sir Joseph Banks, in 1799. The *branches*, and all the *stalks*, as well as the backs of the *leaves*, are clothed with extremely soft, dense, velvet-like pubescence, as is the upper side of the foliage in some degree. Each *leaf* has three pair, with an odd one, of stalked, ovate, taper-pointed leaflets, strongly serrated, and about an inch and a half long. *Flowers* very small, in long, slender, lax, simple, axillary clusters.

R. *glabrum.* Smooth Sumach. Linn. Sp. Pl. 380. Willd. n. 4. Ait. n. 4. Pursh n. 2. Kalm's Travels, v. 1. 66. 75. (R. virginicum, paniculâ sparsâ, ramis patulis glabris; Dill. Elth. 323. t. 243. f. 314.)—Leaves numerously pinnate, lanceolate, serrated, smooth on both sides; glaucous beneath.—Common in North America, flowering in July and August, nor is it rare in our shrubberies. Kalm says that neglected corn-fields are soon overrun with this tree, whose roots subsequently render ploughing the ground very difficult. The *leaves* consist of from eight to twelve pair of longish taper-pointed leaflets, smooth and naked on both sides. The *fruit* much resembles the first species in colour and mode of growth, but is less hispid. According to Mr. Pursh, the *R. elegans*, Ait. Hort. Kew. n. 5. Willd. n. 5, is only a variety of this, with dioecious *flowers*, and a more scarlet-coloured *fruit*.

R. *viridiflorum.* Green-flowered Sumach. Lamarck Dict. v. 7. 504. Pursh n. 3. (R. canadense; Mill. Dict. ed. 8. n. 5.)—Leaves numerously pinnate, ovato-lanceolate, serrated; glaucous, and somewhat downy beneath. Clusters erect.—On the edges of woods in dry sunny situations, in Pennsylvania and Virginia, flowering in July and August. This is one of the species added by Mr. Pursh, after Poiret in Lamarck, but not without a doubt of its being distinct from the last. We can find no important difference in a specimen from the French gardens, except that the *leaflets* are rather more ovate. The *flowers* are yellowish-green. *Leaves* not always downy.

R. *pumilum.* Dwarf Poison Sumach. Michaux Boreal-Amer. v. 1. 182. Pursh n. 4.—Leaves numerously pinnate, oval, scarcely pointed, deeply toothed; downy beneath. Branches and footstalks downy. Fruit clothed with velvet down.—Native of Upper Carolina, flowering in July. The *stem* is not above a foot high. This species is unknown in our gardens. Mr. I. Lyon, who gathered it, assured Mr. Pursh, that it was the most poisonous of the genus, he having been "poisoned all over his body, and lamed for a considerable time," in consequence of collecting the seed.

R. *Vernix.* Varnish Sumach. Linn. Sp. Pl. 380. Willd. n. 6. Ait. n. 6. Pursh n. 5. Kalm's Travels, v. 1. 68. 77. (Toxicodendron, foliis alatis, fructu rhomboide; Dill. Elth. 390. t. 292. f. 377.)—Leaves pinnate, very smooth, as well as the branches; leaflets elliptical, entire, somewhat abrupt, pointed. Clusters compound, lax. Flowers dioecious. Fruit polished.—Found in low copses, from Canada to Carolina, flowering in July. *Pursh.* It has been in our

our gardens for a century paſt, but is not common. Kalm ſpeaks of its dangerous effects, to various perſons, whoſe ſkin, and whole body, in ſome caſes, are affected with inflammation, ſwelling and pain, in conſequence of their touching any part of this tree, or expoſing themſelves to its effluvia; whilſt others, even of the ſame family, can cut or handle it with impunity. Kalm himſelf was generally unhurt by this poiſon, but on one occaſion he did not entirely eſcape its effects. The whole *tree* is very ſmooth. *Leaflets* about ſix pair with an odd one. *Berries* the ſize of a pea, white and remarkably poliſhed, both in a freſh and dry ſtate. Miller contended that this was the ſame with the true Varniſh-tree of Japan, deſcribed in Kæmpfer's Am. Exot. 791. t. 792; which opinion was combatted by Ellis, in the Philoſophical Tranſactions, n. 112. We believe the latter to be in the right. The two trees, indeed, ſeem very nearly akin, but the *leaflets* in Kæmpfer's plate are broader than thoſe of the American plant, nor does his deſcription of the fruit exactly anſwer. Yet Thunberg calls the Japaneſe plant *Rhus Vernix*. Nothing ſeems to be known in America, as to the tree in queſtion affording any varniſh, though that point is certainly worth enquiry, conſidering its near relationſhip, at leaſt, to one whoſe produce is ſo valuable. Kæmpfer ſpeaks of the poiſonous effects of the effluvia of his varniſh-tree, like what we have related of the other.

Section 2. *Leaves ternate or quinate.* Eighteen ſpecies.

R. *Toxicodendron.* Trailing Poiſon-oak, or Sumach. Linn. Sp. Pl. 381. Willd. n. 17. Ait. n. 11. Purſh n. 7. (Edera trifolia canadenſis; Cornut. Canad. 96. t. 97. Barrel. Ic. t. 228.) *β.* R. radicans; Linn. Sp. Pl. 381. Willd. n. 16. Ait. n. 10. Kalm's Travels, v. 1. 67. 177. (Toxicodendron triphyllum glabrum; Duham. Arb. v. 2. 341. t. 98.)—Leaves ternate; leaflets ſtalked, ovate, angular, cut, or crenate. Stem creeping.—Common in woods, fields, and hedges, from Canada to Georgia, flowering in June and July. *Purſh.* We readily concur with Mr. Purſh, in conſidering theſe two Linnæan ſpecies as mere varieties. The *leaves* when young are more downy beneath, in ſome inſtances than in others; but that character, as well as their notches, is certainly variable. We ſpeak with confidence on this ſubject, having been at no ſmall trouble formerly, to determine which was the plant recommended in paralytic and rheumatic complaints, by ſome eminent phyſicians in England and France; and after much examination, finding no certain or permanent difference between the two. Kalm ſpeaks of the poiſonous qualities of the preſent ſpecies, as like thoſe of *R. Vernix;* but it had no effect on him, even when he made the raſh experiment of dropping the juice into his eye. The *ſtem* never grows erect, but when it meets with ſupport, will climb, like ivy, to the tops of the loftieſt trees. The *leaflets* are of a broad, ovate, or rhomboidal form, pointed, always more or leſs downy, at leaſt about the ribs, and ſometimes quite covered with ſoft down at the back; their margin occaſionally almoſt entire, but moſt generally, in the downy variety, ſtrongly crenate, cut, or lobed. *Flowers* in compound axillary cluſters, greeniſh, dioecious. *Berries* white. Both varieties have long been known in our gardens, but have nothing to recommend them to general culture, even were they unexceptionable as to danger.

R. *tomentoſum.* Woolly-leaved Cape Sumach. Linn. Sp. Pl. 382. Willd. n. 24. Ait. n. 15. (Vitex trifolia minor indica ferrata; Commel. Hort. v. 1. 179. t. 92.)—Leaves ternate; leaflets ſtalked, rhomboid, ſomewhat angular; white and very downy beneath.—Native of the Cape of Good Hope. It was introduced very early by the Dutch, into the European gardens, but we know not whether it has been preſerved, or noticed, though an extremely handſome evergreen ſhrub, the backs of whoſe *leaves* are elegantly white and downy, with reddiſh veins. We know nothing of the *flowers* or *fruit.* Commelin miſtook this plant for the Eaſt Indian *Vitex trifolia.*

Several other three-leaved ſpecies of *Rhus,* from the Cape, elegant evergreen ſhining-leaved ſhrubs, are cultivated in our more curious collections, as may be ſeen in Aiton. We ſubjoin one ſpecies to this ſection, which Willdenow has not admitted here.

R. *pentaphyllum.* Five-leaved Morocco Sumach. Deſfont. Atlant. v. 1. 267. t. 77. (Rhamnus pentaphyllus; Jacq. Obſ. faſc. 2. 17. Linn. Syſt. Veg. ed. 14. 233. R. ſiculus; Syſt. Nat. ed. 12. v. 3. 229. R. ſiculus pentaphyllos; Bocc. Sic. 43. t. 21.)—Leaves ternate or quinate; leaflets linear-lanceolate, dilated upwards, obtuſe, nearly ſmooth; cut or undivided. Stem thorny.—Native of uncultivated hills in Morocco and Sicily. A thorny *ſhrub,* or ſmall *tree,* with numerous, round, ſmooth, grey *branches.* *Leaves* alternate, ſtalked, digitate, of from three to five narrow-wedge-ſhaped, obtuſe *leaflets,* above an inch long; ſomewhat downy when young; either quite entire, or unequally toothed, ſometimes pinnatifid. *Flowers* pale yellow, in axillary compound cluſters, dioecious. *Berry* red, reſembling hawthorn, but with three tubercles at the top; its flavour ſlightly acid, not unpleaſant. The *bark* is uſed for tanning, and for dyeing red. *Deſfont.*

Section 3. *Leaves ſimple.* Two ſpecies.

R. *Cotinus.* Venice Sumach, or Coccygria. Linn. Sp. Pl. 383. Willd. n. 32. Ait. n. 21. Jacq. Auſtr. t. 210, Coggygria Theophraſti, and Cotinus coriarius Plinii; Ger. Em. 1476. Cotinus; Duham. Arb. v. 1. t. 78.)—Leaves ſimple, obovate, or orbicular.—Native of Auſtria, Switzerland, Italy, and Greece, in hilly ſituations. Common with us in plantations, for the ſake of the very ſingular and ornamental appearance of its elongated feathery fruit-ſtalks. The *ſtem* is buſhy, the height of a man. *Leaves* ſmooth, orbicular, entire. *Flowers* greeniſh, ſmall, in terminal compound panicles. *Fruit* gibbous. The *leaves* and *ſtalks,* when bruiſed, have an aromatic but pungent and acid ſcent. The whole plant is uſed for tanning in Italy, and called *Scotino;* ſee Smith's Tour. The wood is much uſed by the modern Athenians, according to Dr. Sibthorp, for dyeing wool of a moſt beautiful and rich yellow.

R. *atrum.* Black Sumach. Forſt. Prodr. 23. Willd. n. 33.—"Leaves ſimple, ovate-oblong. Flowers polygamous."—Found by Forſter in New Caledonia. A *ſhrub* or *tree.* We know nothing more of this ſpecies, the only one, except *Cotinus,* with ſimple *leaves.*

Rhus, in *Gardening,* contains plants of the tree and ſhrub kinds, ſumach and toxicodendron; of which the ſpecies cultivated are, the elm-leaved ſumach (R. coriaria); the ſtag's-horn Virginian ſumach (R. typhinum); the ſcarlet ſumach (R. glabrum); the Carolina ſumach (R. elegans); the lentiſcus-leaved ſumach (R. copallinum); the Venice ſumach (R. cotinus); the trailing poiſon-oak, or ſumach (R. toxicodendron); the varniſh ſumach (R. vernix); the rooting poiſon-oak, or ſumach (R. radicans); the woolly-leaved ſumach (R. tomentoſum); the narrow-leaved ſumach (R. anguſtifolium); and the ſhining-leaved ſumach (R. lucidum).

The branches in the firſt ſort are uſed inſtead of oak bark for tanning leather, and it is ſaid that Turkey leather is all tanned with this ſhrub.

In the third ſort there are ſeveral varieties; as the New England ſumach, in which the ſtem is ſtronger, and riſes higher than that of the ſecond ſort; the branches ſpread more horizontally, they are not quite ſo downy, and the down

down is of a brownish colour; the leaves are composed of many more pairs of leaflets, and are smooth on both sides: the flowers are disposed in loose panicles, and are of an herbaceous colour. The Canada smooth red sumach, which has smooth branches of a purple colour, covered with a grey pounce; the leaves are composed of seven or eight pairs of leaflets, which are four inches and a half long, and one inch broad in the middle, terminating in acute points, and a little serrate, of a lucid green on their upper surface, but hoary on their under, and smooth: panicle large, composed of several smaller, each on separate footstalks, the whole covered with a grey pounce; the flowers are of a deep red colour.

In the sixth sort the root is used for dyeing: the leaves and young branches dye black; and the bark is used for tanning leather.

In the eighth species Martyn says, that the milky juice stains linen a dark brown. The whole shrub is, in a high degree, poisonous; and the poison is communicated by touching or smelling any part of it.

The ninth species having, in common with ivy, the quality of not rising without the support of a wall, tree, or hedge, it is called in some parts of America creeping ivy. It will climb to the top of high trees in woods, the branches every where throwing out fibres that penetrate the trunk. When the stem is cut, it emits a pale brown sap of a disagreeable scent, and so sharp, that letters or marks made upon linen with it cannot be got out again, but grow blacker the more it is washed. Like rhus vernix it is poisonous to some persons, but in a less degree. Kalm relates, that of two sisters, one could manage the tree without being affected by its venom, whilst the other felt its exhalations as soon as she came within a yard of it, or even when she stood to leeward of it, at a greater distance; that it had not the least effect upon him, though he had made many experiments upon himself, and once the juice squirted into his eye; but that on another person's hand, which he had covered very thick with it, the skin, a few hours after, became as hard as a piece of tanned leather, and peeled off afterwards in scales.

There is a variety with a straight and stout trunk, having a brownish ash-coloured bark: the leaves smooth, veined, bright green above, somewhat paler underneath, pendulous, and somewhat bent back: in the male plant the leaves are rather wider and longer, and are drawn more to a point; in the female they are shorter and blunter, and the petioles are reddish, whereas in the others they are green: the flowers axillary, in racemes; the males larger, whitish-yellow; the females smaller, herbaceous, on the germ instead of the style there are two, sometimes three black dots: fruits round, the size and form of coriander seeds, streaked with five lines, remaining on the tree till new flowers come out; when the outer rind comes off, and a cretaceous substance comes into view, in which an ash-coloured, hard, horny seed is involved, slightly divided on the upper part, and somewhat kidney-shaped.

Method of Culture.—The first nine sorts of these plants are capable of being raised by seeds and layers, and some of them also by suckers, or their rooting branches. In the first method such of them as do not send up suckers should have the seed procured from abroad, and sown in pots of a large size, or in beds of light mould, being covered in about the depth of half an inch in the autumn. Those in pots should be protected from the frosts during the winter, and if plunged in a moderate hot-bed in the early spring, they will be rendered more forward, letting the plants have a free air when they appear. Those in the open ground often remain long before they vegetate; they should be kept free from weeds, be well watered in summer, and have the protection of mats the first winter. When the plants have had the growth of a year or two, they may be planted out in nursery-rows till fit to be set out in the places where they are to remain. The potted plants should have the protection of the frame the second winter, air being freely admitted in mild weather; and in the spring following they may be shaken out of the pots without injuring the roots, and be set out in nursery-rows, three feet apart, and a foot distant in the rows, where they may remain two years, and then be planted out where they are to remain.

Such sorts as have young branches sufficiently low, may have them laid down in the slit method; when they will mostly have stricken root in the course of a year, and may be taken off and planted out where they are to remain, or in the nursery.

And all those sorts that send up suckers from the roots should have them taken up during the winter, and planted out in nursery rows, in the manner of the seedlings, till of a proper growth to be planted out.

The seventh and ninth sorts may likewise be increased by their trailing branches, which have stricken root as they rest on the ground, which should be taken up with their roots entire in the autumn, winter, or in early spring, and be planted out, either where they are to remain, or in nursery rows, till of sufficient growth for the purpose they are intended.

The first and fourth sorts, being the most tender, require the most sheltered situations.

Most of these plants afford a milky juice, which is extremely acrid and corrosive.

The three last sorts may be raised by cuttings and layers with great facility. In the first method, the cuttings of the young shoots should be planted out in pots of light fresh mould, in the spring and early summer months, plunging them in a moderate hot-bed, where they readily strike root, being occasionallly watered and shaded: and when they have formed good roots, they may be potted off into separate pots. And in the latter mode, any of the young wood may be laid down in the usual manner, in the early spring, when by the autumn they will mostly have stricken good root, and may be taken off, and be potted out the same way as the cuttings.

All the first nine sorts have a fine effect in mixture with other deciduous shrubby plants, in the borders, clumps, and other parts of pleasure grounds, and the three last afford variety among other potted greenhouse plants of the less tender kinds.

Rhus *Cobbe*, in *Botany*. See Schmidelia.

Rhus, in the *Materia Medica*. This genus comprehends a variety of species, which are known to be poisonous; but the *rhus coriaria*, or elm-leaved sumach, is perfectly innocent, and its leaves have been used occasionally for culinary purposes. Its medicinal qualities are owing to its stypticity or astringency, which property renders it useful in dyeing, and also in tanning of leather, to which purpose it was applied in the time of Dioscorides. The leaves and berries have been used in medicine; but the leaves are more astringent and tonic, and have been commonly employed in complaints which indicate remedies of this class. The berries, which are of a red and compressed figure, contain a pulpy matter, in which is lodged a brown, hard, oval seed, manifesting a considerable degree of astringency. The pulp, even when dry, is gratefully acid, and has been found to contain an essential salt similar to that of wood-sorrel, or perhaps more nearly allied to crystals of tartar. An infusion of the dry fruit is not blackened by a solution of iron,

ſo that it appears to be deſtitute of aſtringency; but its acidity is very grateful, and hence the French have called it "le vinaigrier." Like many other acid fruits, theſe berries, which in eaſtern countries are uſed as a pickle, may be advantageouſly taken to allay febrile heat, and to correct bilious putreſcency. The *rhus toxicodendron* and *radicans* have of late been recommended in paralytic affections; the latter by M. Freſnoi, and the former by Dr. Alderſon of Hull: but the caſes in which theſe virulent plants were employed are but few and indeciſive. They excite, however, a ſenſe of heat and pricking, and irregular twitches in the affected limbs. It is ſuggeſted that ſome advantage has been derived from their uſe in herpetic eruptions. The doſe of the powdered leaves may be gr. ſs, given twice or thrice a day, and gradually increaſed to grs. iv, in the form of a bolus. The items of the toxicodendron, when cut or broken, exude a milky juice, which inflames the ſkin wherever it touches, and becomes black when it is expoſed for a ſhort time to the action of atmoſpheric air. This juice forms an indelible black ſtain on linen cloth, and is uſed in Japan, where it is a native, as a varniſh. (Phil. Tranſ. vol. xlix. p. 158. See VARNISH.) The leaves are inodorous, and their taſte is mawkiſh and ſubacrid. Their virtues are completely extracted by water, and partially by alcohol. The aqueous infuſion reddens litmus paper; precipitates the ſolution of iron black, that of nitrate of ſilver brown, and throws down a precipitate with gelatine. Hence it contains gallic acid and tannin; but its effects chiefly depend on a narcotic principle. Woodv. Med. Bot. Thomſon's Lond. Diſp. See SUMACH and TOXICODENDRON.

RHUSELNIUM, in *Botany*, a name given by ſome authors to the ranunculus.

RHUSTICANA, or RUSTICANA, in *Ancient Geography*, a town of Hiſpania, in the interior of Luſitania, between Talebriga and Mendeculia. Ptolemy.

RHUSUNCORÆ, or RUSUCURRUM, a town of Africa, in Mauritania Cæſarienſis. Ptolemy. It had the title of a Roman colony.

RHUTHYN, or RUTHIN, in *Geography*, a borough and market-town in the cwmwd of Llannerch, cantref of Dyffryn-Clwyd, (now called the hundred of Rhuthyn,) county of Denbigh, North Wales, is ſituated on the ſlope of a conſiderable hill, which riſes near the centre of the delightful vale of the Clwyd, at the diſtance of 205 miles N.W. from London. This town, from the etymology of its name, appears to have derived its origin from a caſtle, called Rhyddin, or the red fortreſs, in alluſion to the colour of the ſtone of which it is conſtructed. Although there was probably a walled fortreſs here anterior to the reign of king Edward I., yet the laſt caſtle erected here was moſt probably by this monarch. Camden, however, aſſigns its origin, as well as the town, to a baron named Roger Gray. Its hiſtory affords only a few events worthy of notice. In the year 1400 Owen Glyndwr attempted to take it by aſſault, but was unſucceſsful; ſo that after pillaging the inhabitants, and ſetting fire to the town, he retreated precipitately to the mountains. In the reign of king Charles I. it was garriſoned in the royal cauſe, till about the middle of April, A.D. 1646, when it was compelled to ſurrender, after having ſuſtained a ſiege of two months. Not long ſubſequent to that period, it was diſmantled by order of parliament, and has ſince gradually fallen into its preſent ruinous ſtate; only a few fragments of walls remaining to mark its ſcite and character.

Rhuthyn is deſcribed as having been formerly a populous town, and as poſſeſſing the beſt market of any in the vale. This pre-eminence, however, is now loſt; though it is yet a reſpectable and flouriſhing place, containing, according to the parliamentary reports of 1811, 271 houſes, and a population of 1292 perſons. The government is veſted in two aldermen and ſixteen common council-men, choſen annually in the lord's court. The number of burgeſſes is unlimited. Rhuthyn is a borough both by preſcription and by charter, and joins with Denbigh in returning a repreſentative to the national ſenate. It has two markets, weekly; one on Saturday for proviſions, and another on Monday for corn, &c.; beſides which, there are ſix annual fairs. The lordſhip of Rhuthyn, a manorial right belonging to the Middleton family of Chirk-Caſtle, compriſes three comots, *viz.* Coleigon, Dogfeilyn, and Llannerch; and is diſtinct with reſpect to government from the hundred, the lord appointing a ſteward to it. Here is a free-ſchool of equal, if not greater, celebrity than any other in North Wales. It was founded and endowed by Gabriel Goodman, D.D., who was dean of Weſtminſter in the reign of queen Elizabeth. His deſcendant, Godfrey Goodman, was likewiſe a benefactor to the town. From this ſchool young men are ſometimes admitted into orders, without having graduated at any univerſity. It has two maſterſhips, the head one of which is in the gift of Jeſus college, Oxford. The town-hall is ſituated near the market-place, and is fitted up with apartments for holding the hundred courts, the county aſſizes, and the quarter ſeſſions; which laſt are held alternately here and at Denbigh. The new gaol is a handſome and commodious building, erected according to deſigns furniſhed by Mr. Joſeph Turner. The debtors' apartments and thoſe of the felons are divided by a lofty wall; and both have ſpacious yards, with baths, attached to them. The church is a large ſtructure of conſiderable antiquity. It was originally conventual, having been attached to a religious houſe of the order of monks denominated Bonhommes. In the year 1310, however, it was made collegiate by John de Gray, who placed in it a chapter of ſeven regular canons, and conferred upon them conſiderable landed poſſeſſions, and numerous privileges. The apartments for the canons were connected with the church by a cloiſter, of which a portion is ſtill remaining, converted into a reſidence for the warden of an hoſpital, which was founded and endowed by Gabriel Goodman, the founder of the free-ſchool, as an aſylum for twelve decayed houſekeepers, *viz.* ten men and two women. The warden is *ex officio* rector of the pariſh of Rhuthyn, and has, beſides, the government of the free-ſchool. The interior of the church is much admired, and particularly its roof, which is a very curious piece of workmanſhip, conſiſting of ſmall ſquares, adorned with various ſculptures, and bearing the names of the different workmen employed in their formation. The collegiate eſtabliſhment here was diſſolved at the period of the general ſuppreſſion, when its lands were granted to William Winlove and Richard Fyld. There are no remarkable monuments in this church, excepting that of Dr. Gabriel Goodman, which diſplays a buſt of the deceaſed, in marble. The doctor was a native of Rhuthyn, where he was born in 1583. He was ſucceſſively advanced to be canon of Windſor, dean of Rocheſter, and biſhop of Glouceſter. See Fuller's Church Hiſtory, book xi. Worthies, and Chalmer's General Biographical Dictionary.

The vicinity of Rhuthyn preſents ſome objects worthy of notice. At a ſhort diſtance from the town is the neat village of Llanrhydd, which is noted for the fine ſculptural monuments and decorations in its church. Near this village is the Bathafarn, anciently a ſeat belonging to the lord Gray; and more to the ſouth-weſt lie Pool-Park and Bachymbyd, both ſeats of the lord Bagot. Stretching towards

wards the north is the vale of Clwyd, which is deservedly celebrated by all travellers. Commencing at Rhuthyn, it extends not less than twenty-four miles in length, and from six to eight in breadth, exhibiting a rich scene of cultivation, happily blended with many of those objects which constitute the picturesque. On a small eminence in this vale stands the village of Llan-Rhaiadar; and near it is a well, called Ffynnon Ddyfnog, which is much esteemed by the inhabitants for its medicinal quality in the cure of rheumatism. The church here is an elegant structure in the pointed style, and has a beautiful east window, ornamented with stained glass. The subject is the root of Jesse, who is represented as extended upon his back, with the genealogical tree issuing from his loins, comprising all the kings of Israel and Judah, down to the birth of Christ. Above is an outline rose, including an eye surrounded with a radiance, and another rose of Lancaster to correspond; which last emblem indicates that the work was executed after the accession of Henry VII. to the throne. Here is a splendid but tasteless monument to the memory of Maurice Jones, esq., who founded an alms-house in this parish, A.D. 1720; and in the churchyard is a striking instance of genealogical vanity, in an inscription to the memory of John ap Robert, whose pedigree is traced up to Cadel, king of Powis. Carlisle's Topographical Dictionary of Wales, 4to. 1813. A Tour in South Wales, by the Rev. W. Bingley, 8vo. 1801. Pennant's Tour through Wales, 1770, 2 vols. 4to.

RHYAS, from ῥέω, *to flow*, in *Surgery*. See Rhœas.

RHYDDA, in *Ancient Geography*, a town of Palestine, belonging to the Arabs, according to Josephus.

RHYME, Rhime, *Ryme*, or *Rime*, in *Poetry*, the similar sound or cadence and termination of two words which end two verses, &c.

Or, rhyme is a similitude of sound between the last syllable or syllables of one verse, and the last syllable or syllables of a verse succeeding either immediately, or at a distance of two or three lines.

Rhyme is a modern invention, and the product of a Gothic age: Milton calls it the *modern bondage*. Yet some authors will have it, that the English, French, &c. borrow their rhyme from the Greeks and Latins. The Greek orators, they say, who endeavoured to tickle the ears of the people, affected a certain cadence of periods, which ended alike, and called them ὁμοιοτέλευτα. The Latins, who imitated them, called these chiming terminations, *similiter desinentia*.

This affectation increased as the Latin tongue declined; so that, in the later Latin writers, scarcely any thing is more common than rhyming periods.

The French, and from them the English, &c. adopted this cadence of rhyme, which seemed to them more pretty and agreeable than the metrical verses of the Greek and Roman poets.

This kind of Latin poetry in rhyme was much in vogue in the twelfth century; and the verses thus running were called Leonine verses, for what reason Camden owns he does not know (for a lion's tail, says he, does not answer to the middle parts, as these verses do); but, doubtless, they had their name from a French monk of St. Victor at Marseilles, about the year 1135, called Leoninus, who first composed them with success, and of whom we have several pieces in them remaining, addressed to pope Adrian IV. and Alexander III. It is certain, however, (says Dr. T. Warton, Hist. of English Poetry, vol. i.) that rhymed Latin verses were in use at a much earlier period. Pelloutier (Mem. sur la Lang. Celt. part i. vol. i. ch. 12.) has given a very early specimen of Latin rhymes, occurring in the beginning of the seventh century. Latin rhymes seem to have been first used in the church hymns, but Leonine verses are properly the Roman hexameters or pentameters rhymed, and it is not improbable, that they had their name from the above-mentioned monk, who was the most popular, and almost only Latin poet of his time in France. He wrote many Latin pieces not in rhyme, and in a good style of Latin versification. The early French troubadours mention a sort of rhyme in their vernacular poetry partly distinguished from the common species, which they call Leonine or Leonime.

Camden has given us a collection of Latin rhymes of our ancient English writers; among whom, Walter de Mapes, archdeacon of Oxford, in the time of king Henry II. makes a principal figure, especially for two pieces, the one in praise of wine beginning,

> "Mihi est propositum in taberna mori,
> Vinum sit appositum morientis ori;
> Ut dicant, cum venerint, angelorum chori,
> Deus sit propitius huic potatori."

The other against the pope, for forbidding the clergy to have wives, beginning,

> "Prisciani regula penitus cassatur,
> Sacerdos per *hic* et *hæc* olim declinatur;
> Sed per *hic* solummodo nunc articulatur,
> Cum per nostrum præsulum *hæc* amoveatur."

Since the restoration of learning in the sixteenth century, attempts have been made to banish rhyme out of the modern poetry, and to settle the English and French verses on the footing of the ancient Greek and Latin ones, by fixing the quantities of the syllables, and trusting wholly to those, and to the numbers or measure.

This Milton has done, with great success, in his Paradise Lost, and other pieces; and after him Philips, Addison, and some others. Verses of this kind we call *blank verses*. See Verse.

The French have attempted the same, but not with the same success. Jodelet made the first essay, and after him Pasquier; but they both failed. Passerat and Rapin followed them, and failed, like them. Their hexameter and Sapphic verses were neither imitated nor approved; and the cadence of rhyme was generally preferred to quantity, or the use of long and short syllables. Des Portes, likewise, made some essays of verses, constructed of long and short lines, without rhyme, but the attempt only served to convince the world, that this kind of measure is inconsistent with the genius of the French tongue.

To succeed in such kind of verses, there must be a liberty of varying the order of the words, or of changing their situation, as may best suit the occasions of the poet; of making the substantive either go before or follow after the verb, as the verse requires, &c. Now none of the modern tongues will admit of such an arbitrary situation of the words, equally with the ancients; yet none will allow this more than the English, nor any less than the French.

The principal defect in rhyme is the full close which it forces upon the ear at the end of every couplet; and in this respect it is far inferior to *blank verse*; (which see.) Besides, the constraint and strict regularity of rhyme are unfavourable to the sublime, or to the highly pathetic strain.

An epic poem, or a tragedy, would be fettered and degraded by it. It is best adapted to compositions of a temperate strain, where no particular vehemence is required in the

the ſentiments, nor great ſublimity in the ſtyle; ſuch as paſtorals, elegies, epiſtles, ſatires, &c. To theſe it communicates that degree of elevation, which is proper for them, and, without any other aſſiſtance, ſufficiently diſtinguiſhes the ſtyle from proſe. He who ſhould write ſuch poems in blank verſe, would render his work harſh and unpleaſing. In order to ſupport a poetical ſtyle, he would be obliged to affect a pomp of language unſuitable to the ſubject. Dr. Blair farther obſerves, that though he coincides in opinion with thoſe, who think that rhyme finds its proper place in the middle, but not in the higher regions, of poetry, can by no means join in the invectives which ſome have poured out againſt it, as if it were a mere jingling of ſounds, fit only for children, and owing to nothing but the corruption of taſte in the monkiſh ages. Rhyme might indeed be barbarous in Latin or Greek verſe, becauſe theſe languages, by the ſonoroufneſs of their words, by their liberty of tranſpoſition and inverſion, by their fixed quantities and muſical pronunciation, could carry on the melody of verſe without its aid. But it does not follow, that it muſt, therefore, be barbarous in the Engliſh language, which is deſtitute of theſe advantages. Rhyme was barbarous in Latin; and an attempt to conſtruct Engliſh verſes, after the form of hexameters and pentameters, and Sapphics, is as barbarous among us. It is not true, that rhyme is merely a monkiſh invention. On the contrary, it has obtained under different forms in the verſification of moſt known nations. It is found in the ancient poetry of the northern nations of Europe; and it is ſaid to be found among the Arabs, the Perſians, the Indians, and the Americans. This ſhews, that there is ſomething in the return of ſimilar ſounds, which is grateful to the ears of the greateſt part of mankind. And if any one, after reading Mr. Pope's Rape of the Lock, or Eloiſa to Abelard, ſhall not admit our rhyme, with all its varieties of pauſes, to carry both elegance and ſweetneſs of ſound, his ear muſt be pronounced to be of a very peculiar kind.

The preſent form of our Engliſh heroic rhyme in couplets is a modern ſpecies of verſification. The meaſure generally uſed in the days of queen Elizabeth, king James, and king Charles I., was the ſtanza of eight lines, ſuch as Spencer employs, borrowed from the Italian; a meaſure very conſtrained and artificial. Waller was the firſt who brought couplets into vogue; and Dryden afterwards eſtabliſhed the uſage. Waller firſt ſmoothed our verſe; Dryden perfected it. Mr. Pope's verſification has a peculiar character. It is flowing and ſmooth in the higheſt degree; far more laboured and correct than that of any who went before him. He introduced one conſiderable change into heroic verſe, by totally throwing aſide the triplets, or three lines rhyming together, in which Mr. Dryden abounded. Dryden's verſification, however, has great merit; and, like all his productions, has much ſpirit mixed with careleſſneſs. If not ſo ſmooth and correct as Pope's, it is however more varied and eaſy. He ſubjects himſelf leſs to the rule of cloſing the ſenſe with the couplet, and frequently takes the liberty of making his couplets run into one another, with ſomewhat of the freedom of blank verſe. Blair's Lect. vol. iii. See Verse.

Rhymes are either *ſingle*, or *double*, or *triple*, though the two laſt are now much diſuſed.

Rhymes, *Single*, are divided into perfect or whole rhymes, and imperfect or half rhymes. *A whole* or *perfect* rhyme is where there is a ſimilitude of ſound without any difference; or where a thorough identity of ſound appears in the pronunciation of the two ſyllables, notwithſtanding that there may be ſome difference in the orthography. *A half* or *imperfect* rhyme is where there is a ſimilitude, with a difference either in reſpect of the pronunciation, or the orthography, but chiefly the former.

Rhyme, *the feminine*, is that where the laſt ſyllable of the rhyme ends with an *e* mute, or quieſcent, as in *dove*, *belle*, &c.

Rhymes, *Maſculine*, are thoſe of all other words.

Menage obſerves, that the maſculine rhymes cloſe the periods better; but the feminines, being the ſofter and more languiſhing, end more agreeably, eſpecially in mournful ſubjects.

Rhymes, *Double*, by the French called *rich* rhymes, are thoſe where the two words terminate alike through the whole two laſt ſyllables, as *ſquabble* and *rabble*, &c.

Rhymes, *Plain*, are thoſe where the two rhyming verſes ſucceed immediately to each other.

Rhymes, *Croſs*, are thoſe where the verſes are ſo diſpoſed, as that the firſt rhymes with the third, and the ſecond with the fourth, &c.

Rhymes, *Aſſonant*. See Assonant.

RHYMNICI Montes, in *Ancient Geography*, mountains of Scythia, on this ſide of Imaus, in which the river Rhymnus had its ſource. The mouth of this river was in the Caſpian ſea, between that of the river Rha and that of the river Daïs.

RHYNBECK, or Rhinbeck, in *Geography*, a poſt-town of America, in Dutcheſs county, New York, on the E. ſide of Hudſon's river, oppoſite to Kingſton; 103 miles N. of New York. The townſhip is bounded S. by Clinton, and N. by Beckman. A curious cavern has been diſcovered, in 1792, at a place in this town, called by the Indians Sepaſcot.

RHYNCHÆ, in *Ancient Geography*, a country of Greece, in the iſle of Eubœa. Steph. Byz.

RHYNCHOSPORA, in *Botany*, ſo called from ῥυγχος, *a beak*, and σπορα, *ſeed*; becauſe the permanent baſe of the ſtyle forms a beak to the ſeed.—Vahl. Enum. v. 2. 229. Brown Prodr. Nov. Holl. v. 1. 229. Ait. Hort. Kew. v. 1. 127.—Claſs and order, *Triandria Monogynia*. Nat. Ord. *Calamariæ*, Linn. *Cyperaceæ*, Brown.

Eſſ. Ch. Glumes chaffy; the lower ones empty. Corolla none. Seed one, crowned with the hardened permanent ſtyle, whoſe baſe is as broad as the ſeed.

Vahl, the founder of this genus, deſcribes nineteen ſpecies, among which are *Schoenus albus* and *fuſcus* of Linnæus, and Sm. Fl. Brit. Mr. Brown adopts it, adding to the character, that "the ſeed is accompanied at its baſe by toothed briſtles, ſhorter than the glumes." He remarks, that it differs from Dichromena, (ſee that article,) in having theſe briſtles. This writer defines three New Holland ſpecies, one the *R. aurea* of Vahl, and other two non-deſcripts. The inflorescence is ſaid to be very various, ſome ſpecies having the flowers panicled, whilſt in others they are either corymboſe, or capitate. We do not ſee the neceſſity of eſtabliſhing this genus; at leaſt, as it concerns the Britiſh Flora, we beg leave to ſuſpend our opinion. See Schoenus.

RHYNCOSIA, from ῥυγχος, *a beak*, becauſe the keel terminates in a long ſharp point.—Loureir. Cochin. 460. Claſs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Eſſ. Ch. Corolla papilionaceous. Keel rhomboid, beaked. Legume membranous, with two ſeeds.

1. R. *volubilis*.—Found wild near Canton in China. *Stem* herbaceous, round, twining. *Leaves* ternate, roundiſh, downy. *Flower-ſtalks* axillary, in pairs, many-flowered. *Calyx* two-lipped. *Corolla* yellow. *Seeds* black and ſhining.

In

In ſo difficult a tribe, we dare not anſwer for the permanency of this genus, not having ſeen a ſpecimen. The plant may poſſibly be known to botaniſts, under ſome other name and genus.

RHYNCOTHECA, from ῥυγχος, *a beak*, and θηκη, *a capſule*, on account of its beaked or pointed ſeed-veſſel. De Théis Gloſſaire de Botanique, 402. Fl. Peruv. 71.

RHYNDACUS, in *Ancient Geography*, a river of Aſiatic Myſia, according to Pomponius Mela, who places its ſource in mount Olympus. According to Pliny it had been denominated Lycus.—Alſo, a town of Aſia, between Phrygia and the Helleſpont. Steph. Byz.

RHYNE, in *Botany*, a name uſed by ſome authors for the camphor tree.

RHYPÆ, Ripe, or *Rhypes*, in *Ancient Geography*, a town of the Peloponneſus, in Achaia, the territory of which was denominated Rhypidis. According to Strabo it was N. of Helice, and at ſome diſtance from the coaſts of the gulf of Corinth. Pauſanias ſays that in his time they could only perceive the ruins of Rhypæ, 30 miles from Ægium. Homer calls this town Répe.

RHYPARA, an iſland ſituated near that of Samos. Pliny.

RHYPTICS, Rhiptics, Ῥυπτικα, in *Medicine*, detergent remedies, or cleanſers. See Detergent.

RHYSSADIUS, in *Ancient Geography*, a mountain of Africa, in Lybia interior, in which Ptolemy places the ſource of the river Stachir.

RHYSTROM, in *Geography*, a river of Holſtein, which runs into the Elbe at Gluckſtadt.

RHYTHM, Rhythmus, Ῥυθμος, in *Muſic*, the variety in the movement, as to the quickneſs or ſlowneſs, and length and ſhortneſs, of the notes.

Or the rhythmus may be defined, more generally, the proportion which the parts of a motion bear to each other.

In *ancient poetry* rhyth or rhythm denotes the meaſure of the feet, or the number and combination of long and ſhort ſyllables, called alſo *metre* and *quantity*.

A continued motion in every organized body that is capable of rhythm, is ſuſceptible of ſome kind of meaſure. This meaſure marks the ſeveral parts of motion, and enables us to judge of their proportions. It is to point out theſe proportions that the Greeks, among many other terms, have made uſe of ῥυθμος, *rhythm*, which they have applied to different purpoſes. They have not only expreſſed by it the kind of cadence, or vibration of the wings, in the flight of birds; the movement of the feet in the progreſſive motion of animals; and the geſtures, figures, and ſteps of dancers; but every ſpecies of regular motion, ſuch as is obſervable in the beating of the pulſe, and in reſpiration. They have even abuſed the original import of the word ſo far as to apply it to things abſolutely motionleſs and inanimate; ſuch as works in painting and ſculpture, in which they have called that ſymmetry and juſt proportion which reigns in all the parts by the name of rhythm.

But the moſt common application of this term has been to expreſs the *time* or duration of many ſounds heard in ſucceſſion; whether theſe ſounds are muſical, and ſuch as are produced by voices and inſtruments, or without any determinate tone, as in the ſtrokes of a hammer upon an anvil; in the beating of a drum; and in the articulations of the voice in common ſpeech, in repeating poetry, or pronouncing an oration.

But our enquiries here ſhall be confined to that ſpecies of rhythm, which more particularly concerns melody, and which merits diſcuſſion the more, on account of its great importance in muſic, and of the darkneſs in which it is uſually involved by writers on the ſubject.

From the ſtrict union of poetry and muſic among the ancients, which ſeem to have been almoſt inſeparable, an offence againſt time or rhythm was unpardonable, as it not only deſtroyed the beauty of the poetry, but ſometimes even the meaning of the words of which it was compoſed. Το παν παρα μουσικοις ὁ ῥυθμος, ſay the Greeks; it was the principal point in their muſic, without which they regarded melody as wholly unmeaning and lifeleſs. Hence Plato refuſed the title of muſician to every one who was not perfectly verſed in rhythm, as we ſhould now to a bad *timeiſt*. It is of ſuch importance, that, without it, muſic can have no power over the human paſſions. Pythagoras, according to Martianus Capella, uſed to call rhythm, in muſic, the *male*, and Melos the *female*; and Doni has compared rhythm with *deſign*, in painting, and Melos to *colouring*. It is certain that an ordinary melody, in which the time is ſtrongly marked, and the accents are well placed, has more effect than one that is deficient in thoſe particulars, though more refined and uncommon, and ſet off with all the richneſs of harmony, and learning of modulation.

Iſaac Voſſius, in his Diſſertation "De Poematum Cantu, et viribus Rhythmi," has attributed to rhythm all the miraculous powers of ancient muſic.

As vocal muſic was chiefly cultivated among the ancient Greeks, the firſt part of theſe rhythmical obſervations ſhall be confined to lyric poetry.

Ariſtides Quintilianus defines muſical rhythm συγκριμα ἐκ χρονων κατα τινα ταξιν συγκειμενων; "the aſſemblage of many parts of time, which preſerve a certain proportion with each other;" which, ſince the uſe of bars in muſic, may be called aliquot parts of a meaſure, or a given portion of time. For the better underſtanding of this definition, it is neceſſary to remember that the muſic in queſtion was conſtantly ſung to verſes, the words of which were all compoſed of *long* and *ſhort* ſyllables; that the ſhort ſyllable was pronounced as quick again as the long, and the ſhort ſyllable being regarded as one part or portion of this meaſure, the long was equal to two; ſo that, conſequently, the ſound which was applied to the long ſyllable, was equal in duration to two ſuch ſounds as were ſung to ſhort ſyllables, or, in other words, that one note was equal to two portions of time, and the other to one. It muſt likewiſe be remembered that the verſes thus ſung, were compoſed of a certain number of feet, formed by theſe long and ſhort ſyllables differently combined, and that the rhythm of the melody was regulated by theſe feet; as, whatever was their length, they were always divided into two parts, equal or unequal, the firſt of which was called αἐρσις, *elevation*, and the ſecond θεσις, *depreſſion*. A *foot* in poetry ſeems to anſwer to a *bar* in muſic. A *time*, among the ancients, was a proportion of that foot or bar; as, with us, a bar is divided into accented and unaccented parts. In like manner the rhythm of the melody, correſponding with theſe feet, was divided into two parts, equal or unequal, which we now call the *down* and *up* parts of a bar, expreſſed by *beating down* the hand or foot, and *lifting it up*. Thus far concerns *vocal* rhythm; what follows belongs to *inſtrumental*.

As the notes of the ancient muſic were conſtantly written over each ſyllable of the verſes which were to be ſung; as the quantity of each of theſe ſyllables was perfectly known to muſicians; and as the duration of each ſound was regulated by the ſyllables; it did not ſeem neceſſary that the time ſhould be marked by any particular ſign or character. However, for the eaſe and convenience of the muſician, a canon,

canon, or rule, was given of the rhythm at the beginning of a lyric poem. This canon consisted of nothing but the numbers 1 and 2, that is, the alpha and beta of the Greek alphabet, disposed according to the order of the breves and longs which composed each verse, and divided according to the number of its feet. The alpha, or unit, marked a breve, because it contained only one portion of time; and the beta, or binary, marked a long, being equal to two portions. Some of these poetical, or rhythmical canons, are still to be found in the Manual of Hephæstion.

Rhythm in Latin was called *numerus;* and this term, in process of time, was extended to the melody itself, subjected to certain numbers or rhythms, as appears from this line of Virgil:

"Numeros memini, si verba tenerem:"

"If I knew the words, I could remember the tune well enough."

The Romans had signs for rhythm, as well as the Greeks; and these signs were not only called *numerus*, but *æra*, that is, *number*, or the mark for time. *Numera nota*, says Nonius Marcellus. In this sense we find the word used in a verse of Lucilius:

"Hæc est ratio? perversa æra? summa subducta improbè?"

"Do you call that settling accounts? such a confusion of figures? and the sum falsely cast up?"

Though the word *æra* was at first only applied by musicians to the time, or measure of the melody, they afterwards made the same use of it as of *numerus*, to express the tune or melody itself; and it has been thought that the word *air*, or, as the Italians call it, *aria*, which includes a certain piece of music of a peculiar rhythm, or cadence, is derived from *æra*.

Such was the manner in which the ancients marked the measure in their written music; but to make it still more sensible in the execution, they beat time in several different ways. The most common was by the motion of the foot, which was lifted up and beat down alternately, according to what we call common, or triple time. To regulate the time was generally the office of the music master or director, called μεσοχορος and κορυφαιος, *coryphæus*, because he was placed in the middle of the orchestra, among the musicians, and in an exalted and conspicuous situation, in order to be seen and heard the more easily by the whole band.

The directors of the time were likewise called in Greek ποδοκτυποι and ποδοψοφοι, from the noise of their feet. In Latin they were called *pedarii*, *podarii*, and *pedicularii*, for the same reason. Their feet were generally furnished with wooden or iron sandals, in order to mark the time in a more distinct manner; these implements the Greeks called κρεπιδια, κρεπιλα, κρεπιτα; and the Latins *pedicula*, *scabella*, or *scabilla*, because they resembled little pattens, or clogs.

But it was not only with the feet that the ancients beat the time, but with all the fingers of the right hand upon the hollow part of the left; and he who marked the time or rhythm in this manner, was called *manu-ductor*. For this purpose they sometimes used oyster-shells, and the shells of other fish, as well as the bones of animals, in beating time, as we do of castanets, tabors, &c. Both Hesychius, and the scholiast of Aristophanes, furnish passages to confirm this assertion. What a noisy and barbarous music! All rhythm, and no sound. The drums and systrums of the Idæi Dactyli could not have been more savage.

Many ancient instruments were monotonous, and of little use; but to mark the measure; such were the cymbalum and systrum; and it was for this reason, perhaps, that the cymbal was called *æra*, by Petronius. But it would afford us no very favourable idea of the abilities of modern musicians, who should require so much parade and noise in keeping together. The more time is beat, says M. Rousseau, the less it is kept; and, in general, bad music, and bad musicians, stand most in need of such noisy assistance.

However, if any thing like the power which ancient music is said to have had over the passions can be credited, it must have derived this power chiefly from the energy and accentuation of the rhythm. Aristides Quintilianus gives a long list of different metres, with their several properties of calming or agitating the mind, according to the nature of the syllables, or feet of the verses, as well as the sentiments which they were intended to express; and as it will afford the reader an opportunity of seeing how much stress was laid on this part of music, and how fanciful and ideal many of the distinctions seem to have been, we shall give the whole passage in English.

"Measure, which begins by a *down part* of the metrical division, is calm and gentle; whereas that which begins by an *up part*, expresses trouble and agitation. Full time, that is, always accompanied with melody, is noble in its effect; and that arising from catalectic verses, deficient in a syllable or note, if it be supplied by a rest or pause, has more simplicity. Time of equal proportions, is graceful; and that of odd numbers, or sesquialterate proportion, is more proper to excite commotion. Double time is a kind of mean betwixt the graceful and the turbulent. Among the movements of two even notes, if they are short, their effect is lively, impetuous, and proper for military dances, called *Pyrrhics*, in which the dancers are armed; and time, of which the movement is regulated by poetic feet composed of long syllables, is more grave, serious, and fit for hymns which are sung in honour of the gods, at festivals, and in sacrifices; the measure composed of a mixture of long and short notes, participates of the qualities of both these last mentioned.

"Among the duplicate proportions, the Iambic and Trochaic have the most vivacity and fire, and are peculiarly proper for dancing. Those called ορθιοι and σημαντοι, of which the arsis answers to two long syllables, are full of dignity. Compound measures are more pathetic than simple; and such as are confined to one genus, move the passions much less than those which pass from one genus to another."

After giving these characteristics of time, Aristides proceeds to prove their reality and foundation in nature, by drawing a parallel between some particular species of rhythm, and the gait and actions of man. He pretends, for instance, "that the motion which answers to the Spondaic measure, is a sign of moderation and fortitude; that Trochaics, or Pæans, indicate a greater degree of fire and vivacity; that the Pyrrhic has something low and ignoble in it; that an irregular velocity implies dissoluteness and disorder; and finally, that a movement resulting from all these, is wild and extravagant."

With respect to the excellence and effects of ancient music, it is very difficult to steer between the extremes of credulity and scepticism. Such enthusiasts as Aristides Quintilianus, by asserting too much, have thrown a ridicule upon the subject, and inclined us, perhaps, to believe too little. The simplicity of ancient melody, and its slavish dependence upon poetry, may probably have given birth to some of these fancies.

In addition to the account already given of the poetic feet under their respective articles, we shall here introduce a

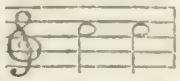
short

ſhort deſcription of each as they more immediately relate to muſic, at the ſame time rendering our diſſertation on rhythm more complete.

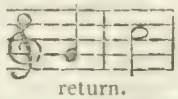
A poetical foot conſiſts of a certain number of ſyllables, which conſtitutes a diſtinct part of a verſe, as a bar does of an air in muſic. An hexameter verſe conſiſts of ſix of theſe feet, a pentameter of five.

The Spondee, Iambus, Trochee, and Pyrrhic or Periambus, are diſſyllabic feet, or of two ſyllables each.

The Spondee conſiſts of two long ſyllables, as *vertunt.* – –

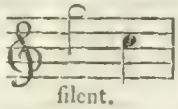


An Iambic foot has one ſhort and one long ſyllable. Θεῷ, λέγω. *potens, amas.* ⏑ –



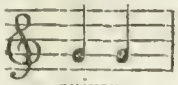
return.

The Trochee has one long and one ſhort ſyllable, as *gratus, muſa.* – ⏑

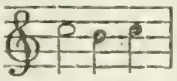


ſilent.

The Pyrrhic, or Periambus, two ſhort ſyllables, as *mare, probus.* ⏑ ⏑



quiver.

The Dactyl, Anapæſt, Moloſſus, Tribrach, Bacchius, Antibacchius, Amphibrachys, and Creticus, are triſyllabics, or of three ſyllables. To ſome of theſe we have no equivalents; however, the Dactyl, conſiſting of one long and two ſhort ſyllables – ⏑ ⏑  is very common in our language, as *tenderly, haſtily;* and we have verſes compoſed of dactyls as well as the Greeks and Romans:

Mȳ | bānks thĕy wĕre | fūrnĭſh'd wĭth | beēs,
Whŏſe | mūrmŭrs in- | vīte ŏne tŏ | ſleĕp.

Theſe may be compared with the following celebrated paſſages in Homer and Virgil, where the ſound is manifeſtly, and intentionally, an *echo to the ſenſe.* Homer (Odyſſey, book xi.) after he has deſcribed in labouring Spondees the ſlow and painful manner in which Syſiphus rolled the ſtone up hill, makes uſe of nimble Dactyls in deſcribing its ſwift deſcent:

Αὖτις ἔπειτα πέδονδε κύλινδε λᾶαν ἀναιδές.

And Virgil, lib. viii. v. 596, deſcribes, in pure Dactyls, the galloping of the horſe:

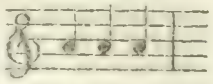
" ———— It clāmŏr, ĕt ăgmĭnĕ fāctō
Quādrŭpĕdāntĕ pŭtrĕm ſōnĭtū quātĭt ūngŭlā cāmpūm."

The Anapæſt has two ſhort and one long ſyllable; as *ſapiens, recubans,* ⏑ ⏑ – . Iſaac Voſſius, "De Viribus Rhythmi," p. 56, has ſaid, that the French have no Dactyls, nor the Engliſh a perfect Anapæſt in their language. Let the French ſpeak for themſelves; but as to our own part of the charge, it is eaſily confuted by the mere mention of the words *recommend* and *diſappoint.*

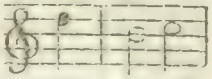
We ſhall enumerate the reſt of the poetic feet of the ancients, merely to ſhew what reſources they had in varying their melody by different combinations of two kinds of notes.

The Moloſſus has three long ſyllables, – – – .

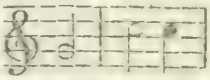
The Tribrach, three ſhort, ⏑ ⏑ ⏑



The Bacchius, which is the reverſe of the Dactyl, has one ſhort, and two long ſyllables, ⏑ – –

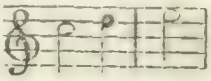


The Antibacchius, two long and one ſhort, – – ⏑



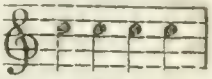
Amphibrachys, one ſhort, one long, and one ſhort, or one long between two ſhort, ⏑ – ⏑

Creticus, one ſhort between two long, – ⏑ –

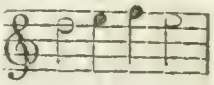


The quadriſyllabics are compounded of feet already mentioned.

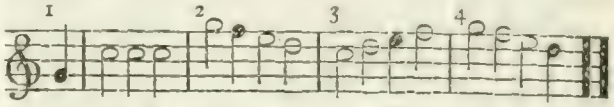
The Proceleuſmaticus is compoſed of four ſhort ſyllables, or of two Pyrrhics, ⏑ ⏑ ⏑ ⏑



The Choriambus, two ſhort between two long, or the junction of the Trochæus and Iambus, – ⏑ ⏑ –



Epitrite; of this foot there are four ſpecies: 1. The Iambus and Spondee ⏑ – – –: 2. The Trochee and Spondee – ⏑ – –: 3. The Spondee and Iambus – – ⏑ –: and 4. The Spondee and Trochee – – – ⏑.



The Pæan or Pæon, which is the contrary of this laſt, conſiſts of one long ſyllable, and three ſhort: – ⏑ ⏑ ⏑, ⏑ – ⏑ ⏑, ⏑ ⏑ – ⏑, ⏑ ⏑ ⏑ –.

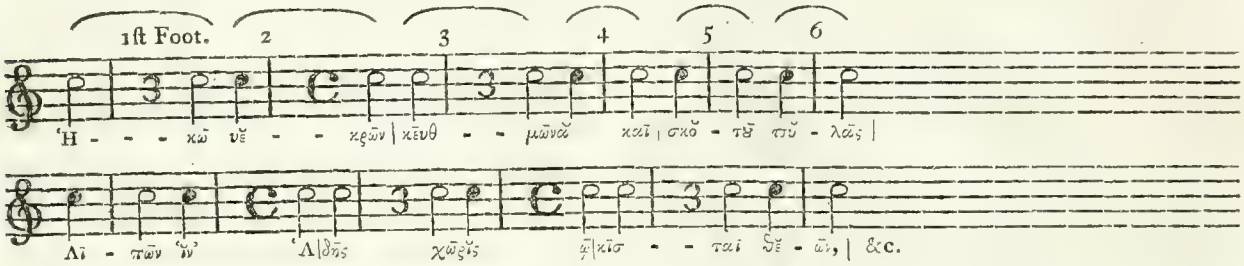
Servius reckons more than a hundred different kinds of verſe among the Latins; and, according to Hephæſtion, the number was ſtill more conſiderable among the Greeks; conſequently their melody might have been varied in as many different ways. There is not, however, the leaſt appearance of the ancients having had in their vocal muſic that kind of meaſure which we call pointed; nor did they admit reſts in the middle of a verſe, though at the end of catalectic, or broken verſes, the ſinger was allowed to make up the deficiency by a ſilence, equivalent to a reſt in modern muſic; and though they had ſo great a variety of feet in their poetry, many of thoſe already inſtanced are unfit for modern melody.

"After all the reſearches," ſays Dr. Burney, "which I have been able to make, it muſt be acknowledged that the ſubject of ancient muſic, in general, ſtill remains, and probably ever will remain involved in much difficulty and uncertainty. It is fortunate, however, for thoſe who wiſh to view as near as poſſible this dark angle of antiquity, that the proſpect happens to be the cleareſt juſt in that part where all its admirers aſſure us it is beſt worth examining; for

for however ignorant we may be of the melody of ancient music, the rhythm, or time of that melody, being regulated entirely, as has been already observed, by the metrical feet, must always be as well known to us as the prosody and construction of the verse; so that we have nothing to do but to apply to the long and short syllables any two notes, one of which is double the length of the other, in order to know as exactly as if we heard, in what manner any particular kind of metre was set by the ancients with respect to time and cadence, that boasted rhythm, which we are so often told was *every thing* in their music. It may, therefore, afford some gratification to the curiosity of those who have never considered the poetry of the ancients in this point of view, if I produce a few examples, which will, perhaps, help to throw a little light upon the *dramatic* music of the Greeks, and give some idea of the rhythmical resources of the *poet-musician* in one of the most interesting provinces of his art.

"The first example shall be of the Iambic verse, which chiefly prevails in the Greek tragedies, and in which the dialogue and soliloquy, indeed all but the chorus and ode, were generally written. I shall content myself with applying notes of correspondent lengths to the syllables, and marking the time; leaving the melody to the imagination of the reader. Should I presume to supply it, I might expect to be reproached as another Salmoneus for my temerity.

"Demens! qui nimbos et non imitabile fulmen, &c."



This measure, when pure and unmixt, consisted of six Iambic feet, as,

ĕquēs | fŏnān|tĕ vēr|bĕrā|bĭt ūn|gŭlā.

Such verses, however, seldom occur. The laws of this metre only required that the second, fourth, and last feet should be Iambics; in the other places, Spondees, Anapæsts, and Dactyls, were admitted. This metre answers to our Alexandrine, or verse of twelve syllables; but more exactly in the *number* and *kind* of feet, than in its cadence, or general effect upon the ear. The pause after the third foot, so essential to a melodious Alexandrine, has no place but by accident, in the Iambic, which runs more swiftly, and has a more prosaic effect. This, undoubtedly, led the ancients to measure it *per dipodiam*, or by *double* feet (see Hor. Art. Poet. v. 252. pes citus: unde, &c.), which answer to double bars in modern music. Ariosto wrote some comedies in this Iambic measure. One of his lines will, perhaps, be as exact a representation of the ancient Iambic as can be produced, in point of cadence.

Per dio son qua|si in pensier di | tornarmene.

The following Alexandrine of Spenser may also serve for the same purpose.

"So in his angry courage fairly pacified."

The above Greek lines are the beginning of the Hecuba of Euripides, and were sung by the ghost of Polydorus. The bars in the verse are only to shew how the ancients divided it into three portions of two feet in each; but the bars of time, the thesis, or beat, must always fall in the middle of the foot: ˘ | ˉ | ˉ. For the sake of distinguishing the feet more clearly, Dr. Burney barred them singly; though it would have been more conformable to the ancient manner of scanning this kind of verse, and probably more expressive of its cadence and *effect*, to have made but three bars in each line. The Iambics of Greek comedy differ from these only in a little more liberty of construction; those of the Roman, in Plautus and Terence, are so licentious, as often not to differ perceptibly from prose, even in the judgment of Cicero himself: "propter similitudinem sermonis, sic sæpe sunt abjecti, ut nonnunquam vix in his numerus et versus sentiri possit." Orator, cap. 55.

Besides this metre, the dialogue admitted, occasionally, Trochaic verses. They are generally introduced in scenes of hurry and disorder; being, as Aristotle has described them, and as their name implies, a voluble and *dancing* measure. A character which the reader will not be inclined to dispute, when he compares the ancient Trochaic with a measure exactly corresponding to it in our own language, but which we have not yet admitted into our tragedy.

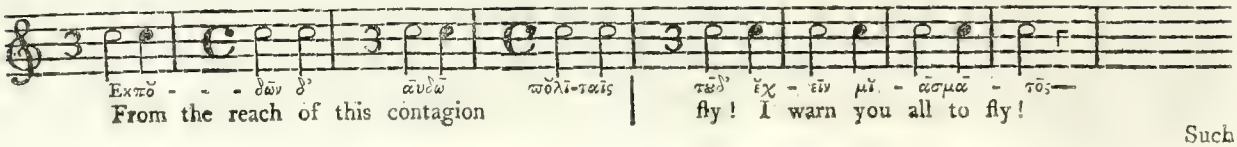
Πῆ ἴμ' ἐν στοῖς, ὃς πεφυγὼς | τὰ δόμων ἐκ δόμων ἐλθοῦς;

This is a pure Trochaic, and is precisely in the measure of our

"Jōllȳ mōrtăls fĭll yoŭr glāssĕs,
Nōblĕ deēds ăre dōne by wīne."

The whole difference is, that the ancient Trochaics were written in one line; but this is merely to the eye; for they really consist of two verses; the last syllable of the *fourth* foot being, as Dr. Burney believes, constantly, the end of a word.

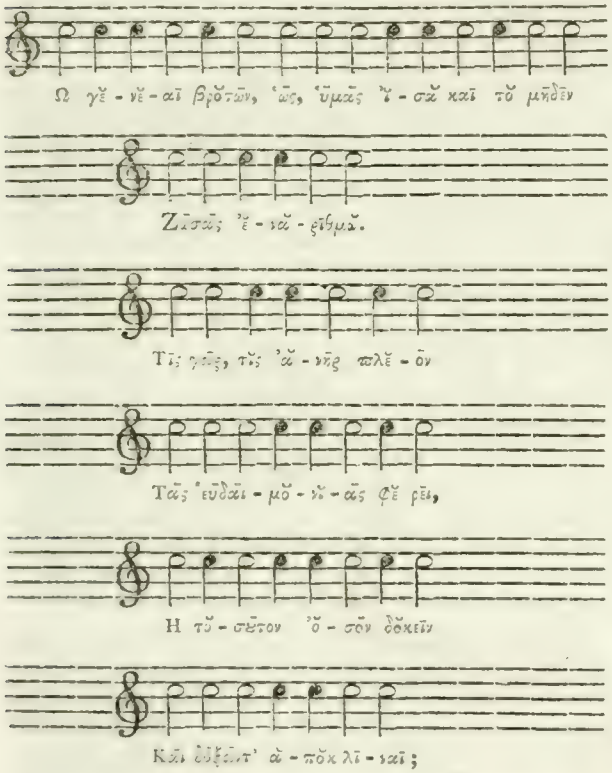
Mr. West, in his translation of the "Iphigenia in Tauris" of Euripides, has given a whole scene of Trochaics in the correspondent English measure. A single line of the original, with his translation, will be a sufficient example of Trochaic rhythm.



Such

Such were the metres appropriated to the dialogue of the ancient tragedy, and ſuch muſt have been the rhythms or times of the muſic to which they were ſet.

We ſhall cloſe theſe obſervations with one example more, taken from the *choral* part of the drama, that part which was more particularly *muſical*, and the circle marked out for the muſician, where all the magic of his art, with all the wonders of rhythm, were to be diſplayed. Of the metre of this part, we ſhall only obſerve, in general, that it ſeems to have admitted of ſuch an unbounded variety in the mixture and arrangement of feet, and to have been fettered by ſo few reſtraints, that, to a modern ear, it is frequently not to be diſtinguiſhed from a ſmooth and elegant proſe. We can therefore be certain of nothing, concerning the muſic applied to the ancient chorus, except the *relative lengths* of the notes as they are determined by the proſody: in what manner the ancients divided them by beats, we do not even preſume to gueſs; and we believe it may be propoſed to the muſical reader as a problem, worthy, for its difficulty at leaſt, if not for its importance, to exerciſe his ſagacity, how the following ſpecimen ſhould be *barred*, in order to render it as little tormenting to the ear as poſſible.



The moſt ſtriking circumſtance in all theſe examples, is the perpetual change of time, occaſioned by the mixture of unequal feet. To the eye, indeed, the recitative of the old French opera preſents a ſimilar appearance; but where no ſtrict time is obſerved, the changes are leſs perceptible to the ear. No circumſtance relative to ancient muſic has been more frequently and triumphantly oppoſed to the modern, in proof of ſuperiority, than its inviolable adherence to the *fixed quantity* of ſyllables. It is, perhaps, equally difficult to diſprove this, and to conceive how ſuch a muſic could be rigorouſly executed, without throwing both the hearers and performers into convulſions. If, however, this was the caſe, we need no longer wonder at the noiſy expedients, to which the ancients had recourſe in beating time; for we believe the beſt modern band would find it difficult, if not impoſſible, to keep exactly together in the execution of a Greek chorus, though aſſiſted by all the clatter of an ancient coryphæus.

Upon the whole, perhaps, even the imperfect view which we have here attempted to give of the rhythmical reſources of ancient muſic, may be ſufficient to warrant ſomething more than a doubt, whether, after all that Iſaac Voſſius, and many others, have ſaid, a *fixed* proſody, and the rigorous, unaccommodating length of ſyllables, be any recommendation of a language *for muſic*; that is, whether a muſic formed and moulded cloſely upon ſuch a language, muſt not neceſſarily be cramped and poor, in compariſon of that free, unſhackled variety; that independent range of rhythmical phraſe, which conſtitutes ſo conſiderable a part of the riches of *modern* muſic. Let the moſt inventive compoſer try to ſet half a dozen Hexameters, pure Iambics, or any other verſes that will fall into regular common or triple time, and he will ſoon find that no reſources of melody are ſufficient to diſguiſe or palliate the inſipid and tireſome uniformity of the meaſure; and as for any thing like expreſſion, we may as well expect to be affected by the mechanical ſtrut of a ſoldier upon the parade. In other metres, ſuch as thoſe already given in the preceding examples, where feet of different times are intermixed, *ſome* variety is indeed acquired; but it is a miſplaced variety, which, without obviating the tireſome effect of a confinement to no more than *two* lengths of notes, adds to it that of an aukward and uncouth arrangement; the ear is ſtill fatigued with uniformity where it requires change, and diſtracted by change where it requires uniformity.

Modern muſic, on the contrary, by its diviſion into *equal* bars, and its *unequal* ſubdiviſion of theſe bars by notes of various lengths, unites to the pleaſure which the ear is by nature formed to receive from a regular and even meaſure, all the variety and expreſſion which the ancients ſeem to have aimed at by ſudden and convulſive changes of time, and a continual conflict of jarring and irreconcileable rhythms.

Nothing ſeems more eſſential to muſical pleaſure, than the diviſion of melody into equal portions of time, or bars. Quintilian attributed to this natural menſuration of the ear, the firſt production of poetry: "Poema—aurium menſurâ, et ſimiliter decurrentium ſpatiorum obſervatione eſſe generatum."[2] Hexameters and Iambics appear to have been the moſt ancient Greek metres; and the latter, if we may credit Horace, Art. Poet. 253, were at firſt *pure* and uncompounded. The mixture of *unequal* feet, and the Dithyrambic licence of lyric poetry, were later refinements. The progreſs of muſical rhythm was, of courſe, the ſame. Plutarch expreſsly ſays, in the dialogue de Muſicâ, that the compoſitions of Terpander, and other old maſters, were ſet to Hexameters, chiefly of Homer; that is, they were in regular common time. The change and intermixture of rhythms is ſpoken of as the innovation of modern artiſts. Plato rejects theſe complicated meaſures from the muſic of his republic; and even Iſaac Voſſius, the great champion of ancient rhythm, who aſſerts that "no man can be a good muſician, that is not a *good drummer*," owns, p. 11, that "vitioſum et incompoſitum imprimis, fiet carmen, ſi duorum, trium, quatuor, pluriumve temporum pedes, veluti Pyrrichii, Iambi, Dactyli, Pæones, Ionici, ſimul copulentur;" though this is done continually, not only in the lyric part, but even in the dialogue of the ancient drama.

It is evident, from the proofs already given, that the Greeks and Romans had but two different degrees of long and ſhort notes; and even the old lozenge and ſquare cha-

racters ſtill uſed in the canto fermo of the Romiſh church, under the denomination of Gregorian notes, are but of two kinds; the time of theſe may, indeed, have been accelerated or retarded, but ſtill the ſame proportion muſt have been preſerved between them; and all their variety muſt have ariſen from different combinations of theſe two kinds of notes, ſuch as any two of ours could afford; as ſemibreves and minims, minims and crotchets, or crotchets and quavers.

This accounts for the facility with which even the common people of Greece could diſcover the miſtakes, if any were committed, in the length and ſhortneſs of the ſyllables, both with reſpect to the poetry, and the muſic, a point of hiſtory in which all writers agree; for beſides the intervals peculiar to the melody, rhythm, or time, muſt have contributed to characterize the modes, though it has no kind of connection with our flat and ſharp keys; and this gives an idea quite different from what our modern modes, taken as keys, and our muſic, in general, furniſh. Tartini, upon this ſubject, ſays, that we make the proſody ſubſervient to the muſic, not the muſic to the proſody; and adds, "that as by the laws preſcribed to the ancient muſicians, they were obliged to preſerve rigorouſly in their muſic the quantity of ſyllables, it was impoſſible to protract a vowel, in ſinging, beyond the time which belonged to a ſyllable; we, on the contrary, prolong the vowels through many bars, though in reading they are oftentimes ſhort."

Tartini, however, in pure courteſy, allows to the ancients a diſcretionary power of making ſyllables longer or ſhorter than rigorous time would admit, in order to diverſify expreſſion, and to enforce the paſſion implied by the words; but if time was rigorouſly beaten, in the manner the ancients have related, it is not very eaſy to ſubſcribe to this opinion.

Having explained the nature, difference, and properties of ancient rhythm, Dr. Burney beſtows a few words on an examination of the modern, and endeavours to ſhew what it has, in common with the ancient, and what peculiar to itſelf.

We no longer know rhythm now under its ancient name; however, it has been continued, with a ſmall change of pronunciation, merely to expreſs the final cadence of verſes, or the agreement and ſimilarity of ſound in the laſt ſyllables of two or more lines in poetry; being at preſent what we call *rhyme;* whereas the proportion ſubſiſting between the different parts of a melody are called *time*, *meaſure*, *movement*.

And when we come to examine this proportion, we find that it only conſiſts of two kinds, differently modified; and theſe two are known by the names of *common time*, conſiſting of equal numbers, and *triple time*, of unequal.

Tartini has deduced all meaſure from the proportions of the octave and its fifth. "Common time, or meaſure," ſays he, "ariſes from the octave, which is as 1 : 2; triple time ariſes from the fifth, which is as 2 : 3. Theſe," adds he, "are the utmoſt limits within which we can hope to find any practicable proportions for melody. Indeed many have attempted to introduce other kinds of meaſure, which, inſtead of good effects, have produced nothing but the greateſt confuſion; and this muſt always be the caſe. Muſic has been compoſed of five equal notes in a bar, but no muſician has yet been found that is able to execute it."

By the improvement of inſtrumental muſic, and indeed by the liberties which we have taken with poetry in ſinging, we have multiplied notes, and accelerated the meaſure. Inſtead of one ſound to one ſyllable, or one portion of time for a ſhort ſyllable, and two for a long one, we frequently divide and ſubdivide the time of theſe ſeveral portions into all their aliquot parts, and ſometimes into incommenſurable quantities.

After the invention of muſical characters for time, different from thoſe in poetry, the ſtudy of their relations became one of the moſt laborious and perplexed parts of a muſician's buſineſs. Theſe characters were of different value and velocity, according to other characters placed at the beginning of a muſical compoſition, and likewiſe frequently occurring in the courſe of a piece, to announce a change of meaſure; as from common time to triple, from quick to ſlow, or the contrary. Theſe characters were called *moods*, but they were ſo extremely embarraſſing and ill underſtood, till the invention of bars, by which muſical notes were divided into equal portions, that no two theoriſts agreed in the definition of them.

Theſe modes, by which the kind of movement, with reſpect to quick and ſlow, as well as the proportions of the notes, uſed to be known, ſince the uſe of technical terms, chiefly taken from the Italian language and muſic, has been adopted, ſerve no other purpoſe than to mark the number and kind of notes in each bar.

But by this invention of muſical characters for time, and the uſe of bars, we have certainly advanced in the performance of inſtrumental muſic, by giving to it more energy and accentuation; it has now a cadence and feet of its own, more marked and ſenſible than thoſe of poetry, by which it uſed to move.

We have alſo, in our *airs*, a diſtinct ſpecies of muſic for poetry, wholly different from recitative and chanting; for in theſe we are no more tied down to ſtated meaſure than the ancients, but are governed by the accent and cadence of the words. However, our florid-ſong, it cannot be diſſembled, is not always ſufficiently ſubſervient to poetry; for in applying muſic to words, it frequently happens that the fineſt ſentiments and moſt poliſhed verſes of modern languages are injured and rendered unintelligible, by an inattention to proſody. Even the ſimple and plain rules of giving a ſhort note to a ſhort ſyllable, a long to a long; and of accentuating the muſic by the meaſure and natural cadence of the verſe, which the mere reading would point out to a good ear and underſtanding, are but too frequently neglected.

Modern melody requires, perhaps, more than a ſingle ſound to a ſingle ſyllable; and a fine voice deſerves, now and then, a long note to diſplay its ſweetneſs; but this ſhould be done upon long ſyllables, and to open vowels, and, perhaps, in general, after the words have been once ſimply and articulately ſung, for the hearer to know what paſſion is intended to be expreſſed, or ſentiment enforced, by future diviſions.

Expletives, particles, and words of ſmall importance, are forced into notice by careleſs or ignorant compoſers, who, only intent upon mere muſic, pay no regard to her ſiſter, poetry. But then, poetry, in revenge, is as little ſolicitous about muſical effects; for ſymmetry of air, or ſimplicity of deſign, are generally ſo little thought of, that every heterogeneous idea, which can be hitched into rhyme, is indiſcriminately crowded into the ſame ſong. Indeed muſic and poetry, like man and wife, or other aſſociates, are beſt aſunder, if they cannot agree; and on many occaſions, it were to be wiſhed, that the partnerſhip were amicably diſſolved.

Salinas tells us, from St. Auguſtine, that poets and muſicians have ever been at ſtrife concerning long and ſhort ſyllables, accents, and quantity, ſince they have ceaſed to be united in one and the ſame perſon, and have ſet up different intereſts.

There is ſome poetry ſo replete with meaning, ſo philoſophical,

ſophical, inſtructive, and ſublime, that it becomes wholly enervated by being drawled out to a tune, which affects no part of the head, but the ear.

And there is, again, ſome kind even of inſtrumental muſic, ſo divinely compoſed, and ſo expreſſively performed, that it wants no words to explain its meaning; it is itſelf the language of the heart and of paſſion, and ſpeaks more to both in a few notes, than any other language compoſed of claſhing conſonants, and inſipid vowels, can do in as many thouſand.

And, upon the whole, it ſeems as if poetry were more immediately the language of the head, and muſic that of the heart; or, in other words, as if poetry were the propereſt vehicle of inſtruction, and modulated ſound that of joy, ſorrow, and innocent pleaſure. "Let the muſician," ſays M. Rouſſeau, "have as many images or ſentiments to expreſs as you pleaſe, with few ſimple ideas; for the *paſſions* only *ſing*, the *underſtanding ſpeaks*."

But, notwithſtanding both poetry and proſody are ſo frequently injured by injudicious compoſers, it muſt not be imagined that in our ſimple airs of the gavot and minuet kind, we have no muſical rhythm, or that it always claſhes with the poetical. Innumerable inſtances may be given from well-known Engliſh ſongs, where the cadence of the verſe, and even the pronunciation of each ſyllable, is carefully preſerved by the air. For though our time-table furniſhes ſix different degrees of long and ſhort notes, without points, yet, if the diviſions in ſongs deſigned to diſplay a particular talent for difficult execution be excepted, we ſeldom uſe more than *two* kinds of notes in the ſame air.

"Mirth, admit me of thy crew," by Handel, as well as ſeveral popular ſongs by Dr. Arne, Mr. Jackſon, and others, are ſufficiently conformable to poetical numbers and rhythm, to ſatisfy the greateſt admirers of ancient ſimplicity, or even ſuch as love poetry better than muſic, from whom complaints of non-conformity generally proceed.

Iſaac Voſſius ſays it is now above a thouſand years ſince muſicians have loſt that great power over the affections, which aroſe only from the true ſcience and uſe of rhythm; and he accuſes modern muſic of ſuch a want of time and accent, as to be all of one ſtyle and colour. We will not defend the age in which Voſſius wrote from the charge, nor the muſic of the preſent ſerious opera in France; but the compoſitions of Italy and Germany are certainly free from the cenſure, as muſic is now more divided into phraſes, and ſentences, than it was; time is more marked, and more eaſily felt than it has ever been ſince the days of Guido. What it was before, is not very well known; but to confeſs the truth, it is our opinion, that whatever it has comparatively loſt in ſome particulars, it has gained in others.

RHYTHMICA, Rhythmice, Ῥυθμικη, in the *Ancient Muſic*, that branch of muſic which regulated the rhythmus. See the preceding article.

RHYTHMOPŒIA, one of the muſical faculties, as they are called, which preſcribes rules for the motions, or rhythm.

The ancient rhythmopœia is very defective. We find nothing of it in the books of the ancients, but ſome general hints, which can ſcarcely be called rules. In their explications there appears nothing but what belongs to the words and verſes of their ſongs, which is a ſtrong preſumption they had no other. See Rhythm.

RHYTIDOSIS, formed of ῥυτιδοω, *to wrinkle*, the name of a diſtemper of the eye, in which it waſtes and wrinkles up.

RHYTIS, in *Botany*, from ῥυτις, *a channel*, or *furrow*, ſo named by Loureiro, becauſe it has a furrowed berry.—Loureir. Cochinch. 660.—Claſs and order, *Polygamia Dioecia*. Nat. Ord. . . .

Gen. Ch. Perfect Flowers, *Cal.* Perianth inferior, cloven into from three to ſix, obtuſe, ſpreading ſegments. *Cor.* none. *Stam.* Filaments three, thread-ſhaped, erect, longer than the calyx, attached to the receptacle; anthers two-lobed. *Piſt.* Germen ſuperior, rather long; ſtyle none; ſtigmas three, cloven, reflexed. *Peric.* Berry flatly ovate, rugoſe, flaccid, with one cell, and three, ovate, ſmall *ſeeds*.

Female Flowers on a ſeparate plant, *Cal.* Perianth inferior, cloven into numerous, lanceolate, hairy, ſpreading ſegments. *Cor.* none. *Stam* none. *Piſt.* and *Peric.* as in the perfect flowers.

Eſſ. Ch. Calyx from three to ſix-cleft. Corolla none. Stamens three. Stigmas three. Berry three-ſeeded.

Female, Calyx cloven into many ſegments.

1. R. *fruticoſa*. Shrubby Rhytis. Loureir. Cochinch. 660.—Native of woods in Cochinchina.—A *ſhrub* about ſix feet high. *Stem* nearly erect, branched in a ſpreading manner. *Leaves* alternate, ovate-oblong, ſlightly pointed, ſmooth, entire. *Flowers* in long, ſlender, crowded, terminal *ſpikes*. *Berry* channelled.

RHYTIUM, in *Ancient Geography*, a town of the iſland of Crete.

RHYZELIUS, Andrew, in *Biography*, a learned Swediſh biſhop, was born in Weſt Gothland in 1677, and ſtudied at Upſal. In 1711 he was appointed profeſſor of theology at Abo, from thence he proceeded to Upſal, where he was ordained, and appointed under paſtor of the congregation of St. Nicholas at Stockholm. In 1713 he was nominated by Charles XII. to be one of his chaplains, whom he afterwards accompanied to Norway. He obtained other high offices, and at length, in 1743, he was raiſed to the epiſcopal bench. He died in the year 1761, leaving behind him a high character for deep learning and accurate judgment. His works are numerous, ſome of which are, 1. "Svio-Gothica munita," or an hiſtorical deſcription of the towns, fortreſſes, caſtles, and royal palaces in the kingdoms of Sweden and Gothland. 2. "Monaſteriologia Svio-Gothica," or a deſcription of monaſteries. 3. "Mnemonica Hiſtoriæ Svio-Gothica Epitome." 4. "Epiſcopoſcopia Svio-Gothica," or a chronicle of the Swediſh biſhops. Gen. Biog.

RIAÇA, or Riaza, in *Geography*, a river of Spain, which riſes in the mountains which ſeparate Old and New Caſtile, and runs into the Duero near Roa.

RIADHIAT, in *Modern Hiſtory*, a ſuperſtitious practice among the Mahometans, and chiefly among thoſe of Hindooſtan, which conſiſts in ſhutting themſelves up for fifteen days, without any other nouriſhment than bread and water, in a place where there is no light; during which time, the devout Muſſulman inceſſantly repeats the word *hou*, which denotes one of the attributes of God.

RIAITTE', in *Geography*, a town of France, in the department of the Lower Loire, and chief place of a canton, in the diſtrict of Ancenis; 12 miles N. of Ancenis. The place contains 613, and the canton 5555 inhabitants, on a territory of 150 kiliometres, in 5 communes.

RIAL, in *Commerce*. See Real.

Rial, or *Royal*, is alſo the name of a piece of gold anciently current among us for ten ſhillings.

In 1 Henry VI. by indenture of the mint, a pound weight of gold of the old ſtandard was coined into 45 rials, paſſing for ten ſhillings a-piece, or a proportional number of half rials, paſſing at five ſhillings a-piece; or rial farthings, which went at two ſhillings and two-pence.

In

In 1 Henry VIII. the gold rial was ordered to pafs at eleven fhillings and three-pence. In 2 Elizabeth, gold rials were coined at fifteen fhillings a-piece, when a pound weight of old ftandard gold was to be coined into 48 rials. In 3 James I. rofe-rials of gold were coined at thirty fhillings a-piece, and fpur-rials at fifteen fhillings.

RIALEJO, in *Geography*, a town on the W. coaft of the ifland of Teneriffe.

Rialejo, or *Ria Lexa*. See Realejo.

RIALP, a town of Spain, in the province of Catalonia.

RIANA, in *Botany*, a genus of Aublet's; but that author gives no account, or reafon, why it is fo called. We prefume this may be its common name in Guiana.—Aubl. Guian. 237. Juff. 287. Lamarck Illuftr. t. 135.—Clafs and order, *Pentandria Monogynia*. Nat. Ord. *Berberides*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, cloven into five, roundifh, acute fegments. *Cor.* Petals five, ovate, acute, joined at the bafe. Nectary of five fcales. *Stam.* Filaments five, very fhort, inferted at the bafe of the nectary; anthers ovate-oblong, nearly feffile, two-celled. *Pift.* Germen fuperior, ovate, villous, with five ftreaks; ftyle fleffy; ftigma capitate, obtufe. *Peric.* Capfule oblong, of one cell, and three valves, compreffed in the middle. *Seeds* three.

Obf. Aublet defcribes the five-fcaled nectary, as five inner petals.

Eff. Ch. Calyx deeply five-cleft. Petals five. Nectary compofed of five fcales. Anthers nearly feffile. Capfule of one cell and three valves. Seeds three.

1. R. *guianenfis*. Aubl. Guian. t. 94.—Native of woods in Aroura, where it flowers in Auguft. This *fhrub* is ten feet high, and has a branched *trunk*. *Branches* erect, knobbed. *Leaves* oppofite, ftalked, ovate-oblong, acute, toothed, fmooth, rigid. *Stipulas* fhort, twin, oppofite, acute, deciduous. *Flowers* white, arranged in an alternate manner, forming a terminal *fpike*; each flower on a fhort *ftalk*, which has four fcales or bracteas at the bafe.

Juffieu fufpects that this plant may be akin to *Paffoura*, Aubl. Guian. t. 380.

RIANANTLA, in *Geography*, a town of Mexico, in the province of Tlafcala; 60 miles S. of Puebla de los Angelos.

RIANJO, a town of Spain, in Galicia, at the mouth of the Ulla; 23 miles S.W. of Compoftella.

RIANO, a town of Italy, in the Patrimonio; 13 miles N. of Rome.—Alfo, a town of Naples, in Abruzzo Ultra; 8 miles W. of Teramo,

RIANS, a town of France, in the department of the Var; 10 miles N.W. of St. Maximin.

RIAO, an ifland in the Eaft Indian fea, about 25 miles in circumference, near the W. coaft of Morty. N. lat. 2° 25′. E. long. 128° 2′.

RIAPA Creek, a river of Weft Florida, which runs into the Miffifippi, N. lat. 31° 2′. W. long. 91° 17′.

RIAVIA, a mountain of Africa; 60 miles W. of Tripoli.

RIAZAN, a town of Ruffia, and capital of a government, on the Oka; 80 miles S.S.E. of Mofcow. N. lat. 34° 45′. E. long. 38° 54′.

RIAZANSKOE, a government of Ruffia, bounded on the N. by Vladimirfkoi, on the E. and S. by Tambovfkoi, and on the W. by Mofkovfkaia and Talfkoe; 108 miles from N. to S. and 100 from E. to W. N. lat. 54° 40′ to 55° 20′ E. long. 38° to 41°.

RIAZSK, a town of Ruffia, in the government of Riazan; 56 miles S.E. of Riazan. N. lat. 54°. E. long. 40° 4′.

RIB, in *Rural Economy*, the fmall arched bones forming the chefts of animals. Cattle and moft other animals fhould be full in the rib.

In horfes the cheft or barrel formed by the ribs fhould be full and circular, taking their fullnefs quite from the back-bone. See Horse.

Rib-*Furrowing*, in *Agriculture*, a mode of ploughing fomewhat fimilar to that of ribbling.

Rib-*Grafs*, a fort of grafs much cultivated in fome diftricts, and which is faid to afford an herbage of which cattle are very fond. It is alfo afferted to be ufeful as a grafs for milch cows, and alfo for fattening any fort of ftock. It is an indigenous plant in this country, which frequently abounds in pafture or meadow lands where the foil is rather inclined to moifture. See Plantago.

In the mode of cultivating it as a grafs for cattle food under the modern fyftem of hufbandry, from four to fix pounds of feed are ftated by Mr. Donaldfon to be fown upon the acre. It is a coarfe fort of grafs, however, that requires to be kept well fed down, in order to render it valuable and prevent its running to feed.

In Chefhire fome farmers are fond of it, while others think that its place would be better fupplied by fome of the other graffes. In fome places, fome fields are fown with it, nearly without any admixture of grafs feeds; and where plentiful crops of it have been produced no animal would eat it, which is fuppofed probable from its nature. And in the Staffordfhire agricultural report, it is faid that there is authority for afferting that cattle will not eat its leaves, but it is believed to be grateful in admixture with other herbage.

RIBA, or Ribas, in *Geography*, a town of Spain, in New Caftile, on the Xaramo, founded by William de Ribas of Segovia, a celebrated commander, in the year 1100; 9 miles from Madrid.

Riba *de Sella*, a fmall fea-port of Spain, in Afturia, on the coaft of the Atlantic; 36 miles E.N.E. of Oviedo. N. lat. 43° 28′. W. long. 5° 18′.

RIBADAVIA, a town of Spain, in Galicia, famous for its vineyards, which are faid to produce fome of the beft wine in Spain; 15 miles S.W. of Orenfe.

RIBADENEIRA, Peter, in *Biography*, a Spanifh Jefuit, was a native of Toledo. He ftudied at Paris and at Padua, after which he taught rhetoric with reputation at Palermo. He died at Madrid in 1611, aged 81. His works are "Lives of the Saints," folio, 1616; the "Lives of St. Ignatius Loyola, St. Francis de Borgia, and of the Father Lainez and Solmeron;" "A Treatife of the Schifm of England;" another entitled "The Prince," which is full of bad political maxims; and the "Library of Writers among the Jefuits," 8vo.

RIBADEO, in *Geography*, a fea-port town of Spain, in Galicia, at the mouth of the Eo, with a good harbour defended by two caftles; 15 miles N.E. of Mondonedo. N. lat. 43° 33′. W. long. 7° 5′.

RIBAGNAC, a town of France, in the department of the Dordogne; 5 miles S. of Bergerac.

RIBAGORZA, a diftrict of Spain, bordering on the E. part of Aragon, and W. part of Catalonia; watered by the river Noguera de Ribagorza, about 40 miles long and 18 wide, N. of Balaguers.

RIBAN, an ifland in the Red fea, near the coaft of Arabia. N. lat. 17° 12′.

RIBAT-

RIBATTUTA, Ital. in *Muſic*, is iterating, ſtriking, or ſounding the ſame note again.

Ribattuta *di Gola* is one of the graces uſed in ſinging; it is performed by beating or ſtriking two diatonic notes, the one ſlow and the other quick, in the following manner.

It differs from the ſhake and the beat.

RIBAUDEQUEM, in *Ancient Artillery*, a projectile machine uſed in the 11th and 12th centuries, which was a large kind of croſs-bow: the croſs-bow was called in Latin baliſta, and ſometimes manubaliſta.

RIBAUVILLE', in *Geography*, a town of France, in the department of the Upper Rhine, and chief place of a canton, in the diſtrict of Colmar; 6 miles N. of Colmar. The place contains 4950, and the canton 14,219 inhabitants, on a territory of 85 kiliometres, in 9 communes.

RIBBAND, or Ribbond, a narrow ſort of ſilk, chiefly uſed for head ornaments, badges of chivalry, &c.

The knights of the Garter wear a blue ribband; thoſe of the Thiſtle, a green ribband, &c. ſcarfwiſe. See Collar, Garter, &c.

Ribbands, *Figured*. See Figured.

Ribband, or *Ribbon*, in *Heraldry*, is the eighth part of a bend. (See the article Bend.) It is borne a little cut off from the outlines of the eſcutcheon: thus; he beareth or, a ribband, gules.

Ribbands, from *rib* and *band*, in *Ship Building*, are long pieces of fir timber from four to eight inches ſquare, according to the ſize of the ſhip; theſe are nailed on at certain heights to the frame timbers of the ſquare body, as the *harpins*, which are oak of the ſame ſize, are nailed to the frames of the cant-bodies; but the latter are ſhaped to the form of the body by moulds and bevelling. The ends of the harpins forward are faſtened againſt the ſtem, and thoſe abaft againſt the ſtern-poſt or tranſoms; the ribbands then uniting with the harpins, envelop the ſhip lengthways, and being judiciouſly arranged, with regard to their diſtance from each other, they not only ſupport the filling-timbers, but by being ſhored at every frame, the whole ſhip is ſupported, and kept to her true ſhape, until the plank is brought on, as they are in that caſe removed one at the time, the bottom being ſhored againſt the planks above. The difference between cant-ribbands and horizontal or ſquare ribbands is, that the latter are only ideal, and uſed in the laying-off.

RIBBING Nails. See Nail.

RIBBLE, in *Geography*, a river of Lancaſhire, England, has its ſource in the high moors of Craven, Yorkſhire, and paſſing the lofty mountains of Ingleborough and Pennigaut, enters the county of Lancaſter near the town of Clitherhoe, where it forms a boundary to the county. Taking a ſouth-weſtern courſe, and receiving, in its progreſs through Lancaſhire, ſeveral ſmaller ſtreams, and the tributary rivers of the Hodder, Calder, and Darwent, it paſſes by Ribcheſter and Preſton. Soon after leaving the latter town it gradually expands its ſtream, and in a few miles preſents a broad eſtuary, and unites its waters with the Iriſh ſea. At this place, the ferry from North Theols to Lytham, it is about five miles acroſs at high water. This river is navigable, for ſmall coaſters, as high as Preſton, and was formerly capable of conveying veſſels much higher up the country. At Preſton it is croſſed by an aqueduct, for the Lancaſter canal. See Aſton's Lancaſhire Gazetteer, Beauties of England, vol. ix. and Whitaker's Hiſtory, &c. of Whalley, 4to.

RIBBLING, in *Agriculture*, a term uſed in ſome diſtricts to ſignify a mode of ploughing ſimilar to that of ſlob-furrowing. It is practiſed in ſome northern counties as well as thoſe of the ſouth, and in the former appears to be the only kind of winter fallow which is beneficial to lands of looſe texture. Every furrow that is turned over on a foot of ſolid ground, from the beginning to the end of the ridge, that is every alternate furrow, is left untouched, and the ploughed furrow is turned over above it, ſo that the greateſt ſurface poſſible is expoſed to the ameliorating influence of the atmoſphere, while, at the ſame time, the looſe ſoil is out of the reach of any little rills which may run down in the different ruts. If the ſtubble has been, in ſome meaſure, luxuriant, and the ribbling done ſoon after the crop was taken from the ground, the two ſtrata of ſtubbles meeting and fermenting under cover of the rid furrow, form, it is ſuppoſed, an aid to the ſubſequent manure, while the weeds are no leſs ſmothered than when the whole land is turned over by a complete ploughing. Nevertheleſs, it is believed, that when the uſe of green crops becomes general, and the planting and hoeing of them are neatly performed by the plough, this will ſtir the earth more perfectly, and pulverize and clean the ſoil more completely than any winter fallow or ribbling can poſſibly effect. See Tillage.

RIBCHESTER, in *Geography*, a village and pariſh in the hundred of Blackburn, and county palatine of Lancaſter, England, is ſituated at the diſtance of five miles and a half N.N.W. from the town of Blackburn, and eight miles N.E. from Preſton. Though now comparatively an inſignificant place, it was in Roman times an important and flouriſhing town. Much diſpute has taken place among antiquaries with reſpect to the original name of this ſtation. Horſley calls it the Coccium of Antoninus, and Camden the Rigodunum of Ptolemy, the identity of which places is clearly proved by the reaſonings of Dr. Whitaker, in his Hiſtory of Whalley. (See Coccium, in which article for *Rilcheſter* read *Ribcheſter*.) Mr. Whitaker, the author of the Hiſtory of Mancheſter, however, contends that Ribcheſter muſt have been the Rerigonium of Richard of Cirenceſter, and places Coccium at Blackrode. But whatever was the name of this place, it was indubitably among the number of Agricola's ſtations, and appears to have been not merely a military poſt, but the ſeat of manufacturing and commercial proſperity. At that period the river Ribble was navigable as high as Coccium to veſſels of no inconſiderable burden. Of this fact, tradition, the veſtiges of a dock, and numerous nautical relics, afford inconteſtible proof. To the filling up of the river, by the gradual accumulation of ſand, is to be attributed, in part at leaſt, the decay of this place after its abandonment by the Romans. Many votive ſtones, and others with inſcriptions, have been found here. Of theſe Dr. Whitaker has printed nine, but they do not furniſh any thing intereſting either with reſpect to the place or the people. Various ſmaller antiquities have likewiſe been dug up here at different periods; ſuch as ſilver and braſs coins, an intaglio in a ruby, gold rings, &c. "But," to uſe the words of the hiſtorian of Whalley, "the nobleſt diſcovery ever made here, or perhaps in Britain, was in the year 1796, when the ſhelving bank of the Ribble expoſed the following remains, which ſeemed to have been depoſited in an excavation of the earth, filled up with ſoil of a different quality. Theſe were,

were, 1. A large flat earthen veſſel, extremely thick, with the potter's ſtamp very diſtinct, "Boriedof, *Boriedi officina.*" 2. An entire patera of copper, about ſix inches diameter, with a handle. 3. The imperfect remains of a ſimilar veſſel. 4. A column, or colander of the ſame ſize and metal. 5. Several concave and circular plates of copper, with loops behind, which had evidently been intended to faſten them perpendicularly againſt a ſhaft, in order to form a Roman vexillum: ſuch are frequent upon ancient monuments; but for a particular illuſtration, the reader is referred to a monument of Lucius Duccius, ſignifer of the ninth legion, in Horſley, pl. 63. 6. A very fine helmet, of which the creſt was a ſphinx, afterwards unfortunately loſt, the head-piece enriched with baſſo relievos of armed men ſkirmiſhing with ſwords, and a viſor, conſiſting of an entire and beautiful female face, with orifices at the eyes, mouth, and noſtrils." Theſe remains were depoſited in the muſeum of Charles Townley, eſq. The helmet particularly merits attention. From the ſtyle of the head-piece, it is conjectured by the beſt judges not to be prior to the age of Severus; but the viſor is a much more delicate and exquiſite piece of workmanſhip, and is ſuppoſed not only to be Grecian, but, from the boldneſs of its lines, to belong to a period ſomewhat anterior to the laſt perfection of the arts in that wonderful country. For engraving of this helmet, with ſome obſervations thereon, ſee "Vetuſta Monumenta," vol. iv.

The chief remains of this ſtation, now viſible, are a mutilated rampart and foſſe, ſurrounding a ſmall eminence near the church, which is called Anchor-hill, from the circumſtance of ſeveral anchors having been dug up at its baſe. In the ſame place, ſome years ago, an entire veſſel was diſcovered at a great depth beneath the ſurface of the ground. From this place the Roman road, called Watling-ſtreet, ſtretches itſelf in a northern direction over Long Ridge Fell, marked by "a long ſtripe of green interſecting the brown heath of the mountain." Hence it is denominated Green Lane. It enters Yorkſhire a little below Dowford bridge, and proceeds by Newton and Bentham to the celebrated ſtation at Overborough.

The pariſh of Ribcheſter formerly conſtituted a portion of the original pariſh of Whalley, but was ſevered from it at the ſame time with that of Chipping. According to the parliamentary returns of 1811, it contained 649 houſes, and 3544 inhabitants, including the townſhips of Ribcheſter, Dilworth, Dutton, Alſton, and Hotherſal.

At Stede, in the vicinity of Ribcheſter, is a parochial chapel, which Dr. Whitaker ſtates to be the oldeſt building within the boundaries of ancient Whalley. It appears to have formerly belonged to a guild, or hoſpital, and, from the ſtyle of its architecture, was probably erected in the reign of king Stephen. The arches are ſlightly pointed, and are decorated with zigzag, and other Saxon ornaments. In the interior is a "coffin tomb" of high antiquity, placed in front of the pulpit, which is elevated upon an antique ſtone pediment. The floor is covered with ancient grave ſtones, ſome of which are inſcribed with Longobardic or Norman characters. An Hiſtory of the original Pariſh of Whalley and Honor of Clitheroe, in the Counties of Lancaſter and York, by Thomas Dunham Whitaker, L. L. D., F. S. A. 2d edit. 4to. Lond. 1806. A Deſcription of the Country, from thirty to forty Miles round Mancheſter, by J. Aikin, M. D. 4to. Lond. 1795. Hiſtory of Mancheſter, by John Whitaker, B. D., F. S. A. 2. vols. 4to. 1771. Antiquitates Bremetonacenſes; or the Roman Antiquities of Overborough, &c. Lond. 4to. 1746.

RIBECOURT, a town of France, in the department of the Oiſe, and chief place of a canton, in the diſtrict of Compiegne. The place contains 520, and the canton 8805 inhabitants, on a territory of 182½ kiliometres, in 21 communes.

RIBEMONT, a town of France, in the department of the Aiſne, on the Oiſe, and chief place of a canton, in the diſtrict of St. Quentin; ſix miles S.E. of St. Quentin. The place contains 2345, and the canton 12,497 inhabitants, on a territory of 182½ kiliometres, in 17 communes.

RIBENSKOI, a town of Ruſſia, on the Tunguſka; 72 miles E.S.E. of Eniſeiſk.

RIBERA, Francis de, in *Biography*, a learned Spaniſh Jeſuit in the ſixteenth century, was born in the year 1537. He purſued his academical ſtudies at the univerſity of Salamanca, and acquired a high reputation for his intimate acquaintance, not only with the Latin, but with the learned languages alſo. Having been ordained prieſt, he retired to his native place, that he might proſecute his theological ſtudies in uninterrupted privacy, at the ſame time he was able to aſſiſt his brethren in the neighbouring country churches. In the year 1570, when he was thirty-three years of age, he was perſuaded to unite himſelf with the diſciples of Loyola, and become a member of their ſociety. He now ſpent moſt of his time in interpreting the ſcriptures, and filling the chair of profeſſor of divinity, in their ſeminary at Salamanca, till his death, which happened in the year 1591. He was author of numerous works, which are ſtill in eſtimation with the Catholics; among theſe may be mentioned "Commentarii in XII. Prophetas minores, ſenſum eorundem Prophetarum hiſtoricum et moralem, ſæpe etiam Allegoricum complectentes," 4to. "Commentarii Hiſtorici ſelecti in XII. Prophetas minores," 8vo. "De Templo, et iis quæ ad Templum pertinent Lib. V." 8vo. And "The Life of St. Thereſa, Foundreſs of the reformed Order of the barefooted Carmelites," written in the Spaniſh language.

Ribera, Giuseppe. See Spagnoletto.

Ribera, in *Geography*. See *St.* Jago.

Ribera *de Muria*, a town of Portugal, in Eſtramadura; ſix miles N. of Thomar.

RIBERAC, a town of France, and chief place of a diſtrict, in the department of the Dordogne; 17 miles E. of Perigueux. The place contains 2985, and the canton 11,194 inhabitants, on a territory of 85 kiliometres, in 13 communes. N. lat. 45° 14′. E. long. 6° 25′.

RIBERAIRY, a town of Abyſſinia; 25 miles E.N.E. of Axum.

RIBES, in *Botany*, an Arabian name, properly belonging to an acid-leaved ſpecies of Rheum, ſee that article; but which botaniſts, for about 200 years paſt, have, by miſtake, applied to the currant and gooſeberry family, and with theſe it now remains. They conſtitute a natural and very important genus.—Linn. Gen. 111. Schreb. 154. Willd. Sp. Pl. v. 1. 1153. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 263. Prodr. Fl. Græc. Sibth. v. 1. 160. Ait. Hort. Kew. v. 2. 40. Purſh 163. Juſſ. 310. Lamarck Illuſtr. t. 146. (Groſſularia; Tourn. t. 409. Gærtn. t. 28.) —Claſs and order, *Pentandria Monogynia.* Nat. Ord. *Pomaceæ*, Linn. *Cacti*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, tubular, or bell-ſhaped; the limb cut, about half way down, into five oblong, concave, coloured, reflexed, permanent ſegments. *Cor.* Petals five, ſmall, obtuſe, erect, inſerted into the rim of the calyx. *Stam.* Filaments five, awl-ſhaped, erect, inſerted into the rim of the calyx; anthers incumbent, compreſſed, burſting at the edges. *Piſt.* Germen roundiſh, inferior; ſtyle cloven; ſtigmas obtuſe. *Peric.* Berry globoſe, umbilicated, of one cell, with two lateral, oppoſite, longitudinal

tudinal receptacles. *Seeds* numerous, roundiſh, ſlightly compreſſed.

Eſſ. Ch. Calyx ſuperior, tubular, five-cleft. Petals inſerted, with the ſtamens, into the calyx. Style cloven. Berry with many ſeeds.

The whole genus is ſhrubby. *Leaves* deciduous, alternate, ſtalked, ſimple, lobed and notched. *Flowers* ſtalked, generally pale, greeniſh or yellow, rarely reddiſh. *Fruit* eatable.

Section 1. Currants. *Stem without prickles.*

1. R. *rubrum*. Common Currant. Linn. Sp. Pl. 290. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 1289. Woodv. Med. Bot. t. 74. Fl. Dan. t. 967. (R. vulgaris, fructu rubro; Ger. Em. 1593.)—Cluſters ſmooth, pendulous. Flowers flattiſh. Petals inverſely heart-ſhaped. Leaves obtuſely five-lobed. Stem erect.—Native of woods and thickets, eſpecially about the banks of rivers, in the north of Europe. Undoubtedly wild on the banks of the Tees, Durham. *Mr. Robſon.* Commonly cultivated throughout the cooler parts of Europe, for the ſake of its gratefully acid and wholeſome berries, of which the white or bluſh variety is the ſweeteſt and mildeſt. It flowers in May; the fruit is ſcarcely ripe before Auguſt. The *ſtem* is buſhy, three or four feet high, or more, if trained to a wall, with ſmooth blackiſh bark. *Leaves* on long ſtalks, ſpreading, doubly ſerrated, veiny, bright green, ſomewhat downy. *Flowers* in ſtalked, ſimple, pale green, drooping cluſters. *Petals* yellowiſh-green. *Bracteas* ovate, minute, ſolitary at the baſe of each partial flower-ſtalk. *Fruit* quite pendulous.

2. R. *petræum*. Rock Currant. Wulf. in Jacq. Miſc. v. 2. 36. Jacq. Ic. Rar. t. 49. Willd. n. 2. Fl. Brit. n. 4. Engl. Bot. t. 705. (R. n. 818; Hall. Hiſt. v. 1. 364. R. vulgaris rubro flore; Cluſ. Hiſt. v. 1. 119.)—Cluſters erect, ſomewhat hairy; pendulous when in fruit. Flowers flattiſh. Petals obtuſe. Leaves acutely lobed. Bracteas ſhorter than the flower-ſtalks. Stem erect.—Native of Germany, Switzerland, and the north of England. This was confounded, even by Haller, with the former. The *leaves* are more downy, eſpecially about the veins; more acutely lobed and notched. *Cluſters* erect when in bloſſom; their ſtalks leſs elongated in the lower part. *Flowers* often ſtained with red. *Berries* bright red, very acid.

3. R. *ſpicatum*. Acid Mountain Currant. Robſon Tr. of Linn. Soc. v. 3. 240. t. 21. Fl. Brit. n. 3. Ait. n. 6. Engl. Bot. t. 1290.—Spikes erect. Flowers nearly ſeſſile. Petals oblong. Bracteas ſhorter than the calyx. Stem erect.—Native of the mountainous parts of Yorkſhire and Durham, flowering in May. Differs from the laſt in having the *inflorescence* ſpiked, not racemoſe; upright both in flower and fruit. The *berries* are red and acid.

4. R. *procumbens*. Trailing Currant. Pall. Roſſ. v. 1. p. 2. 35. t. 65. Willd. n. 3. Ait n. 3.—Cluſters erect. Flowers flattiſh. Leaves bluntly lobed. Berries ſmooth. Stem procumbent. Plentiful, according to Pallas, on the moſſy ſides of hills in Dauria, where its fruit is much in requeſt. The proſtrate *ſtems* are concealed among the moſs. *Leaves* not bigger than thoſe of a gooſeberry-buſh, while the ſhrub is in bloſſom, but afterwards attaining the ſize and ſhape of the three foregoing ſpecies. *Flowers* like *R. rubrum*, but ſmaller, in erect *cluſters*, which become drooping as the fruit ripens. The *berries* are full as large as a common Black Currant, but of a greeniſh-yellow, or, when quite ripe, reddiſh.

5. R. *glanduloſum*. Glandulous Currant. Ait. n. 4. Willd. n. 4. (R. proſtratum; L'Herit. Stirp. v. 1. 3. t. 2. Purſh n. 4.)—Cluſters erect, rough with glandular hairs. Flowers flattiſh. Leaves acutely lobed, toothed. Bracteas minute. Berries hiſpid. Stem creeping, with aſcending branches.—Native of rocky moiſt places, in Newfoundland, Canada, and Pennſylvania, flowering in April and May. *Purſh.* Habit and *leaves* not unlike the laſt. The *flowers* are yellow, tinged with red. *Berries* red.

6. R. *rigens*. Stiff-branched Currant. Michaux Boreal-Amer. v. 1. 110. Purſh n. 3.—Cluſters lax, erect. Leaves acutely lobed and toothed, reticulated, rugoſe; downy beneath. Berries roughiſh. Branches ſtraight.—On the banks of lake Miſtaſſins, in Canada. *Michaux.* In the Pennſylvanian mountains, &c. flowering in May and June. *Berries* red, erect, as well as the *flowers*. *Purſh.*

7. R. *trifidum*. Notched-flowered Currant. Michaux Boreal-Amer. v. 1. 110. Purſh n. 2.—Cluſters lax, downy. Leaves lobed, ſmooth; downy beneath. Flowers flattiſh. Segments of the calyx ſlightly three-cleft. Petals ſpatulate. Berries hairy.—Found by Michaux near Quebec, and at Hudſon's Bay; by Purſh on the Pennſylvanian mountains, &c. flowering in April and May. *Flowers* like *R. rubrum*, but ſmaller. *Calyx* pale green. *Petals* purple, rounded, and blunt at the end. *Berries* red.

8. R. *albinerve*. White-veined Currant. Michaux Boreal-Amer. v. 1. 110. Purſh n. 1.—Cluſters recurved. Berries ſmooth. Leaves ſhort, acutely lobed, ſmoothiſh, with pale ribs.—Found by Michaux, about lake Miſtaſſins, Canada; by Purſh, on the Catſkill mountains, about New York, &c. flowering in April and May. *Flowers* ſmall, greeniſh-yellow. *Berries* red.

9. R. *alpinum*. Taſteleſs Mountain Currant. Linn. Sp. Pl. 291. Willd. n. 5. Fl. Brit. n. 2. Engl. Bot. t. 704. Jacq. Auſtr. t. 47. Fl. Dan. t. 968.—Cluſters erect. Bracteas longer than the flowers. Leaves ſmooth; ſhining at the back. Stem erect. Berries ſmooth.—Native of mountainous woods and thickets, in Germany, Switzerland, Sweden, Siberia, and the north of England, flowering in April and May. The *leaves* are rounder, and ſcarcely half ſo large as thoſe of our common Currants, beſides being quite ſmooth on both ſides, and remarkably poliſhed beneath. *Bracteas* very long, acute, erect. *Flowers* ſaid to be often dioecious, from which cauſe perhaps the *fruit* is ſeldom perfected in our ſhrubberies, where this ſpecies often occurs. The *berries* are ſomewhat elliptical, of a beautiful red, but inſipid and mucilaginous like a ſolution of gum arabic.

10. R. *reſinoſum*. Reſinous Currant. Purſh n. 5. Curt. Mag. t. 1583.—Whole plant viſcid, with glandular hairs. Leaves with roundiſh, notched lobes. Cluſters erect. Flowers flattiſh. Bracteas tongue-ſhaped, concave, as long as the flowers. Berries hairy.—Gathered on the mountains of North America, by Mr. Fraſer, from whoſe garden we obtained flowering ſpecimens, in May 1810. This has more the aſpect of a gooſeberry-buſh, eſpecially in the ſize and form of the *leaves*, but the whole herbage is clothed with downy, viſcid, fœtid pubeſcence. *Cluſters* moſt like thoſe of *R. alpinum*, but the partial *flower-ſtalks* are extremely ſhort, and the *bracteas* more obtuſe, and elliptical. *Flowers* apparently dioecious, green, with ſhort, rounded, yellowiſh *petals*.

11. R. *viſcoſiſſimum*. Glutinous Currant. Purſh n. 6. —Whole plant very glutinous, with viſcid hairs. Leaves heart-ſhaped, bluntly three-lobed, ſerrated. Cluſters ſhort, erect. Calyx tubular. Petals oblong. Bracteas linear-ſpatulate, ſhorter than the partial flower-ſtalks. Germen hairy.—Found by the late governor Lewis, on rocky mountains in the interior of North America, flowering in

June. Whole plant covered with viſcous hair. *Flowers* large, yellow. This approaches near to *R. glanduloſum*, Fl. Peruv. v. 3. 13. t. 233. f. *b*. It differs principally in the *leaves* being equally lobed, not having the middle lobe projecting; its long ſlender *partial flower-ſtalks*, and its *petals*. *Purſh*.

12. R. *ſanguineum*. Crimſon-flowered Currant. Purſh n. 7.—Leaves heart-ſhaped, three-lobed, ſerrated, veiny; ſmooth above; finely downy and hoary beneath. Cluſters lax, downy, twice the length of the leaves. Calyx tubular. Petals oblong, equal to the limb. Bracteas obovate-ſpatulate, the length of the partial ſtalks. Germen hairy.—Gathered by governor Lewis, on the Columbia river, flowering in March. *Branches* purple. *Flowers* beautiful, blood-red or purple. It nearly approaches *R. albinervium*, Fl. Peruv. v. 3. 12. t. 232. f. *b*. *Purſh*.

13. R. *malvaceum*. Mallow-leaved Currant. — Leaves heart-ſhaped, ſlightly five-lobed, ſerrated, veiny; hiſpid on both ſides; denſely downy beneath. Cluſters hairy, longer than the leaves. Calyx tubular, hairy. Petals rounded, not half ſo long as the limb. Bracteas ovate, acute, jagged, half the length of the calyx.—Gathered in California, by Mr. Menzies. *Branches* dark purple, downy, like every part of the plant. *Leaves* an inch, or inch and half, long; dark green above; white, and denſely downy, beneath; hiſpid on both ſides with glandular briſtles. *Stipulas* beautifully fringed. *Cluſters* denſe, on long, rough, glandular *ſtalks*. *Calyx* red, about half an inch long, hairy, eſpecially its baſe, and the *germen*. *Petals* wedge-ſhaped, rounded, ſomewhat cloven, ſcarcely one-third ſo long as the ſegments of the limb, which are elliptical. *Stamens* the length of the petals. *Bracteas* elegantly jagged and fringed. This fine ſpecies ſeems nearly allied to the laſt. We have not at hand the *Flora Peruviana*, to aſcertain how far it reſembles any in that work.

14. R. *aureum*. Golden-flowered Currant. Purſh n. 8. —Very ſmooth. Leaves with three, obtuſe, ſparingly notched lobes. Footſtalks fringed at the baſe. Cluſters denſe. Calyx tubular, ſlender. Petals linear, half the length of the limb. Bracteas linear, equal to the partial ſtalks. Berry ſmooth.—Found by governor Lewis on the banks of the Miſſouri and Columbia, flowering in April. We received wild ſpecimens from Mr. John Bradbury, three years ago. The *leaves* have the aſpect of Hawthorn. *Flowers* in denſe cluſters. *Calyx* of a beautiful golden yellow, about three-fourths of an inch long, not unlike the flower of a Jonquill in miniature, and reported to have a ſimilar ſcent; its ſegments oblong, obtuſe. *Petals* purple. *Berries* red or brown, conſiderably larger than any garden currants, and peculiarly delicious in flavour. This very deſirable plant is introduced into the gardens about London, but we have not yet heard of its bloſſoming.

15. R. *recurvatum*. Recurve-branched Currant. Michaux Boreal-Amer. v. 1. 109. Purſh n. 9.—"Branches recurved. Leaves dilated, downy, dotted with minute glands, acutely lobed. Cluſters reflexed. Calyx tubular, ſmooth."—Found near Hudſon's Bay. *Michaux*. *Berries* black. We know nothing more of this ſpecies.

16. R. *fragrans*. Fragrant Siberian Currant. "Pallas Nov. Act. Acad. Petrop. v. 10. 377. t. 9." Willd. n. 6. —Stem aſcending. Leaves bluntly three-lobed, glandular beneath.—Flowers bell-ſhaped. Cluſters erect.—Native of Siberia, on mountains bordering on the country of the Mongols, where no woods grow. The *ſtems* are partly procumbent, a foot and a half long; their young *branches* beſprinkled with yellow, prominent, glandular dots. *Leaves* on long ſtalks, ſmooth, ſerrated, ſlightly five-angled, with three or five lobes; very veiny, and moſt glaucous beneath, where alſo they are covered with minute crowded drops of a yellow fragrant exudation, having a ſcent ſtronger than balm, approaching that of *R. nigrum*, n. 18, to which ſpecies indeed the preſent bears altogether a conſiderable reſemblance. *Cluſters* when in flower ſhort, erect, rigid, denſe, of about ten white, highly fragrant, *flowers*. *Calyx* bell-ſhaped, deeply five-cleft. *Petals* lanceolate, acute, ſpreading. *Bracteas* deciduous, ſmaller than in *R. procumbens*, n. 4. *Cluſters* elongated in fruit, ſtill erect, except when bent down by its weight. *Berries* reddiſh, extremely ſweet, the full ſize of *R. rubrum*. *Pallas*.

17. R. *triſte*. Dark-coloured Siberian Currant. "Pallas Nov. Act. Acad. Petrop. v. 10. 378." Willd. n. 7.—Root creeping. Stems erect, leafy in the upper part. Leaves five-lobed. Cluſters ſmooth, pendulous. Flowers flattiſh. Petals revolute.—Native of loſty mountains in Siberia, towards Tartary. The creeping *root* throws up many erect *ſtems*, two or three feet high, bearing at their ſummits a few ſcattered *leaves*, reſembling thoſe of *R. rubrum*. *Cluſters* always pendulous. *Flowers* reddiſh without, yellowiſh within. *Berries* ſmall, black, inſipid; their deep-red juice very uſeful for colouring wines. *Pallas*.

18. R. *nigrum*. Common Black Currant. Linn. Sp. Pl. 291. Willd. n. 8. Fl. Brit. n. 5. Engl. Bot. t. 1291. Woodv. Med. Bot. t. 75. Fl. Dan. t. 556. Lob. Ic. v. 2. 202.—Stem erect. Leaves five-lobed, acute. Cluſters pendulous, downy, with a ſeparate flower-ſtalk at their baſe. Calyx tubular-bell-ſhaped. Berries ſmooth.—Native of wet buſhy iſlands, and banks of rivers, in Sweden, Germany, Switzerland, and England, flowering in May. In gardens it is well known, and valued for the fruit, whoſe flavour indeed, in a recent ſtate, is not acceptable to every body; but its jelly is both agreeable, and uſeful for colds, ſore-throats, &c.; whence this currant has been named Squinancy-berry or Quinſy-berry. The buſh is of a more humble ſtature than *R. rubrum*; the *leaves* have a ſtrong ſcent, if bruiſed, reſembling Savine, and are ſomewhat glutinous when young. The tube of the *calyx* is more elongated than in any other Britiſh ſpecies. *Berries* large, black, each bunch always accompanied at the baſe by a ſolitary ſtalk, whoſe fruit is larger and earlier than the reſt. Dr. Withering made the truly curious obſervation, that the *petals* are ſometimes changed into *ſtamens*, of which we know no other inſtance.

19. R. *floridum*. Penſylvanian Black Currant. L'Herit. Stirp. v. 1. 4. Willd. n. 9. Ait. n. 8. Purſh n. 10. (Ribeſium nigrum penſylvanicum, floribus oblongis; Dill. Elth. 324. t. 244. f. 315.) — Leaves three-lobed, cut; dotted with glands on both ſides. Cluſters pendulous, downy. Calyx ſomewhat cylindrical. Bracteas about as long as the germen.—Found in hedges and woods, from Canada to Virginia; flowering in April and May. *Flowers* pale yellow. *Berries* black. *Purſh*. The reſinous dots on both ſides of the *leaves* diſtinguiſh this ſpecies, and its *flowers* are more oblong than thoſe of *nigrum*, with much larger *bracteas*.

Sect. 2. Gooſeberries. *Stem prickly*.

20. R. *Diacantha*. Two-thorned Cluſter Gooſeberry. Pallas Reiſe v. 3. 722. t. I. f. 2. Roſſ. v. 1. p. 2. 36. t. 66. Linn. Suppl. 157. Willd. n. 10. Ait. n. 9.—Prickles in pairs, in the place of ſtipulas. Leaves wedge-ſhaped, deeply three-cleft, bluntly notched. Cluſters nearly erect. Berries ſmooth.—Native of gravelly, ſtony, ſaline ſoils in Dauria. Introduced into England by Mr. Buſh, in 1781. Hardy, flowering in May and June. *Ait*. Linnæus ſays it flowered every year at Upſal, without bearing fruit.

fruit. Possibly the *flowers* may be in some measure dioecious, like those of *R. alpinum*, a species which this nearly resembles, except the prickles.

21. R. *saxatile*. Rock Siberian Gooseberry. "Pallas Nov. Act. Acad. Petrop. v. 10. 376." Willd. n. 11.—Prickles scattered, setaceous. Leaves wedge-shaped, bluntly three-lobed. Clusters erect.—Native of granite mountains in Siberia. Allied to *R. alpinum* and *R. Diacantha*. *Berries* red, sourish, scarcely so big as our red currant. *Pallas*.

22. R. *reclinatum*. Procumbent Gooseberry. Linn. Sp. Pl. 291. Willd. n. 12. Ait. n. 10.—Prickles solitary or three together. Branches reclining. Stalks single-flowered, with a three-leaved bractea. Germen hairy.—Native of Germany and Switzerland. Said to have been long known in our gardens. It much resembles the following.

23. R. *Grossularia*. Rough Gooseberry. Linn. Sp. Pl. 291. Willd. n. 13. Ait. n. 11. Fl. Brit. n. 6. Engl. Bot. t. 1292. (R. Uva crispa; Fl. Dan. t. 546.)—Prickles solitary or three together. Branches spreading. Footstalks hairy. Stalks single-flowered, with a two-leaved bractea. Fruit hairy.—Common throughout Europe, but so generally cultivated, that we can hardly say when we meet with it truly wild. The *shrub* is bushy, of humble growth, armed, as every body knows, with smooth awl-shaped prickles, either solitary or ternate, in the place of *stipulas*. *Leaves* bluntly three-lobed and cut, slightly downy. *Flowers* drooping, solitary, green, on downy stalks, with two separate *bracteas*. *Calyx* cup-shaped. *Germen* and *fruit* rough with prominent bristly hairs. The *berries* are either green, yellow, or red.

24. R. *Uva crispa*. Smooth Gooseberry. Linn. Sp. Pl. 292. Willd. n. 14. Ait. n. 12. Fl. Brit. n. 7. Engl. Bot. t. 2057. Schmidel Ic. 5. t. 1. (Uva crispa; Fuchs. Hist. 187. Ger. Em. 1324.)—Prickles usually three together. Branches spreading. Footstalks hairy. Stalks single-flowered. Bracteas united into a tube. Fruit smooth.—Native of Europe, and as commonly cultivated as the last, of which we believe it a mere variety. The number and connection of the *bracteas* are certainly variable.

25. R. *aciculare*. Needle Siberian Gooseberry.—Prickles scattered, setaceous; those under the buds five together, combined. Leaves bluntly five-lobed and cut. Stalks single-flowered. Bracteas united. Fruit smooth.—Gathered by Laxmann in Siberia. We find two specimens in the Linnæan herbarium of this, which seems a very distinct species, hitherto neglected by every author. The habit is like the three last, but the *branches* are copiously armed all over with fine, straight, prominent, needle-like, brown *prickles*, besides the larger ones, five together, and combined by a broad base, which stand, like those of common Gooseberries, under the buds. *Flowers* solitary, drooping, on longish simple stalks, with two or three *bracteas*, usually combined, about the middle. *Calyx* bell-shaped, smooth, red. *Petals* white, obovate, one-third the length of the limb. *Germen* smooth.

26. R. *ferox*. Strong-thorned Californian Gooseberry.—Prickles scattered, setaceous, very slender; those under the buds three together, combined, awl-shaped. Leaves five-lobed, rugose, downy beneath. Stalks single-flowered. Segments of the calyx lanceolate, twice the length of its tube. Germen and fruit prickly.—Gathered by Mr. Menzies, near Port Trinidad, in California. A very fine remarkable species, whose *branches* are thickly covered with tawny, setaceous, prominent prickles, about a quarter of an inch in length, and armed under each bud, with three very strong and pungent awl-shaped ones, an inch long, having sometimes lesser reflexed prickles at their base. The *leaves* are not unlike our common Gooseberries, but more rugose; and densely downy at the back. *Flower-stalks* solitary, simple, longer than the leaves. *Bracteas* scattered. *Flowers* drooping, large and handsome. *Calyx* three quarters of an inch long, funnel-shaped, downy and bristly; as far as we can judge from the dried specimens it seems of a fine crimson; its segments lanceolate, ribbed, erect, full twice as long as the tube. *Petals* half the length of these segments, erect, pale, obtuse. *Stamens* the length of the calyx. *Anthers* large, oblong-heart-shaped, pointed. *Germen* covered with prominent, glandular bristles, which harden, as the *fruit* advances, into stiff, sharp spines, so that whatever its flavour may be, it seems perfectly inaccessible, in the common way of eating gooseberries.

27. R. *rotundifolium*. Round-leaved Carolina Gooseberry. Michaux Boreal-Amer. v. 1. 110. Pursh n. 11.—"Prickles solitary under the buds. Leaves nearly orbicular, slightly downy; lobes roundish, obtuse. Stalks single-flowered. Limb of the calyx tubular. Fruit smooth." Native of the high mountains of Carolina. *Michaux*.

28. R. *hirtellum*. Small-leaved Canada Gooseberry. Michaux Boreal-Amer. v. 1. 111. Pursh n. 12.—Prickles solitary under the buds, small. Branches somewhat hispid. Leaves three-cleft half way down, slightly notched. Stalks single-flowered. Fruit smooth.—Found among rocks, on the Allegany mountains; from Canada to Virginia, flowering in May and June. *Pursh*. *Leaves* small. *Berries* red.

29. R. *gracile*. Slender-stalked Blue Gooseberry. Michaux Boreal-Amer. v. 1. 111. Pursh n. 13.—Prickles solitary under the buds, very short. Leaves acutely lobed and cut, downy on both sides. Footstalks slender. Flower-stalks capillary, erect, mostly two-flowered. Calyx bell-shaped. Fruit smooth.—On rocks, and in mountain meadows, from New York to Carolina, flowering from April to June. *Calyx* smooth. *Berries* purple or blue, of an excellent taste. *Pursh*.

30. R. *flamineum*. Scarlet-flowered Californian Gooseberry.—Branches finely hispid. Prickles several under each bud, unequal. Leaves rounded, slightly three-lobed, smooth. Stalks two-flowered. Calyx hemispherical; limb in very long parallel segments. Petals equal to the limb. Stamens thrice as long.—Gathered by Mr. Menzies in California. *Branches* brown, clothed with copious, extremely fine, prominent, capillary bristles. *Prickle* under each bud rigid and sharp, about one-third of an inch long, with several smaller deflexed ones at the base. *Leaves* not an inch long, quite smooth, veiny; paler beneath; orbicular and entire, except three very slight, scarcely notched, obtuse lobes, at the extremity. *Footstalks* short, smooth. *Flower-stalks* longer than the leaves, hispid, glandular, two-flowered, with a single roundish *bractea*. *Flowers* scarlet. *Calyx* with a very short hemispherical tube, hispid like the *germen*; its limb five times as long, in five oblong, parallel, smooth segments. *Petals* of the same length, but rather paler and more obtuse. *Stamens* capillary, straight, parallel, projecting (four of them at least) with the *style*, full an inch out of the flower; the fifth is perhaps abortive. We know nothing of the *fruit* of this beautiful species, whose *flowers* have the aspect of a *Fuchsia*.

31. R. *triflorum*. Three-flowered Mountain Gooseberry Willd. Hort. Berol. v. 1. 61. t. 61. Pursh n. 14.—Prickles solitary under each bud. Leaves smooth, three or five-lobed, notched. Stalks about three-flowered. Petals spatulate, undulated. Style prominent, hairy, divided.

Fruit ſmooth.—On the Blue mountains; from Pennſylvania to Virginia, flowering in May and June. *Purſh.* The *partial flower-ſtalks* are very long. *Bracteas* very ſhort. *Flowers* yellowiſh-green, with white *petals*. *Berries* pale red, ſmall.

32. R. *oxyacanthoides*. Hawthorn-leaved Gooſeberry. Linn. Sp. Pl. 291. Willd. n. 15. Ait. n. 13. Purſh n. 15. (Groſſularia oxyacanthæ foliis amplioribus, e ſinu Hudſonio; Dill. Elth. 166. t. 139.)—Branches clothed with briſtly prickles; thoſe under the buds larger, moſtly ſolitary. Leaves ſmooth, three-lobed, notched. Stalks one or two-flowered, ſhorter than the footſtalks. Fruit ſmooth.—Native of rocky places at Hudſon's Bay, Canada, New York, &c. flowering in April and May. It is ſaid to have been cultivated in England in 1705, and was certainly in the Eltham garden near thirty years after. This reſembles the common gooſeberry in habit, but the *branches* are covered with innumerable, fine, briſtly, not very rigid prickles, beſides the larger ones, proper to this ſection of the genus, which are moſtly ſolitary under each bud. *Leaves* larger, more deeply cut than in our gooſeberries, ſmooth. *Flowers* drooping, one or two on each ſtalk. *Fruit* globoſe, the ſize of a black currant, purple, or almoſt black, with a cærulean bloom on the ſurface; ſlightly acid.

33. R. *lacuſtris*. Swamp Cluſter Gooſeberry. "Perſ. Syn. v. 1. 252." Purſh n. 16. (R. oxyacanthoides; Michaux Boreal-Amer. v. 1. 111.)—Branches clothed with briſtly prickles; thoſe under the buds numerous, aggregate, pungent.—Leaves deeply lobed, doubly notched. Cluſters downy, drooping, many-flowered. Fruit hiſpid.—Found in ſwamps, on the mountains, from Canada to Virginia, flowering from April to June. *Purſh.* Many perſons have confounded this with the laſt, and we are not ſure that the two are diſtinguiſhed by our leading gardeners. We received ſpecimens of the preſent from the Edinburgh garden, ſo long ago as 1782, with the name of *R. oxyacanthoides*. Another, in the herbarium of the younger Linnæus, is marked *armatum*; an excellent name, given, we believe, by ſir J. Banks or Dr. Solander, who could not overlook the characters which ſo clearly diſtinguiſh this from the true *oxyacanthoides*. Theſe are not only the deeply divided vine-like *leaves*, but the numerous, combined, aſcending *prickles*, almoſt palmate at their baſe, which ſtand under each leaf or bud; and alſo the long hairy glandular cluſters of *flowers*, with a prickly *germen* and *fruit*. The *branches* are beſet with abundance of rigid prickly briſtles, rather ſtronger than thoſe of *oxyacanthoides*. The *flowers* are of a dull, tawny, yellowiſh-green. "*Berries* amber-coloured, or brown." *Purſh.*

34. R. *cynoſbati*. Thorny-fruited Cluſter Gooſeberry. Linn. Sp. Pl. 292. Willd. n. 16. Ait. n. 14. Purſh n. 17. Jacq. Hort. Vind. v. 2. t. 123.—Branches ſmooth. Prickles one or two under each bud, ſimple. Leaves five-lobed, downy beneath. Cluſters drooping, of few flowers. Fruit armed with ſtrong thorns.—On the ſides of hills and rocks, in the Allegany mountains, and in Canada, flowering from April to June. *Flowers* green. *Berries* dark brown, and covered with thorns. *Purſh.* Miller cultivated this ſpecies at Chelſea, where we believe it ſtill remains. The *leaves* are downy on both ſides, but eſpecially beneath. *Prickles* moſtly ſolitary, variable in ſize; thoſe on the large globular fruit are peculiarly ſtrong.

We have thus more than doubled Willdenow's catalogue of ſpecies, in this genus. Some of the newly diſcovered ones, from North America, are likely to prove great acquiſitions to our kitchen gardens, provided they bear fruit in this climate; of which, till the experiment is fairly made, there muſt always be ſome uncertainty.

Ribes, in *Gardening*, contains plants of the hardy, deciduous, ſhrubby kind, of which the ſpecies cultivated are; the common currant (R. rubrum); the common black currant (R. nigrum); the rough-fruited gooſeberry (R. groſſularia); the ſmooth-fruited gooſeberry (R. uva criſpa); the procumbent gooſeberry (R. reclinatum); the hawthorn-leaved currant (R. oxyacanthoides); and the prickly-fruited currant (R. cynoſbati).

It is obſerved by Martyn, that the firſt ſort is very apt to be infeſted with the aphis ribes, in which caſe the green leaves become red, pitted, and puckered. It has been long cultivated in the garden, and greatly improved. There are ſeveral varieties; as the common ſort, with ſmall red fruit; with white fruit; with pale fruit, commonly called the Champaign currant, differing only in being a pale red or fleſh-colour. But ſince the white and red Dutch currants have been introduced and become common, the old ſorts have been almoſt baniſhed, and are now rarely to be found. And Mr. Forſyth mentions the fine new white Dutch, long-branched red, ſtriped-leaved red-white currant, and large pale and red Dutch.

There are alſo the ſweet currant, the ſmall-fruited currant, and a variety with blotched leaves, which is kept in ſome plantations; but as the variegation is apt to go off when the plant is vigorous, it ſcarcely deſerves a place in them.

Of the ſecond there is a ſort often termed the American black currant. The berries have a very peculiar flavour, which many perſons diſlike; but are commonly eaten in puddings in ſome parts, and make a tart little inferior to the cranberry. The juice of which is alſo frequently boiled down to an extract, with the addition of a ſmall proportion of ſugar; in this ſtate it is called rob, and uſed in ſore throats and other diſeaſes.

Currants in general are by ſome ſuppoſed the moſt uſeful of all the ſmall fruits, as ſerving either for table or culinary uſes, as well as for wine, and continuing long in ſucceſſion with due management. The black ſort is ſeldom ſent to table as a fruit for that purpoſe. But it is a ſort which may be infuſed in ſpirit of any kind, in which way they make a good liquor.

The third, or rough-fruited, ſort is a low branching ſhrub, which has the berries pendulous and hairy. And it is obſerved by the editor of Miller's Dictionary, that if the bracteas do not diſtinguiſh this from the following, the roughneſs or ſmoothneſs of the berries will hardly do it, as Mr. Robſon has found that ſeeds from the ſame plant will produce both rough and ſmooth fruit. He cannot regard them as different ſpecies.

The fourth, or ſmooth-fruited, ſort has the berry pulpy, ſubdiaphanous, pale, amber-coloured, red or purple, ſmooth, and the pulp watery and ſweet. And Martyn remarks, that the gooſeberry ſeems to have been formerly a fruit in very little eſteem, but has received ſo much improvement, that it is now become valuable, not only for tarts, pies, and ſauces, both freſh and preſerved in bottles, but as an early deſert fruit, and preſerved in ſugar for winter uſe to anſwer the ſame purpoſe.

It may be noticed, that the moſt important varieties of the red kind are, the hairy, ſmooth, deep red, damſon or dark red, blueiſh, red raſpberry, early black-red, Champaigne, &c. Of the green kind; the hairy, ſmooth, Gaſcoigne, raſpberry, &c. Of the yellow kind; the great oval, great amber, hairy amber, early amber, large tawny or great mogul, &c. And of the white kind; the common, white-veined, and large cryſtal. But beſides theſe, there is the rumbullion, large ironmonger, ſmooth ironmonger, hairy globe, and innumerable

innumerable others, ſome of very large ſize, annually raiſed from ſeed, weighing from ten to fifteen pennyweights; however, there are ſmall ones better taſted. There are ſaid to be upwards of two hundred, at leaſt in name.

And Mr. Forſyth has given the following liſt from the catalogue of Meſſrs. Kirk, nurſerymen, at Brompton, near London.

The ſupreme red, perfection red, high ſheriff of Lancaſhire, royal George, unicorn, rough amber, white walnut, Ackerley's double bearer, royal oak, Miſs Bold's, ſparkler, Ackerley's Rodney, Hampſon's Cæſar, Monk's Charles Fox, St. John, pigeon egg, Worthinglowe's conqueror, golden eagle, Royder's triumph, Williamſon's yellow hornet, Swingham, Jackſon's golden orange, Goliah champion, hairy amber, Nixon's golden eagle, Worthington's white lily, Laylord's ſeedling, Nixon's white heart, Riding's old England, Bakeley's Swingham, Tillotſon's St. John.

The ſame writer alſo adds another liſt of the largeſt new ſorts which were ſhewn in Lancaſhire, in the ſummer of 1800, with their colour and weight, as communicated by Meſſrs. M'Niven, nurſerymen, Mancheſter.

Red Sorts of Gooſeberries.

	dwt.	gr.
Alcock's king	16	15
——— duke of York	16	1
Boardman's royal oak	15	4
Brundrit's atlas	17	1
Chapman's peerleſs	15	21
Dien's glory of England	16	2
Fairlow's lord Hood	14	5
Fiſher's conqueror	17	19
Fox's jolly ſmoker	15	8
Hall's porcupine	13	20
Lomax's victory	16	11
Maſon's Hercules	13	16
Taylor's volunteer	16	17
Worthington's glory of Eccles	14	10

Yellow Sorts of Gooſeberries.

Brundrit's ſir Sidney	15	22
Davenport's defender	15	12
——— creeping Ceres	16	0
Hamnet's Kilton	15	9
Hill's golden gourd	13	17
——— royal ſovereign	17	10
Leigh's prince of Orange	15	0
Parkinſon's goldfinder	14	5
Robinſon's crudus	13	17
Withington's ſceptre	13	7

Green Sorts of Gooſeberries.

Blakeley's chiſſel	17	0
Boardman's green oak	14	1
Brundrit's tickle Toby	14	6
Chadwick's hero	13	10
Dean's lord Hood	15	10
Mill's Langley-green	16	2
Read's ſatisfaction	15	4
Robinſon's ſtump	13	21
Smith's green maſk	13	20
Yates's duke of Bedford	14	11

White Sorts of Gooſeberries.

Adam's ſnow-ball	12	22
Atkinſon's white hall	14	8
Chapman's Highland white	12	0
Davenport's lady	15	0
Gibſon's Apollo	14	20
Holding's white muſlin	13	0
Kenyon's white noble	13	6
Moor's white bear	14	12
Woodward's white ſmith	17	2

It is obſerved, that in favourable ſeaſons, many of the above ſorts have been known to weigh more by ſeveral pennyweights.

In all the ſouth-eaſtern parts of Lancaſhire there are a great number of little ſocieties held by the labouring and manufacturing workmen, and the gardeners; where theſe ſorts of fruits are annually exhibited, under many different arbitrary names and deſignations, as *Goliahs*, *golden drops*, &c. and their merits and capabilities of improvement finally ſettled and decided upon.

The fifth ſort has the fruit when ripe commonly dark purple, but ſometimes red or even yellow.

In the ſixth kind the fruit is ſmall and round, the ſize and ſhape of a currant; the colour at firſt purple, but when ripe, dark purple with a blue bloom; it is ſmooth, on a ſhort ſlender ſtalk.

Method of Culture in the Currant Kind.—In general theſe may be raiſed with great facility from layers, ſeed, cuttings, and in other ways. In the firſt of theſe modes, when the trees are cut low, Mr. Forſyth adviſes the laying down ſome of the branches either in the winter or ſpring ſeaſons, when the ground in the quarters or rows is dug, which ſhould always be done annually. In the autumn following, theſe layers will have made fine roots; then they may be taken off, and planted out where they are to ſtand, and they will moſtly bear fine fruit in the following ſummer.

But in the ſecond method, the cuttings ſhould be choſen of the ſtrongeſt and ſtraighteſt ſhoots, which ſhould be cut ſix or eight inches in length, and be planted out on an eaſt or north border, in the early autumn, at the diſtance of a foot from row to row, leaving only a few inches out of the ground. In this way they may be kept perfectly free from weeds. In dry weather, during the ſpring, they ſhould be often refreſhed with water. Some alſo raiſe theſe plants from ſuckers; but this is a method that ſhould be avoided as much as poſſible, as they never grow handſome, and are apt to throw out ſuckers afterwards.

With reſpect to the ſeed, it ſhould be ſown on a border where the mould is fine, either in the autumn or early in the ſpring; and the young plants, when they appear, be kept free from weeds. When they have attained ſufficient growth, they may either be planted out where they are to remain, or be ſet out in nurſery-rows. However, Mr. Forſyth obſerves, that under the buſhes that have been covered for late fruit, plenty of ſelf-ſown plants may conſtantly be found, which he adviſes to be planted out by themſelves. And thoſe who make currant-wine may, he thinks, ſave the ſeed, after the fruit is ſqueezed, and dry it: it may then be ſown in the manner directed above, by which, moſt probably, ſome fine varieties may be obtained. As in many gardens there ſtill remains, the ſame writer remarks, a ſmall ſort of red and white currant not worth cultivating, he would adviſe thoſe who have any of them to root them up, and plant in their room the large red and white Dutch, the long-bunched red, and Champaigne large pale red. Theſe kinds of plants may be planted out, it is ſuggeſted, either in the quarters, or ſingle rows round the edges of the quarters, in the gardens or other places. And he would particularly

particularly recommend planting a few againſt a ſouth or weſt wall, or paling, which will produce fruit much earlier than in the quarters, &c.: alſo to plant ſome between other fruit-trees, on north walls, or palings, for later crops. Theſe may be covered with double nets, to preſerve them from birds; tucking in a few fern branches between the two nets, which will prevent the heat of the ſun and drying winds from ſhrivelling the fruit. In the quarters they ſhould be covered with mats, for the ſame purpoſe; at the ſame time permitting all the leaves to remain on the buſhes, to ſhade the fruit, and make it keep the longer in a proper ſtate.

In what reſpects the pruning of the buſhes, the work may, according to the above author, be begun in the month of November, and continued till March, as it ſuits the planter's convenience. And they ſhould never be left too thick of wood; but a great deal depends on the management of them in ſummer, to have ſtrong and fine wood for the following ſeaſon. If they have been neglected for ſome years, and ſuffered to run up to long naked wood, they muſt, in his opinion, be cut down near the ground: they will then ſend forth fine ſtrong ſhoots. In this caſe, he would recommend heading down every other tree, and cutting the others partially, by taking out every other branch as near as can be to the ground, unleſs they are trained up with ſingle ſtems; in which caſe, it will be neceſſary to cut them as near as poſſible to where the branches begin to break out and form the head. And in the winter pruning, the ſtrongeſt and fineſt ſhoots ſhould be preſerved, leaving them from nine to eighteen inches long, according to their ſtrength, and from eight to ten inches apart, and as regular as poſſible from top to bottom of the tree; taking care to cut out all the dead and weak ſhoots. And particular attention ſhould be paid in ſummer, keeping the middle of the buſh open to admit the ſun and air; preſerving the fineſt and ſtrongeſt ſhoots that are neareſt the ſtem. Some, he remarks, are fond of training them up with ſingle ſtems, to a conſiderable height, to form fine round heads, which are very ornamental, if not ſuffered to run up too high; as, in that caſe, they are liable to be broken by the wind, if not well ſupported by ſtakes. Care muſt be taken not to let the ſhoots run to more than ſix inches long, becauſe ſuch ſhort ſhoots will not be ſo liable to be damaged by the wind as long and weak ones are, eſpecially when loaded with fruit. He prefers dwarfs from three to four feet high.

Further it is added, that the ſame manner of pruning, &c. will do for black currants; but as they grow ſtronger than the red or white, the ſhoots ſhould be left thinner, and laid in longer, which will make them produce larger and finer fruit. And thoſe againſt walls and palings ſhould have the ſhoots laid in thinner than thoſe in the quarters, and trained as horizontally as poſſible; ſhortening them, in the winter pruning, to a foot or eighteen inches, according to the ſtrength of the ſhoots.

As this ſort of fruit is very liable to be devoured by earwigs, which take ſhelter under their leaves and branches, bundles of bean-ſtalks ſhould, he ſuggeſts, be hung up ſome time before the buſhes are covered with mats or nets. If proper attention be not paid to this, the fruit will generally ſuffer very much from theſe inſects. After the buſhes are covered, take the mats off once in three or four days, and kill the earwigs that have got in the bean-ſtalks, which it will be neceſſary ſtill to keep hung up. As there is a ſweetneſs in the inſide of bean-ſtalks, which attracts the earwigs, they very readily take ſhelter in them from rain. By proper attention to theſe directions, theſe deſtructive inſects may be kept under, and the greater part of the fruit be preſerved. It is alſo neceſſary to carefully ſtock up all ſuckers at the roots of the trees, and keep them as clean as poſſible; otherwiſe they will prevent the ſun and air from penetrating to the roots, and greatly weaken and injure the trees.

Theſe plants are very liable to be infeſted with aphides, and other inſects, from which they ſhould be freed as ſoon as poſſible, by proper picking, waſhing, and liming.

Culture in the Gooſeberry Kind.—All theſe are capable of being raiſed by cuttings and layers, as well as ſeeds for new varieties. They are likewiſe ſometimes increaſed by ſuckers; but this laſt is not an adviſeable method, as the plants raiſed in this way are more apt to throw out ſuckers than thoſe from cuttings or ſeed. The cuttings ſhould be made from the ſtrongeſt and cleaneſt ſhoots, and have the length of ſeven or eight inches, being planted out in the early autumn, in a border which has an eaſtern or northern aſpect, at the diſtance of about a foot from row to row, and having only about three or four inches of each cutting above the ground; as by this means they may be kept clean by hoeing. They require to be frequently watered in the ſpring ſeaſon, when the weather is dry.

Alſo the layers may be laid down any time in the autumn or ſpring ſeaſon, in the common way, when they readily ſtrike root; and in the following autumn, may be taken off, and planted out where they are to remain, or in nurſery-rows, to get ſtrength to be finally planted out.

And the ſeed obtained from the ripened berries ſhould be ſown in the autumn, or very early ſpring, in a bed of fine light mould. The plants come up readily, and ſhould be kept perfectly clear from weeds; and when they have had one or two years' growth, may be removed into nurſery-rows, in the ſame manner as the currants, to remain till they become fit for being planted out. In this way good new varieties may be procured. Mr. Forſyth remarks, that the gardeners in the vicinity of Mancheſter have made great additions to the varieties of this fruit; and by mixing up a rich ſoil to plant them in, carefully watering, ſhading, and thinning the fruit, have brought the berries to a ſize much larger than had been before met with in this country; but that thoſe of ſome of the layers are much thicker in the ſkin, and not ſo well flavoured as many of the old ſorts.

In moſt parts of Lancaſhire, this is indeed a kind of fruit which is uncommonly fine, and of a very large ſize, in both the red and white kinds; and in many of the ſouthern and ſouth-eaſtern parts, very great attention, in numerous inſtances, is beſtowed in the cultivation and improvement of it, ſo as to render it of an unuſual magnitude and fine appearance. This is chiefly effected by much more pruning and thinning than that which is generally had recourſe to with theſe ſorts of plants, frequent digging about them, and a very liberal uſe of well rotted ſtable dung incorporated with the mould which is applied near their roots.

As to the methods of planting out this ſort of plants, they are extremely various. According to Mr. Forſyth, the market gardeners in the vicinity of the metropolis ſet them out in rows from eight to ten feet apart, and ſix from plant to plant. In caſes of this ſort, he recommends that they ſhould be pruned in the autumn, as about the beginning of October, when the ground between them may be planted with coleworts, or beans for a ſpring crop; and by ſo doing, there will be no occaſion to tread over the ground, and hurt the coleworts, in pruning the buſhes; as, before the gooſeberries begin to ſhoot, the coleworts will be all cleared off the ground. And after this time, (or before, if you find it convenient,) a good coat of rotten dung ſhould be

be laid on the ground; then dig it, and plant early potatoes, but not so near as to hurt the gooseberries by their growth. He likewise advises that the roots of gooseberries should be kept clear to admit the sun and air. In small gardens, he would recommend planting them in a quarter by themselves, at the distance of six feet between the rows, and four feet from plant to plant: they may be planted round the edges of the quarters, about three feet from the path; in which case, the ground will be clear for cropping, and a man, by setting one foot on the border, can gather the gooseberries, without injuring the crop that may be on the border. Also that, as they like a rich soil, they should be dunged every year, or at least have a good coat of dung once in two years. They should never be planted under the shade of other trees, as it injures the flavour of the fruit.

And in respect to the pruning of the bushes, it is a practice too common, Mr. Forsyth thinks, to let them branch out with great naked stems, suffering them to remain in that state for years. When that is the case, they should be cut down near to the ground in the winter pruning, as it will make them throw out fine strong healthy shoots, which will bear fruit the second year; and as gooseberry bushes, in general, bear their fruit on the second year's wood, great care should be taken in summer to keep the middle of the bush clear, to admit a free air, leaving the finest and strongest shoots from six to ten inches distant from each other. This will, he conceives, help to ripen and harden the wood. It is a practice with some to shorten the shoots in the autumn or winter pruning, which should be always near to a wood-bud; which may be known by its being single, whereas fruit-buds are in clusters. The shoots may, he thinks, be shortened to eight or ten inches, according to their strength. Some leave them at full length for three or four years, thinning out those that are superfluous. He advises always to leave a proper number to be trained up between the full length shoots, to succeed them when they are tired of bearing; and then to cut the old ones down to the young ones that are to succeed them. By these means, the bushes may always be kept in a constant state of bearing. Those branches which were cut the first year will, in the second, throw out short dugs, or spurs, which produce the fruit; and these should by no means be cut off, unless the branches are in a sickly state, and require to be cut close down, when the bushes are overloaded with fruit. It will then, in his opinion, be necessary to cut out a good deal of the old wood, to assist nature to recover herself, after producing so great a quantity of fruit.

He likewise advises that great attention be paid to the cultivation of the early and late sorts. In some old gardens, in particular, there are, he observes, very valuable sorts that have been of late too much neglected; he would therefore recommend to those who live in the neighbourhood of such gardens, to observe their time of ripening, and to cultivate those especially which are early and late. And he adds, that it is a practice with some to clip the tops of gooseberries with a pair of garden shears, as they would clip a thorn hedge; this he by no means approves of, as the fruit will not be half the size, nor of so fine a flavour, as when the bushes are kept clear of such wood as is unnecessary.

Farther it is recommended that great care should be taken in spring and summer to stock, or grub up, all the suckers from the roots of the bushes, leaving their stems clear and unencumbered. And as many of the Lancashire sorts are apt to grow horizontally, and the branches frequently trail on the ground, which renders them liable to be broken by high winds, especially when they are loaded with fruit, he would recommend two or three hoops to be put round them, to which the branches may be tied, to support them, and prevent their being broken by the wind, or any other means.

In cases where it is wished to have them late, they should be planted on north walls and palings, between the other trees, when they may be removed as the trees begin to meet. If laid in thin, they will bear very fine and handsome fruit. He would advise to plant the finest late sort; as by this method the table will be supplied much longer than by the common custom of planting in quarters of the garden.

Also immediately after pruning, he always applies the plaster composition to the ends of the shoots and cuttings; and he finds it of great use in preventing the exhalation of the sap, and preserving the cuttings till they take root, and become established.

It may be observed that these sorts of plants are very much infested with a small green caterpillar, which frequently devour both leaves and fruit: great attention is of course necessary to observe their first appearance on the bushes; as, if not destroyed early, they increase so fast, that they soon devour all the leaves, and the fruit is good for nothing. It is noticed, that they first appear generally on the edges and under-sides of the leaves. In order to destroy them, he advises to take some sifted quick-lime and lay it under the bushes; but not at first to let any of it touch the branches or leaves; then shake each bush suddenly and smartly, and the caterpillars will fall into the lime; if the bush be not shaken suddenly, the caterpillars, on being a little disturbed, will take so firm a hold as not easily to be shaken off. After this is done, some of the lime should be sifted over the bushes; this will drive down those which have lodged on the branches. The caterpillars ought, in his opinion, to be swept up next day, and the bushes well washed with clear lime-water mixed with urine; this will destroy any caterpillars that may still remain, and also the aphides, if there are any on the bushes at the time.

Forcing.—It may be stated, that sometimes trees of the gooseberry and currant kinds are forced for early fruiting, by means of artificial heat in fruit-forcing-houses, hot-walls, or forcing-frames, &c. For this purpose, some young trees should be planted in largish pots, one plant in each, and being advanced to a full state of growth for plentiful bearing, should be introduced in any of the above forcing departments that are in work by fire, or hot-bed heat, or both, in forwarding any principal sorts of fruit-trees, plants, or flowers, at the proper season, as about January or February, in which the same culture, in regard to the degree of heat, and other requisites, necessary for the other trees, &c. is suitable for these. Water should be given occasionally to the earth in the pots, and sometimes after the fruit is set, throwing it lightly over the branches on a warm sunny day; and they will thus produce ripe fruit in April or the following month.

However, the forcing of this sort of fruit is now seldom much attended to, in consequence of other finer sorts being so common.

Ribes, in the *Materia Medica.* The *ribes rubrum* or *rutilum, i. e.* the red currant, and the *ribes album,* or white currant, are varieties of the same species, and therefore the fruit of both, considered in both a botanical and medical sense, is perfectly analogous. The red currant is abundantly cultivated in our gardens, from which we are supplied with the fruit; and this, on account of its grateful acidity, is universally acceptable, both in its natural state, and as variously prepared by art with the addition of sugar. The juice is a most agreeable acid in punch. If equal weights of picked currants and pure sugar are put over the fire, the liquor

liquor that ſeparates ſpontaneouſly is a moſt agreeable jelly. The juice of red currants, with ſugar, is a common beverage at Paris, where it is generally preferred to orgeat or lemonade. Dr. Cullen claſſes this fruit with the alimentary plants, and being generally and excluſively conſidered as ſuch, it was not received in the Britiſh catalogues of the Materia Medica till that publiſhed in a late collection of the London Pharmacopeia: but it is omitted in the laſt edition. The medicinal qualities of red currants appear to be ſimilar to thoſe of the other ſubacrid fruits, which are eſteemed to be moderately refrigerant, antiſeptic, attenuant, and aperient. Hoffman and Boerhaave had great confidence in the efficacy of theſe fruits in obſtinate viſceral obſtructions. They may be uſed with conſiderable advantage to allay thirſt in moſt febrile complaints; to leſſen an increaſed ſecretion of bile; and to correct a putrid and ſcorbutic ſtate of the fluids, eſpecially in ſanguine temperaments; but in conſtitutions of a contrary kind they are apt to occaſion flatulency and indigeſtion,

The *ribes nigrum*, or black currant, has berries larger than thoſe of the red; and beſides poſſeſſing the properties in common with the "fructus acido-dulces," they are alſo ſaid to be peculiarly uſeful in ſore throats; and to manifeſt a diuretic power in a very conſiderable degree. In caſes of inflammatory angina, they may be advantageouſly employed to anſwer the ſame intentions as gargles, and from their efficacy in this reſpect they have acquired the name of "Squinancy berries," but the proofs of their diuretic powers ſeem to want confirmation. With reſpect to their former application and utility we may obſerve, that the black currant jelly in common domeſtic uſe is rendered leſs efficacious by having too much ſugar in its preparation. The fruit both of this, and of the red currant, afford a pleaſant wine; and that made of the former is mentioned by Haller, "ex eo optimum vinum fieri non deterius vinis verioribus viteis, quando annuum eſt." The leaves of the black currant are extremely fragrant, and have been recommended for their medicinal virtue, which Bergius ſtates to be "mundificans, pellens, diuretica." An infuſion of theſe leaves is ſaid to have the taſte of green tea, and when prepared from the young leaves, is to ſome people very agreeable. The officinal preparations of the black currant berries in the late London Pharmacopeia (but omitted in the laſt edition) were the "Syrupus ribis nigri," and the "Succus ribis nigri inſpiſſatus." Woodv. Med. Bot. See CURRANTS.

RIBIERS, in *Geography*, a town of France, in the department of the Higher Alps, and chief place of a canton, in the diſtrict of Gap; four miles N.W. of Siſteron. The place contains 1301, and the canton 3939 inhabitants, on a territory of 180 kiliometres, in nine communes.

RIBNA, a town of Ruſſia, in the government of Kolivan, on a river of the ſame name; 112 miles S.E. of Kraſnoiarſk.

RIBNIK, a town of Sileſia, in the principality of Ratibor; 13 miles E. of Ratibor. N. lat. 50° 3′. E. long. 18° 30′.—Alſo, a town of European Turkey, in Walachia, on the Alaut; 44 miles S. of Hermanſtadt. N. lat. 45° 19′. E. long. 24° 8′.—Alſo, a town of European Turkey, in Walachia, on the Ribnik, otherwiſe Rymnick, as it is called by the Ruſſians; the ſee of a Greek biſhop. From a ſevere battle fought here in 1789, between the Auſtrians and Ruſſians againſt the Turks, Suwarrow, who commanded the Ruſſians, and defeated them, was created by the emperor Leopold, a count of the empire, inveſted with the order of St. Andrew, and honoured with the title of Rymniſki by the empreſs Catharine; 100 miles S. of Jaſſi. N. lat. 45° 36′. E. long. 27° 4′.—Alſo, a river of Walachia, which runs into the Siret, near Dubravitza, on the borders of Moldavia.

RIBNITZ, a town of the duchy of Mecklenburg, ſituated on a large lake, near the mouth of the Reckenitz; 12 miles N.N.E. of Roſtock. N. lat. 54° 17′. E. long. 12° 35′.

RIBNITZY, a town of Poland, in the palatinate of Braclaw; 64 miles S. of Braclaw.

RIBNO, a town of Pruſſia, in the province of Oberland; 15 miles N.N.E. of Ortelſburg.

RIBNOI, a town of Ruſſia, in the government of Jaroſlavl; 40 miles W.N.W of Jaroſlavl. N. lat. 57° 45′. E. long. 39° 14′.

RIBS, in *Anatomy*, the bones forming the ſides of the cheſt, attached to the ſpine behind, and terminating in front in portions of cartilage, ſome of which are fixed to the ſternum, the others not. The former are called *true*, the latter *falſe* ribs. They are deſcribed in the article LUNG of this Cyclopædia.

RIBS, *Fractures of the*, in *Surgery*. See FRACTURE.

RIBS *of Fiſh*. There is a very great variety in the ſhape and other peculiarities of the ribs of fiſh. They are in ſome ſmooth, and flattened ſideways, as in the cyprini; in others they are rounded, as in the cotti and gadi. In the cyprini the ſeveral ſpecies have from thirteen to nineteen ribs on a ſide, and the vertebræ are from thirty-ſeven to forty-nine in number, differing greatly in number in the ſeveral ſpecies of the ſame genus. The ribs in many fiſh adhere to the vertebræ, by means of cartilages, and ſeem only continued parts of them; but in others they are free and looſe, and do not ſo much as touch the vertebræ. We find inſtances of the firſt ſort of ſtructure in the cyprini, ſalmons, &c. and of the other in the perch, the gadi, and the pleuronectæ. In the ſpinoſe fiſhes, the laſt vertebra always is terminated by a pair of broad apophyſes placed perpendicularly, and touching one another, and by means of cartilages theſe are fixed to the bones of the tail. Artedi Ichthyolog. See *Anatomy of* FISH.

RIBS, a figurative expreſſion for the timbers or frames of a ſhip, ariſing from the compariſon of it with the human body, as the keel with its keelſon, to the back-bone, and the timbers to the ribs; for the former unite and ſupport the whole fabric, ſince the ſtem and ſtern-frame, which are raiſed on the ends of the keel, may be ſaid to be a continuation of it, and ſerve to connect and incloſe the extremities by the hawſe-pieces forward, and the tranſoms abaft, as the keel forms and unites the bottom by the floor-timbers. The idea, if carried further, may in a manner repreſent the muſcular parts of the human fabric; for the wales, clamps, and thickſtuff, at the different heads of the timbers, are as ſo many muſcles or ſtrong ligaments to connect the ribs together, while the planking of the bottom and top-ſides, which is thinner, may be compared to the ſkin or covering of the whole; and hence planking is often termed, *ſkimming* the ſhip.

RIBS *of a Parrel*, ſhort flat pieces of wood hollowed on the back, having a hole near each end, through which the parrel rope is reeved. See PARREL.

RIBS, among *Jewellers*, the lines or ridges which diſtinguiſh the ſeveral parts of the work, both of brilliants and roſes.

RIB-WORT, in *Botany*. See PLANTAIN.

RICA, among the Romans, a veil with which the ladies covered their heads.

RICÆ, ῥῖκαι, ſurgical bandages for the head.

RICARD, DOMINIC, in *Biography*, was born at Toulouſe in 1741, and entered into the congregation of the Chriſtian

Chriſtian doctrine, and became a diſtinguiſhed profeſſor in it. He quitted the ſociety after ſome years, and took up his reſidence at Paris, where he employed himſelf in inſtructing youth, and in literary purſuits. He was celebrated for his deep knowledge in the Greek language, and engaged in the great taſk of tranſlating the whole works of Plutarch. Between the years 1783 and 1795 he publiſhed his verſion of that philoſopher's moral works, in 17 vols. 12mo.: of the Lives he only publiſhed 4 vols. 12mo. He publiſhed likewiſe a poem, entitled "La Sphere," in eight cantos, 8vo. 1796, which contains a ſyſtem of aſtronomy and geography, enriched with notes, and notices of Greek, Latin, and French poems, treating on aſtronomical ſubjects. Ricard died in 1803. He was diſtinguiſhed by modeſt merit, and the practice of all the ſocial virtues.

RICAUT, *Sir* PAUL, was the youngeſt ſon of ſir Peter Ricaut, knight, ſuppoſed to be a merchant in London. The time and place of the birth and education of the ſubject of this article are not known, but he appears to have travelled during ſeveral years in Europe, Aſia, and Africa. In the year 1661 he went out as ſecretary to the earl of Winchelſea, the ambaſſador extraordinary to the Ottoman Porte. Here he remained eight years in that poſt. In 1663 he publiſhed the treaty or capitulation concluded between Charles II. and the Turkiſh ſultan, in which was the favourable article, that Engliſh ſhips ſhould be exempted from ſearch for foreign goods. When his connection with the Porte was expired, he was appointed Engliſh conſul at Smyrna, an office which he held about eleven years, to the entire ſatisfaction of the Turkey company, and with the reſpect and attachment of all the Europeans in that city. Upon his return, he employed himſelf in literary occupations till the year 1685, when he accompanied the earl of Clarendon, lord-lieutenant of Ireland, as his ſecretary for Leinſter and Connaught. He was nominated by James II. one of his privy-council for Ireland, and judge of the admiralty court, and received the honour of knighthood. After the revolution, he was ſent by king William as his reſident to the Hanſe towns, in which poſt he continued ten years. He died in England, in the year 1700, literally worn out with age and long ſervices. Independently of his high character as a diplomatiſt, he was celebrated for his knowledge of the learned languages, and alſo of the modern Greek, the Turkiſh, the Italian, Spaniſh, and French. As an author, he is known by "The preſent State of the Ottoman Empire;" "The preſent State of the Greek and Armenian Churches;" "A Continuation of Knolles' Hiſtory of the Turks." He continued "Platina's Lives of the Popes" to his own time. He tranſlated from the Spaniſh, "The Royal Commentaries of Peru, by Garcilaſſo de la Vega." A paper of this author is inſerted in the Tranſactions of the Royal Society, of which ſociety he was a member. Biog. Brit.

RICCATI, VINCENT, a learned Italian Jeſuit, was born at Caſtel-Franco, in the territory of Treviſo, about the year 1707. His genius inclining him chiefly to the ſtudy of the mathematical ſciences, he cultivated them with ſo much ſucceſs, that his ſuperiors ſelected him as a proper perſon to teach them to others. He accordingly was choſen profeſſor in the college at Bologna, which he filled with reputation till the ſuppreſſion of the order in 1773. He died in 1775, leaving behind him ſeveral works that teſtify his high merit as a ſcholar, among which is "A Treatiſe on the Integral Calculus," in 3 vols. 4to. He did not confine himſelf to the abſtract mathematics, but paid much attention to the ſtudy of hydraulics; a branch of ſcience of the utmoſt importance in all the northern Italian ſtates, where the many and rapid rivers expoſe the country to continual inundations. In this line he appears to have rendered conſiderable ſervice to the Venetian territories; ſo much ſo, that in 1774 a gold medal was ſtruck in his honour.

RICCI, BARTHOLEMEW, a learned Italian, was born at Lugo, in Romagna, in the year 1490. He ſtudied under Amaſeo in Bologna, and for further improvement viſited Padua and Venice. He paſſed ſome years in the houſe of Giovanni Cornaro, as preceptor to his ſon, who was afterwards a cardinal; and for ſome time kept a ſchool at Ravenna. Through the recommendation of Calcaquini, he was invited, in 1539, to the court of duke Hercules II. of Ferrara, to undertake the education of the princes Alfonſo and Luigi. He there acquired the affection of his pupils, and the eſteem of the learned. He died at the age of 79, in the year 1569. The principal works of Ricci are "Orations," and "Epiſtles," the Latin ſtyle of which has been much applauded, as a happy imitation of that of Cicero. The moſt laborious of his works is entitled "Apparatus Latinæ Locutionis," being a Latin lexicon, in two parts; the firſt containing the verbs, and the ſecond the nouns with which they are joined. It was printed at Venice in 1535. Ricci alſo wrote a comedy in Italian proſe, entitled "Le Balie," which is well ſpoken of; and ſome Italian poems, which have appeared in collections.

RICCI, MATTHEW, an eminent miſſionary, was born of a good family at Macerata, in 1552. He was ſent to ſtudy the law at Rome, where, at the age of 19, he entered into the ſociety of Jeſuits. He had not completed his theological ſtudies, when he followed to the Eaſt Indies his preceptor, father Valignan. During his abode at Goa, he applied aſſiduouſly to the language of China, to which country he was deſtined. In 1583 he arrived at Caoquin, in the province of Canton, where he ſettled with ſome brethren. To ingratiate himſelf with the Chineſe, he made a map of the world, in which, whilſt he corrected their prejudices with reſpect to the relative dimenſions of their country, he complied with them by altering the meridian, ſo as to place it in the centre. It was not till 1600 that he was able to gain acceſs to the emperor at Peking, employing the pretext of bringing him a preſent of curioſities from Europe. He was well received, and permitted to ſettle in that capital, where his mathematical ſkill rendered him acceptable to the court and men of letters. He purchaſed a houſe there, and built a church; and the progreſs, ſuch as it was, which Chriſtianity made in the metropolis of China, was greatly owing to his exertions. He died there in 1610, leaving curious memoirs on China, of which father Trigault made uſe in his work "De Chriſtiana Expeditione apud Sinas."

RICCI, MICHAEL-ANGELO, an Italian cardinal, and able mathematician, in the 17th century, was deſcended from a noble family originally from Bergamo, and born at Rome in the year 1619. In the courſe of his ſtudies, he conceived a powerful inclination for the mathematics, which was confirmed by Torricelli, during the temporary reſidence of that philoſopher at Rome. Under his directions, Ricci's genius was carefully cultivated, and his progreſs reflected great honour both on the tutor and pupil. After Torricelli left Rome, he maintained a regular correſpondence with Ricci, who proved and illuſtrated in a happy manner ſeveral of his new theorems. In the year 1666 Ricci publiſhed a little work, entitled "Exercitatio Geometrica," &c. in which he determined, in a purely geometrical manner, the tangents, and the maxima and minima of curves, chiefly compared with conic ſections of the firſt order. This piece was reprinted by the Royal Society of London, as a treatiſe of the

the greatest utility; and it was warmly applauded by some of the most distinguished mathematicians of the age. Having been induced to enter into the church, he relinquished his mathematical pursuits, and wholly devoted his attention to the assiduous study of divinity, and the duties of his new profession. He filled several ecclesiastical stations, and, among others, those of secretary to the congregation of indulgences and of relics, and of consultor of the holy office. In the year 1681, pope Innocent XI. raised him to the purple; an honour which he wished to decline, but was compelled to accept by the pontiff's absolute command. He possessed it, however, only for a short period, as he died in 1682, at the age of 64. One of his "Dissertations" is preserved in cardinal Brancaccio's "Works;" another in Charles Dati's "Epistola ad Philalethos;" and one of his "Letters" in the first volume of the collection, entitled "Lettere Memorabili." Gen. Biog.

Ricci, Sebastian, was born at Belluno, near Trevisano, in 1659; and having discovered an early genius for painting, was conducted by his father to Venice, and placed as a disciple with Fred. Cervelli, a Milanese artist of good reputation, with whom he studied for nine years. He afterwards improved his practice at Bologna, &c. by copying, and obtained the favour and patronage of Rannuccio, the second duke of Parma.

By the liberality of that prince, he was honourably maintained at Rome, studying the productions of the best ancient and modern masters; and there he formed that manner which distinguishes his productions, and exhibits a ready and splendid invention, a free and masterly handling of the pencil, with a full luxuriance of colour, which for a while raised him into the highest esteem, and consequently immense employment.

Having quitted Rome, he returned to Venice, where he was so eagerly solicited for his paintings, that he had scarcely time to take even necessary refreshment. His fame spread through Europe, and he received an invitation to the court of the emperor at Vienna, to adorn the magnificent palace of Schoenbrun. From thence he was encouraged to visit London, where he was immediately and incessantly employed by the court, the nobility, and persons of fortune. Here he remained ten years, with his nephew and co-adjutor, Marco Ricci, who painted skilfully scenes of architecture and landscape. He acquired great wealth by the immense occupation he found; and then returned to Venice, where he passed the remainder of his days till his 75th year, when he shared the common fate of mortals.

Ricci was one of the few, comparatively speaking, who enjoy during their lives the utmost extent of their fame. In his history, that portion of renown which attaches to him died with him, or nearly so. In fact, he was a machinist, one who, being conversant in the rules of art, and skilful in the application of the means, dazzled where he could not instruct, and deluded by ingenuity without judgment, and art without expression. His works are to be found in many of our great houses, as well as those of his nephew. At Chelsea and at the British Museum there are considerable pictures of his painting, but they do not rise in esteem by continued observation; and yet, unfortunately, they had sufficient influence in their day to lead the artists astray from the contemplation and imitation of the works of Raphael, and the greater masters of the Italian school.

RICCIA, in *Botany*, a cryptogamic genus of plants, named by Micheli after a Florentine Senator of his time, Peter Francis Riccio, President of the Order of St. Stephen, Auditor of the Academy of Pisa, &c.; who seems to have been rather a patron, than a practical cultivator, of botanic science.—Mich. Gen. 106. t. 57. Linn. Gen. 566. Schreb. 766. Mart. Mill. Dict. v. 4. Schmidel. Ic. t. 44, 45. Hedw. Theor. 116. t. 29. Juss. 8. Lamarck Illustr. t. 877.—Class and order, *Cryptogamia Hepaticæ*. Nat. Ord. *Algæ*, Linn. *Hepaticæ*, Juss.

Ess. Ch. Male, scattered warts?

Female, Germen globose, sunk, with the *style*, in the frond. *Capsule* exposed, globose, crowned with the style, of one cell. *Seeds* numerous, elliptical.

The genuine species of this genus grow on the earth, flourishing in the damp cold season of the year, and disappearing in hot dry weather. Hence they are supposed to be annual. Such are three of the British species; *R. glauca*. Linn. Sp. Pl. 1605. Engl. Bot. t. 2546; *R. minima*. Linn. Sp. Pl. 1605. Mich. Gen. t. 57. f. 6; and *R. crystallina*. Linn. Sp. Pl. 1605. Dicks. H. Sicc. fasc. 15. 20. Mich. Gen. t. 57. f. 3.—These form small glaucous patches on the ground, in sandy or moist places. The other two British species float in fresh water pools; *R. fluitans*. Linn. Sp. Pl. 1606. Engl. Bot. t. 251, whose frond is forked and linear; and *R. natans*. Linn. Syst. Nat. ed. 12. v. 2. 708. Engl. Bot. t. 252, whose inversely heart-shaped form, with copious linear serrated scales, like radicles, beneath, has a very peculiar appearance. Nothing is known respecting the fructification of these two last. *R. fruticulosa* of Dickson is a *Jungermannia*, Engl. Bot. t. 2514, probably a variety of the *furcata*.

Riccia, *La*, in *Geography*, a town of Italy, in the Campagna di Roma; 1 mile S.E. of Albano.

Riccia, a town of Naples, in the Molise; 15 miles E. of Boiano.

RICCIARELLI, in *Biography*. See Volterra, Daniel da.

RICCIOLI, John-Baptist, a learned Italian Jesuit, and an eminent philosopher, astronomer, and mathematician, in the 17th century, was born at Ferrara, a city belonging to the papal jurisdiction, in the year 1598. At the age of 16 he commenced his noviciate in the society of Jesus. When he had completed his course of academical studies, he was selected to teach successively rhetoric, polite learning, philosophy, and scholastic divinity, in the Jesuits' colleges at Parma and Bologna. While he discharged the duties of these appointments with great success and reputation, he devoted his leisure hours to the study of geography, hydrography, chronology, experimental philosophy, and astronomy. During the dispute which took place in his time, respecting the correctness of the Gregorian reformation of the calendar, he inlisted himself among the advocates for the reform, and published some little pieces on the subject at Bologna, under the name of Michael Manfredi. His principal attention, however, was occupied on productions of greater magnitude. He projected a grand work, which was to be divided into three parts, containing a complete system of philosophical, mathematical, and astronomical knowledge. The first of these parts was given by him to the public in 1651, in two large and closely printed volumes, folio, under the title of "Almagestum Novum, Astronomiam Veterum, Novamque Complectens," &c. In imitation of the "Almagest" of Ptolemy, it presents us with a collection of the discoveries and improvements in astronomical science, from the earliest ages of antiquity to the author's own time. From a table of contents which is prefixed to this part, it appears that the second part was to be divided into five books, treating of trigonometry, or the doctrine of plane and spherical triangles, astronomical instruments, the optical part of astronomy, geography, and chronology; and the third part into ten boks, comprehending

hending obſervations of the ſun, of the moon, of eclipſes, of the fixed ſtars, and planets, with precepts, and tables of the primary and ſecondary motions, and other aſtronomical tables. But if theſe parts were completed, they do not appear to have been ever publiſhed. In the year 1661 he preſented to the world his "Geographiæ et Hydrographiæ Reformatæ, Libri XII." in folio; and in 1665, his "Aſtronomiæ Reformatæ, Tomi duo," folio, 2 vols. in one. The laſt work which he publiſhed made its appearance in 1669, under the title of "Chronologia Reformata, et ad Certas, Concluſiones Redacta," folio, 2 vols. in one. Father Riccioli died in 1671, when about 73 years of age.

RICCOBONI, Louis, a comic actor and writer, born at Modena in 1674, devoted himſelf to the theatre under the name of Lelio. In 1716 he came to France with his family, and diſtinguiſhed himſelf as the beſt actor at the Theatre Italien. Religious motives induced him to quit the ſtage in 1729; and he died in 1753, much eſteemed for the decency of his manners, and his amiable diſpoſition. He was the author of a number of comedies, which had a temporary ſucceſs, and which contain much comic humour. One of them, entitled "Les Coquets," was revived a few years ſince. He alſo wrote "Penſées ſur la Declamation;" "Diſcours ſur la Reformation du Theatre;" "Obſervations ſur la Comedie et ſur le Genie de Moliere;" "Reflexions Hiſtoriques et Critiques ſur les Theatres de l'Europe;" and "Hiſtoire du Theatre Italien."

The "Hiſtory of the Italian Theatre" of this author, in 2 vols. 8vo., publiſhed in 1730 and 1731, and the "Reflections Hiſtorical and Critical upon all the Theatres of Europe," which appeared in 1738, contain many judicious obſervations relative to the ſtage in general, and, in the work firſt mentioned, to the lyric theatre in particular.

Riccoboni, Marie Laboras de Mezieres, ſecond wife of the preceding, was born at Paris in 1714. After her marriage, ſhe became an actreſs on the Italian theatre, which ſhe quitted with her huſband. She is known by ſeveral novels, written with much elegance of ſtyle and refinement of ſentiment. The principal of theſe are "Lettres de Miladi Cateſby;" "Lettres de la Counteſſe de Sancerre;" "Lettres de Sophie de Valiere;" "Erneſtine;" "Lettres de Milford Rivers." She alſo tranſlated Fielding's Amelia; and ſhe appears to have had a predilection for England, in which the ſcene of ſeveral of her novels is laid. She was in habits of intimate correſpondence with Garrick. The works of Madame Riccoboni were printed collectively in 10 vols. 12mo. Neufchatel, and 9 vols. 12mo. Paris. They rank among the moſt elegant and ingenious of the claſs, and diſplay much knowledge of the tender affections, and great decency joined to vivacity. Several of her novels have been tranſlated into Engliſh. She died in 1792, reduced by the troubles of the time to a ſtate approaching to want.

RICE, in *Botany*. See Oryza.

Rice, in *Rural Economy*, the name of a plant cultivated in many parts of the Eaſt, in South Carolina, in America, and alſo in Spain, Italy, and Piedmont. It is a plant that grows to the height of about two feet and a half, with a ſtalk not unlike that of wheat, but fuller of joints, and with leaves reſembling that of the leek. It branches out into ſeveral ſtems, at the top of which the grain grows in cluſters, and each of them is terminated with an ear or beard, and incloſed in a yellow rough huſk. When ſtripped of this, they appear to be of an oval ſhape, of a ſhining white colour, and almoſt tranſparent. It is probably a plant that cannot be cultivated in this climate, as the experiments ſaid to be made by ſir Joſeph Banks, and detailed as below by a writer in the tenth volume of the Agricultural Magazine, ſeem to ſhew. It is ſtated, that the dry or mountain rice which he received laſt year from the Board of Agriculture for trial, had been procured at a conſiderable expence by ſir John Murray, from the neighbourhood of Serinagur, a city in India, ſituated at the foot of mount Imaus, where ſnow lies till late in the ſpring; and where the climate has been ſuppoſed to reſemble that of England ſufficiently to make it probable that the vegetable productions of the one would equally ſucceed in the other country; he therefore conſiders it as a duty owing to the patriotic exertions of ſir John, to give the Board ſome account of the reſult of the trial of it, made at Spring-Grove, near Hounſlow, in Middleſex. He adds, that it was not till near the end of May, when the ſamples, being of ſix ſorts, were delivered out by the Board, and they were ſown immediately, on the 21ſt day of that month, on ſix ſmall beds in a garden, under the ſhelter of a paled fence, in a ſouth expoſure. And the grains were ſown very thin, in order that the progreſs of their vegetation might be better noted: in a very few days they appeared above ground. The ſeaſon being warm, with a moderate ſupply of rain, it was ſeldom neceſſary to water them; however, when they appeared to flag, which generally happened after three or four dry days had taken place, they were well ſprinkled with a watering pot. He ſays, that in leſs than a month they had grown ſeveral inches high; each ſort had acquired an appearance very different from the reſt; ſome were pale green, and had broader blades; ſome were deeper coloured, and narrower in the blade; and one ſort had a brown hue on the whole plant; and the baſes of the leaves in this kind were nearly black.

He further ſtates, that during the month of Auguſt, they tillowed much more than he has obſerved any other corn to do; ſo much ſo, that although they had been ſown very thin, they became a denſe, compact bed of plants: the blades in ſome of the kinds ſtanding as cloſe, or cloſer to each other, than the thickeſt ſown barley ever does. At the cloſe of the month the blades were from a foot to eighteen inches high; the plants continued to tillow, each root having by this time produced from ten to twenty off-ſets, but no ſymptom of a riſing-ſtem was at all obſervable. In the middle of September they had ſtill continued to tillow, and the blades to ſtrengthen, ſo that ſome of them were at leaſt two feet long. As the froſts of the autumn were now nearly approaching, it became an object of ſome importance to examine the ſtate in which the plants really were, in order to aſcertain the probability of their having produced ears, or poſſibility of their having ripened corn, if they had been ſown a month or two earlier.

The moſt careful inſpection was therefore made by diſſection, but no traces could be found of the rudiment of a joint beginning to form itſelf on the crown of the root, or of the embryo of the glumes of the ear, which in all kinds of corn are firſt diſcernible in that part. He ſays that about this period he was taken ill, and obliged to deſiſt from obſerving their future progreſs; but a froſt ſoon after followed, which cut the blade down to the earth, and at once deſtroyed all hopes of theſe kinds of rice producing grain in our climate; the quantity of the blade was however ſo uncommonly great, that it is not impoſſible, he thinks, it might be advantageous to ſow it as food for cattle, for a very large proportion of ſtock might certainly be maintained upon an acre of it. He concludes by obſerving, that before the froſt ſets in, he had ordered a tuft of each kind of the rice to be tranſplanted into a pot, and placed in a hothouſe, in order, if poſſible, to aſcertain the natural period of this grain; whether, like winter corn, it requires eight or nine months to come to perfection, or, like our Lent

corn, arrives at the ſame period in five or ſix: but all of theſe died, notwithſtanding great attention was paid to them: ſome ſeed, however, which he had given to Mr. Lambert, ſucceeded better; it was ſown in his hot-houſe in the month of June, where it throve well, but did not produce ears till near Chriſtmas, a period of ſeven months, from whence it is probable, the grain would have ripened in leſs than two months from the time the ear appeared. It is eaſy to deduce that in the neighbourhood of Serinagur theſe kinds of rice are either ſown as winter corn, or the climate there is far better ſuited to promote the quick progreſs of vegetation than our's is. It was, when it produced ears, about three feet and a half high, and ſome of the ſtems had five joints, including the radical one: had it been in a more ſuitable climate, it would certainly have grown taller, for the flowers dropped off without producing ſeed.

It is however cultivated much in the Eaſt, as in China, as well as in the ſouthern parts of America; the method of which is thus deſcribed by Mr. Duhamel.

1. To haſten the ſprouting of the rice, it is put into baſkets, and ſoaked for ſome days in a ſtanding water. 2. When their rice-grounds are ſo ſoaked with water as to be quite like mud, they are ploughed with a buffalo yoked to a plough very ſimple in its make, having but one ſhare, one handle, and no wheels. 3. After a gentle rain, they break the clods with a kind of large hurdle, drawn by a large buffalo; the driver ſitting upon it to increaſe the weight. 4. The ground is cleared of all ſtones, and whatever roots are in it are pulled up by a ſtrong harrow, with great iron teeth. This inſtrument is drawn by a buffalo, and a man guides it by the help of two handles, like thoſe of a plough, upon which he leans hard. The earth is like mud, and partly covered with water during all this operation. 5. The earth is afterwards ſmoothed with a harrow, which has ſeveral rows of teeth. A man guides this harrow by its two handles, whilſt a buffalo draws it; and as faſt as its teeth form little channels in the ground, the water runs in and fills them up. 6. When the rice that was laid to ſoak has ſprouted, the ſeed is known to be good; and it is then ſown by hand, very thick, and as equally as poſſible. Only part of the ground is ſown in this manner, to furniſh plants for the reſt. The day after it has been ſown the points of the plants appear above the ſurface of the water; for the ground is overflowed all this time with juſt enough water to cover it. And it is added, that when the plants have acquired a little ſtrength, they are ſprinkled with lime-water, to deſtroy the inſects, and ſome of the weeds that would hurt them. For this purpoſe a ſmall baſket is faſtened to the end of a long handle, and dipt in the lime-water, which runs through it, and is conveyed over the plants. And the Chineſe have a great veneration for the firſt inventor of this method, which anſwers to our cuſtom of ſteeping wheat in lime-water, or manuring land with quick-lime. 7. Towards April, when the plants are grown ſtrong enough to cover the whole field, and look very green and even, the greateſt part of them is pulled up by handfuls, all the mud is carefully waſhed off their roots, and, being held at the ſame time as even as poſſible with one another, they are planted in tufts, pretty far aſunder, and in a quincunx form, in fields prepared on purpoſe for them. A ſerene day is choſen for this operation, which muſt be performed as quick as poſſible. This practice of the Chineſe is, he thinks, with reſpect to the common culture of rice, what the new huſbandry is with reſpect to the common culture of wheat. 8. The rice muſt be watered, which is always done in China by overflowing it. To this end, the rice-grounds are always near a rivulet, pond, or great pool of water, from which they are ſeparated only by a bank or cauſeway. If the water was higher than the rice-ground, a trench cut through the cauſeway would overflow it at once: but as it is generally lower, or on a level with the rice-ground, the neceſſary quantity is conveyed in pails or buckets, which are worked chiefly by the help of ropes. 9. Though a man cannot ſtep in theſe rice-grounds without being up to his knees, the Chineſe weed them three times in a ſummer, and that with ſuch care, that they pull up even the roots of every weed. 10. When the rice is ripe, which is known by its turning yellow, like wheat, it is cut down with a ſickle, made into ſheaves, and carried into a barn, where it is threſhed with flails pretty much like ours: the ſtraw is removed with pitch-forks and ſhovels, and the outer huſk of the grain is taken off by beating it with great wooden peſtles, or a kind of mallet, after which it is ſifted and winnowed: and, laſtly, to get off the under huſk, the grain is put between two mill-ſtones, which are worked by a lever faſtened to the upper one. But the two moſt remarkable circumſtances of this culture are, 1ſt, the care which the Chineſe take not to let their plants be too cloſe together, leſt they ſhould rob one another of their food; and 2dly, their weeding their rice-grounds three times in a ſummer, which anſwers the end of the hoeings recommended for the alleys between the beds of other grain, cultivated according to the horſe-hoeing huſbandry.

This plant is ſaid to have been lately cultivated with ſucceſs near Dumfries, by Mr. Charters; notwithſtanding the want of ſucceſs in the above trial, as well as by others in Cambridgeſhire. And it is not improbable, but that by degrees it may be ſo naturalized to the climate, as has been the caſe with many other plants, as to be cultivated without much trouble or difficulty, and thus contribute to the advantage of the country as an article of the grain kind. Rice forms an excellent kind of bread when incorporated with flour, as well as a good food for the feeding of different ſorts of animals of the poultry and other kinds.

Rice is much uſed as food in the Roman Catholic countries in time of Lent. The ordinary preparation is, by firſt ſteeping it in water, then boiling it in milk. Some make it into a ſort of farina, or flour, by pounding it in a mortar, after having firſt put it in hot water, and again waſhed it out in cold.

Among the common kinds of grain, rice is accounted the mildeſt and moſt nutritious, and is ſuppoſed to be particularly ſerviceable in dyſenteries and diarrhœas. It is leſs viſcous than wheat, or of leſs tenacity, when boiled with water.

The northern nations eat their fowls and other meats with rice and ſaffron. The Chineſe make a wine of rice, which is of an amber colour, and taſtes like Spaniſh wine, and ſerves them for their common drink. In ſome parts of Europe they alſo draw a very ſtrong brandy, or ſpirit, from rice.

Rice-*Balking*, in *Agriculture*, a provincial word applied to a method of ploughing, in which, according to Mr. Marſhall, the flag is always turned up towards the unploughed ground, the edge of the coulter paſſing cloſe to the edge of the flag laſt turned: whereas, in *ſlob-furrowing*, the flag is turned towards the ploughed ground, the coulter paſſing fifteen or ſixteen inches from the laſt ploughed furrow; into which, in this caſe, the edge of the flag hangs; and, in both caſes, a ſlip of unploughed ſoil, of a width nearly to that of the flag, is buried.

Rice-*Bird*, in *Ornithology*. See Emberiza *Oryzivora*.

Rice *Lake*, in *Geography*, a lake of Canada, having a portage

portage of 11 miles to lake Ontario. It discharges itself by the river Trent, into the head of the bay of Quinté.

RICEBOROUGH, a town of America, in Liberty county, Georgia, where the county courts are held. The county contains 6228 inhabitants.

RICERCARE, Ital. to seek; whence *ricercata*, a research, a flourish, a prelude, an impromptu, a voluntary. See RESEARCH.

RICEYS, LES, in *Geography*, a town of France, in the department of the Aube, and chief place of a canton, in the district of Bar-sur-Seine; 6, 7, and 8 miles S. of Bar-sur-Seine. The place contains 3842, and the canton 7875 inhabitants, on a territory of 167½ kiliometres, in 8 communes.

RICH, CAPE, a cape on the west side of Newfoundland, towards the north end, and is the N.E. part of the gulf of St. Lawrence, having the isle of St. John, and some other small isles, to the N. This cape was the boundary of the French privilege of fishing, which extended from hence northward, and round to cape Bonavista.

RICH *Inlet*, a narrow channel between two small islands near the coast of North Carolina. N. lat. 34° 14′. W. long. 77° 52′.

RICHARD *of St. Victor*, in *Biography*, a celebrated divine and scripture commentator in the 12th century, was a native of Scotland, who went to pursue his studies at the university of Paris. Here he entered among the canons regular of St. Augustine, at the abbey of St. Victor, and became a pupil of the famous Hugh, who, like him, derived his surname from the same house. Under this master he assiduously studied the several branches of science, as far as they were then known, particularly theological and biblical literature; and he acquired great reputation by his proficiency, as well as the friendship of the most eminent men in that seat of learning. In 1164 he was elected prior of his monastery, where he died, in the year 1173, equally respected for his virtues as for his learned attainments. His critical pieces are very accurate for the time in which he lived. His style, however, is not very elevated; on which account his pious treatises, though abounding in excellent matter, are greatly deficient in weight and energy. His works consist of critical observations and remarks on some of the historical parts of the Old Testament, relating to the tabernacle and the temple of Solomon; allegorical and moral "Commentaries" on several of the Psalms, the Song of Songs, and the Apocalypse; questions on certain difficult passages of St. Paul's epistles, and other parts of the bible; and numerous critical, doctrinal, and practical treatises. The whole have been frequently printed in a collective form; and the best edition is said to be that of Rouen, in 1650, in 2 vols. folio.

RICHARD I., king of England, surnamed *Cœur de Lion*, son of Henry II. by Eleanor Guienne, was born in the year 1157. As second son he was invested in the duchy of Guienne, and county of Poitou. In 1173 he united with his brothers, Henry and Geoffrey, in a rebellion against his father, which was soon quelled, and forgiven by the reigning monarch. Richard was now sent to Poitou to reduce some revolted barons, where he displayed that martial spirit for which he was afterwards celebrated, and on account of which he obtained his surname. Refusing to pay homage for the duchy of Aquitaine to his elder brother Henry, a war broke out between them in France, which their father found great difficulty in terminating. Henry soon after this died, and Richard, being now heir apparent, was required to resign Aquitaine to his youngest brother, John. This he refused, and new wars ensued. In 1189 he joined Philip Augustus, king of France, against his own father, and did homage to the French king for the possessions which he held on the continent. A war was the consequence of this unnatural junction, in which Henry was harassed and worn out by Richard, while he found himself abandoned by his youngest son John. Henry died in July of the same year, and was succeeded in his throne by the subject of this article. He is said to have visited his father's corpse on the day after his decease, and expressing great remorse for his past behaviour, charged himself with being his murderer. Richard was crowned at Westminster, received into his confidence the faithful servants of the late king, and discountenanced all those who had been abettors in his own rebellion. He set at liberty his mother, queen Eleanor, who had long been in a state of confinement, and endeavoured to conciliate the affection of his brother John by grants of great extent in England and France. Richard, while prince, had taken the cross along with his father; and now he had come to the crown, he was determined to give scope to his martial talents in the East. Having made the requisite preparations, he, in 1190, had an interview with Philip of France, who had also taken the cross, at which, mutual conditions were agreed upon respecting their co-operation in the expedition, and the peace of the kingdoms during their absence. As a prelude to their enterprize, which, according to the opinion of the times, was regarded as extremely pious in its object and motives, Richard and his nobles, who had embarked in the same cause, exercised their zeal in a horrible massacre and pillage of the Jews in several of the principal towns, which was ended by a bonfire of the bonds which the Christians had entered into with this much injured people.

About the middle of the year, the kings of England and France mustered their forces, which amounted to 100,000 men in arms, in the plains of Veselay, on the borders of Burgundy. Richard then proceeded to Marseilles for embarkation, and in September the two monarchs met at Messina, where they spent the winter, in the course of which, dissentions arose that were nearly breaking out into open hostilities, but which ended in a new treaty, in which all differences were for the present adjusted. Richard had long been under engagements to marry Adelais, Philip's sister; but an attachment which he had formed to Berengaria, daughter of Sanchez, king of Navarre, together with some misconduct of the French princess, induced him to break the contract, in which it appears that Philip acquiesced. Eleanor arrived at Messina with Berengaria; but Richard, without waiting to celebrate his nuptials, set sail in April, 1191, with his fleet, which was soon dispersed by a storm. The king sailed into Crete; but three of his ships, with his intended bride, and his sister, the queen of Sicily, on board, were stranded on the coast of Cyprus. The king of that island treated the unfortunate crews and the princesses with great rigour, in revenge for which insult, Richard landed his army in the island, defeated the inhabitants in two battles, and reduced the king to the surrender of himself, his only daughter, and his sovereignty. In this island he consummated his marriage with Berengaria, and then embarked for Palestine.

The siege of Acre, celebrated likewise in modern times, which had been commenced two years before, was still carrying on by the relics of the emperor Frederic's army, with the other Christian adventurers who had at different times joined the banners of the cross, while it was obstinately defended by a numerous Saracen garrison, supported by Saladin at the head of a powerful host in the field. The arrival of the two kings infused new vigour into

into the beſiegers, and feats of arms were performed under the walls, by Richard and Philip, eſpecially by the former, who far ſurpaſſed his rival in military enterpriſe. The city ſurrendered in July 1191, and immediately there were two competitors for the titular kingdom of Jeruſalem, whoſe claims were eſpouſed by the rival kings. Philip, however, did not remain long in the Eaſt; he returned home, leaving 10,000 men with Richard, who marched from Acre with the intent of reducing the other towns on the ſea-coaſt, while Saladin attended his motions, and gave him frequent aſſaults, which produced deeds of extraordinary valour on both ſides, till at length a general engagement was brought on, in which, after both wings of the Chriſtian army had been defeated, Richard in the centre, by the moſt heroic exertions of bravery, and conſummate military ſkill, gained a complete victory. This was immediately followed by the poſſeſſion of Joppa, Aſcalon, and other places which Saladin had deſerted; and Richard advanced within ſight of the holy city; but the greater part of the allies refuſed to concur in the ſiege of that capital, and he was obliged reluctantly to return to Aſcalon. Here he concluded a truce with Saladin, on the condition that Acre, Joppa, and the other ſea-ports of Paleſtine, ſhould remain in the hands of the Chriſtians, and that they ſhould enjoy full liberty to perform their pilgrimages to Jeruſalem.

Richard now prepared to return home, where his preſence was abſolutely neceſſary on account of the great diſorders into which his kingdom was fallen. Previous to his embarkation, he terminated the conteſt for the crown of Jeruſalem, by concurring in the election of Conrad, and beſtowing the conquered kingdom of Cyprus upon the diſappointed competitor Luſignan. At this period, Conrad was murdered in the ſtreets of Tyre by two emiſſaries of the prince of Aſſaſſins, commonly called the "old man of the mountain;" and although the deed was clearly traced to this ſource, Philip was baſe enough to calumniate Richard as the author of it, in order that he might have an excuſe for the deſigns which he was carrying on againſt him in Europe.

Richard ſet ſail from Acre in October, 1192. In the courſe of his voyage he was wrecked near Aquileia: thence he purſued his way through Germany, in the diſguiſe of a pilgrim; but being diſcovered near Vienna, he was arreſted by the orders of Leopold, duke of Auſtria, and thrown into priſon. He was afterwards given up to the emperor Henry VI., who had been offended by him. When intelligence of this event reached England, queen Eleanor wrote repeatedly to the pope, repreſenting to his holineſs the ſcandal and injuſtice of ſelling and impriſoning the moſt illuſtrious champion of Chriſtendom, whoſe exertions for the common cauſe were celebrated throughout Europe and Aſia; and claiming, in behalf of the captive king, the protection of the holy ſee. Her repreſentations were of no avail: Richard was kept in priſon, and loaded with irons; which afforded his rival, Philip, full opportunity for invading his dominions. He entered into a treaty with John, who readily took up arms againſt his brother's government, while Philip was making himſelf maſter of great part of Normandy. Richard, in the mean time, ſupported his miſfortunes and indignities with the moſt undaunted courage. The emperor, to juſtify his own conduct, produced the royal captive before the diet at Worms, under a charge of ſeveral heinous offences; but Richard repelled the accuſations with ſo much ſpirit and eloquence, that he carried the aſſembly with him, who loudly exclaimed againſt his detention. At length he was liberated, on the condition that 150,000 marks ſhould be paid as a ranſom. He arrived in England in March, 1194, to the great joy of his ſubjects in general.

When Philip was made acquainted with Richard's deliverance, he wrote to John "to take care of himſelf, the devil being broke looſe." The property of John was immediately confiſcated, and his caſtle at Nottingham ſeized. Richard was recrowned at Weſtminſter, in the preſence of William, king of Scotland; and he then began to raiſe money, that he might take revenge upon his inveterate foe, Philip of France. John threw himſelf at the feet of his brother, imploring, in the moſt abject terms, his pardon. "I forgive him," ſaid the hero, "and hope I ſhall as eaſily forget his injuries as he will my pardon." In the enſuing war between Richard and Philip, the former gained ſome advantages; but a truce ſuſpended farther hoſtilities. A peace was terminated in 1196; but in the following year, the war was renewed, in which much cruelty was exerciſed on both ſides.

England, during this foreign contention, had been the ſcene of much calamity, partly through diſturbances occaſioned by the exactions of a needy and rapacious government, and partly by the more grievous calamities of famine and peſtilence. A laſting accommodation with France, as preparatory to another expedition to the Holy Land, was in agitation, when the reign and life of Richard were brought to a cloſe through his avarice, which is thus related by Hume.

Vidomar, viſcount of Limoges, a vaſſal of the king's, had found a treaſure, of which he ſent a part to that prince as a preſent. Richard, as ſuperior lord, claimed the whole, beſieged the viſcount in the caſtle of Chalus, near Limoges, in order to make him comply with his demands. The garriſon offered to ſurrender, but Richard was determined on revenge; and as he was ſurveying the caſtle with Marcadèe, leader of his Brabançons, he was ſtruck by an arrow, aimed at him by Bertrand de Gourdon. The wound was not conſidered as mortal: the place was aſſaulted and taken, and the whole garriſon executed, except Gourdon, who had wounded him, and who was reſerved for a more ſavage execution. By the unſkilfulneſs of the ſurgeon, the wound, which was at firſt but ſlight, exhibited the moſt dangerous ſymptoms, and the king felt that his end was approaching. He ſent for Gourdon, and aſked him what had induced him to make an attempt upon his life; to which the man boldly replied, "You killed, with your own hands, my father and my two brothers, and you intended to have hanged myſelf: I am now in your power, and you may take your revenge, by inflicting upon me the ſevereſt torments; but I ſhall endure them with patience, provided I can think that I have been ſo happy as to rid the world of ſuch a nuiſance." Richard, ſtruck with the magnanimity and reaſonableneſs of the reply, and probably humbled and penitent by the near approach of death, ordered Gourdon to be ſet at liberty, and a ſum of money to be given him; but Marcadèe, unknown to the dying king, ſeized the unhappy man, cauſed him to be flayed alive, and then hanged. Richard died in the tenth year of his reign, and the forty-ſecond of his age, leaving no iſſue behind him. The moſt ſhining parts of his character are his military talents. He loved glory, and chiefly military glory; and as his conduct in the field was not inferior to his valour, he ſeems to have poſſeſſed every talent neceſſary for acquiring it. His reſentments were high, and his pride unconquerable. He was diſtinguiſhed by all the good as well as bad qualities incident to an impetuous and vehement ſpirit: he was open, frank, generous, ſincere, and brave; but revengeful, ambitious, haughty, and cruel. His talents were conſiderable

in

in the cabinet, as well as in the field. He was a paſſionate lover of poetry: ſome of his compoſitions in that line are ſaid to remain; and he bears a rank among the Provençal poets and Troubadours, who were the firſt of modern Europeans that diſtinguiſhed themſelves by attempts of that nature.

Though the Engliſh pleaſed themſelves with the glory which the king's martial genius procured them, his reign was oppreſſive and arbitrary, by the high taxes which he levied on them, and frequently without conſent of the ſtates, or great council. In the ninth year of his reign he levied five ſhillings on each hyde of land; and becauſe the clergy refuſed to contribute their ſhare, he put them out of the protection of the law, and ordered the civil courts to give them no ſentence for any debts which they might claim. Twice in his reign he ordered all his charters to be ſealed anew, and the parties to pay fees for the renewal. He eſtabliſhed by law one weight and meaſure throughout the kingdom, which the mercenary diſpoſition and neceſſities of his ſucceſſor engaged him to diſpenſe with for money.

Richard II., king of England, ſon of Edward the black prince, and grandſon of Edward III., was born in 1366, and, on the death of his grandfather in 1377, he ſucceeded to the throne in his eleventh year. The chief authority of the ſtate, at this time, was in the hands of his three uncles, *viz.* John, duke of Lancaſter; Edmund, earl of Cambridge, afterwards duke of York; and Thomas of Woodſtock, afterwards duke of Glouceſter. A council of nine perſons was now nominated to conduct the adminiſtration of government. The early part of the king's minority paſſed in wars with France and Scotland; the conſequence of which was a formidable inſurrection at home, produced by the taxes neceſſary for the public ſervice. In 1381, the indecent conduct of a collector of the poll-tax at Deptford having provoked one Walter, by trade a tyler, to break his ſkull with a hammer, a flame was inſtantly kindled, which ſpread over Kent, and the neighbouring counties; ſo that, in a ſhort time, a body of 100,000 men was collected on Blackheath. Their object was not merely to put an end to an arbitrary tax, but to free the country from the perſonal ſervitude to which the lower claſſes were, at that time, in a great meaſure ſubjected. On their approach to London, they ſent a meſſage to the king, requeſting a conference. He met them on the bank of the Thames, but was unable to ſatisfy their demands. In the rage of diſappointment, they burſt into London, committed great devaſtation, and excited univerſal conſternation. At length ample charters of freedom were granted to them, and a general pardon for all paſt offences. The inſurgents now diſperſed, but the principal leader, Wat Tyler, at the head of the Kentiſh men, remained in London, and was unſatisfied with the conceſſions granted by the monarch. He met the king in Smithfield, whom he addreſſed with much inſolence, and making the moſt extravagant demands, Walworth, lord mayor of London, drew his ſword and felled him to the ground. While the rioters ſtood aſtoniſhed with the fall of their leader, the king, with great preſence of mind, rode up alone, and exclaiming that he would be their leader, drew them off involuntarily into the neighbouring fields. The monarch would willingly have pardoned the inſurgents, and confirmed to them the charters which had been extorted by force; but other inſurrections being excited, his adviſers cauſed him to revoke all the charters that had been extorted from him, and to iſſue commiſſions for the trial of the rioters, many of whom were executed.

Richard, when he was ſixteen years old, eſpouſed Anne, daughter of the late emperor Charles IV.; after this he began to exerciſe a very tyrannical ſpirit, notwithſtanding the early promiſe of his reign, and he took the great ſeal from Scroop, who had refuſed to ſet it to certain extravagant grants of lands made to courtiers. A war with France and Scotland, and the ambitious projects of the duke of Lancaſter, diſquieted ſome ſucceeding years. In 1385 Richard marched with a large army into Scotland, and ravaged the country to Edinburgh and Perth, both which towns he burnt; in the mean time a Scotch army was making a deſtructive inroad into England. The duke of Lancaſter being abſent, proſecuting his claim to the crown of Caſtile, the king's younger uncle, the duke of Glouceſter, a man of popular manners and dangerous ambition, became a leader of the oppoſition to the adminiſtration of the king's favourites. By his influence an impeachment was ſent up to the lords againſt the chancellor; and though the king withdrew, with his court, to Eltham, he was intimidated into a diſmiſſion of his miniſter, who was afterwards ſtript of his eſtates, and committed to cuſtody. The parliament now felt themſelves ſtrong enough to proceed to active meaſures, and they went ſo far as to diveſt the king of all his authority, by obliging him to ſign a commiſſion, appointing a council of regency, conſiſting of fourteen perſons, to whom the ſovereign power was transferred for a year. The king now, in the twenty-firſt year of his age, was reduced to a ſtate of complete inſignificance, but he held frequent conſultations with his friends relative to the means of emancipating himſelf; and in the year 1387, making a progreſs to the north, he ſummoned a council of his friends at Nottingham, by which queſtions were propoſed to the judges concerning the legality of the commiſſion which he had been compelled to ſign. They unanimouſly declared it to be a violation of the royal prerogative, and pronounced all who had joined in the execution of it, as guilty of a capital offence. The duke of Glouceſter and his party began now to make preparations to maintain their cauſe by force of arms. Being by much the ſtronger party, they obliged the king to accept of terms, and at the enſuing meeting of parliament the five principals in the king's council were impeached, and condemned to death. The judges, who had given their opinion in favour of the king, were all found guilty of high-treaſon, but the puniſhment of death was commuted for impriſonment in Ireland during life. In 1389 Richard entered the council, and, in a reſolute tone, obſerved, that he was of full age to take the government into his own hands: his enemies ſubmitted, and he granted a general amneſty.

Several years of tranquillity enſued, and the return of the duke of Lancaſter formed a counterbalance to the influence of the duke of Glouceſter. In 1394 Richard viſited Ireland at the head of an army, in order to ſettle the affairs of that iſland, which he accompliſhed, and then returned. Although no acts of notorious miſgovernment had been committed by the king for a conſiderable period, yet his private character and mode of life tended to diſgrace him in the eyes of his ſubjects. He was indolent and averſe from buſineſs, and ſpent all his time in conviviality and amuſement, admitting jeſters and perſons of the meaneſt rank and ſtation to his intimacy, and laying aſide all the proper dignity of rank. He was ſtill governed by favourites, who were the real diſtributors of every grace from the crown, ſo that the king was little better than a cypher. By Glouceſter and his party the moſt criminal deſigns were imputed to Richard, which led the king, by the advice and ſolicitation of his adherents, to apprehend the duke and his two accomplices, the earls of Arundel and Warwick. This plan was executed in 1397; the duke was ſent over to Calais in cloſe cuſtody, while the earls were committed to priſon. A parliament

was then aſſembled, before which the culprits were impeached of high treaſon. Lord Arundel was condemned, and executed; the earl of Warwick was alſo convicted, and condemned to perpetual baniſhment. The duke of Glouceſter was ſaid to have died of an apoplexy, but it was ſoon diſcovered that he had been ſuffocated. Although the proceedings of parliament were favourable to the royal authority, yet much ill-will prevailed in the nation on account of its ſeverities, and troubles were continually breaking out among the nobles. A quarrel between the dukes of Hereford and Norfolk, ariſing from a charge brought by the former againſt the latter, of ſlanderous words ſpoken concerning the king, was the cauſe of the revolution that terminated the reign. Richard interpoſed his authority and baniſhed them both; but it was agreed, that both exiles might receive, by their attornies, any inheritance that ſhould fall to them during their abſence. In 1399, John of Gaunt, duke of Lancaſter, died, and his ſon, the duke of Hereford, became heir to his vaſt eſtates, which Richard, in defiance of the agreement, ſeized as property lapſed to the crown, and the attorney who claimed them for the duke was even condemned as a traitor. While the nation was full of diſcontent on account of this act of tyranny, Richard went to Ireland, and, during his abſence, Henry of Bolingbroke, as the duke of Hereford, invited by his numerous partiſans to make uſe of this opportunity, came over from France, and landed in Yorkſhire, and being joined by the earls of Northumberland and Weſtmoreland, and other men of rank, proceeded towards the ſouth, at the head of 60,000 men, pretending that their ſole intention was to recover the duchy of Lancaſter. The duke of York, who had been left regent of the kingdom, joined Henry; and Richard, having heard theſe facts, intended to withdraw into France. He was, however, taken and thrown into Flint caſtle, from whence he was taken to London. His depoſition being reſolved on, thirty-five articles of accuſation were drawn up againſt him, which, however informal, and many of them unjuſt, were conſidered as quite ſufficient to juſtify the meaſures taken againſt him, and Richard was depoſed Sept. 30, 1399. Henry at the ſame inſtant ſtood forth, and claimed the crown, which was without heſitation awarded to him. He declared that the life of the dethroned king ſhould be ſafe, and he was committed for ſafe cuſtody to the caſtle of Pomfret; but the uſual fate of depoſed monarchs ſoon awaited him. Indeed it was eaſy to foreſee that he would not long remain alive in the hands of ſuch barbarous and ſanguinary enemies. Hiſtorians differ with regard to the manner in which he was murdered. It was long the prevailing opinion, that ſir Piers Exton, and others of his guards, fell upon him in the caſtle of Pomfret, where he was confined, and diſpatched him with their halberts. But it is more probable, that he was ſtarved to death in priſon; and after all ſuſtenance was denied him, he prolonged his unhappy life, it is ſaid, for a fortnight, before he reached the end of his miſeries. This account is more conſiſtent with the ſtory, that his body was expoſed in public, and that no marks of violence were obſerved upon it. He died in the thirty-fourth year of his age, and the twenty-third of his reign. He left no poſterity, either legitimate or illegitimate.

All the writers who have tranſmitted to us the hiſtory of Richard, lived during the reigns of the Lancaſtrian princes; and candour requires, that we ſhould not give entire credit to the reproaches which they have thrown upon his memory. But, after making all proper allowances, he ſtill appears to have been a weak prince, and unfit for government, leſs for want of natural parts and capacity, than of ſolid judgment and good education. He was violent in his temper; profuſe in his expence; fond of idle ſhow and magnificence; devoted to favourites, and addicted to pleaſure; paſſions, all of them, the moſt inconſiſtent with a prudent economy, and conſequently dangerous in a limited and mixed government.

This prince lived in a more magnificent manner than perhaps any of his predeceſſors or ſucceſſors. His houſehold conſiſted of 10,000 perſons. He had 300 in his kitchen, and all the other offices were furniſhed in proportion. It muſt be remarked, that this enormous train had tables ſupplied them at the king's expence, according to the mode of that age. Such prodigality was probably the ſource of many exactions by purveyors, and was one chief reaſon of the public diſcontents.

Richard III., king of England, born in 1450, was the youngeſt ſon of Richard, duke of York. On the acceſſion of his brother, Edward IV., he was created duke of Glouceſter, and during the viciſſitudes in the early part of Edward's reign, he adhered moſt cloſely to him, and ſerved him with courage and fidelity. He is ſaid to have had a hand in the ſlaughter of Edward, prince of Wales, after the battle of Tewkeſbury, and to have been the author, if not the real perpetrator, of the murder of Henry VI. in the Tower, but the ferocity of his diſpoſition was in him united with deep policy and diſſimulation. He married, about the year 1473, Anne, the widow of the prince of Wales, already mentioned, who was daughter of Neville, the great earl of Warwick. His elder brother, Clarence, had married the other daughter, and a violent diſſention took place between them, on account of the diviſion of the property. Richard, who found Clarence an obſtacle to his views of aggrandizement, combined with the adverſaries of that unfortunate prince in accuſations which proved his deſtruction. On the death of Edward (ſee his article) in 1483, the duke of Glouceſter was appointed the protector of the kingdom. He immediately cauſed his nephew, the young Edward V., to be proclaimed king, and took an oath of fealty to him. There were at this time two great factions in the nation, of which the leaders were the duke of Buckingham and lord Haſtings. Both theſe courted the duke of Glouceſter, who pretended a ſteady friendſhip for each when apart, while he was purſuing ſchemes of the blackeſt ambition. His firſt object was to get rid of thoſe who were connected with the young king by blood; and after ſpending an evening in company with Rivers, Grey, and ſir Thomas Vaughan, he cauſed them to be arreſted the next morning, and committed to Pomfret caſtle, at the ſame time diſmiſſing all the king's attendants and ſervants. He ſhortly after cauſed the priſoners at Pomfret to be put to death without the form of trial; and on the very day of their execution, at a council held in the Tower, a cry of treaſon was raiſed by his order, on which a party of armed men entered, who ſeized the archbiſhop of York, the biſhop of Ely, lord Stanley, and lord Haſtings, of whom the three firſt were committed to cuſtody, while Haſtings was led to immediate death. After this, his next ſtep was to eſtabliſh, with or without evidence, the illegitimacy of Edward's children, to make way for himſelf on the throne. This he did by attacking the chaſtity of his own mother, who, he ſaid, had been true to her huſband only in the caſe of himſelf, and that to Edward and Clarence there were different fathers. Theſe pleas were zealouſly advocated by his adherents, and among others by Dr. Shaw, brother to the lord mayor of London, who dwelt upon them with much eloquence, in a ſermon which he preached at St. Paul's Croſs. The duke of Buckingham afterwards, in a ſpeech

ſpeech before the corporation and citizens of London, enlarged upon the title and virtues of the protector, and then put the queſtion to his audience, whether they choſe the duke of Glouceſter for king? On their ſilence, he repeated the queſtion with more importunity, and at length a few voices cried out "God ſave king Richard." This was conſtrued into a public declaration in his favour, and Buckingham, with the lord mayor, repaired to the protector with a tender of the crown. He firſt affected alarm and ſuſpicion, and then pretended loyalty to his nephew, and unwillingneſs to take ſuch a burden upon himſelf. At length he accepted the offer, and Richard was proclaimed king on the 27th of June 1483. The depoſed king and his brother were never more heard of, they were probably murdered in the Tower.

Richard was now extremely liberal towards thoſe who had been inſtrumental in the change, and took other methods to court popularity. He made a progreſs with a ſplendid retinue through ſeveral of the towns, and at York was a ſecond time crowned, on which occaſion he created his only ſon prince of Wales. He ſoon began to diſplay all the qualities of a moſt cruel tyrant, which ſo diſguſted the whole nation, that deſigns were formed to hurl him from the throne. A conſpiracy was excited againſt him, in favour of Henry, earl of Richmond, which he diſcovered and quelled. This failure appeared to ſeat the king more firmly on the throne, and he took advantage of his ſituation by calling a parliament, in which many good laws were paſſed, the progeny of Edward IV. were baſtardized, and the crown ſettled on himſelf and poſterity. The death of his ſon, ſoon after, was a ſevere ſtroke to him in the midſt of his proſperity, which was followed by that of his wife; the laſt was imputed, but without any evidence, to the effects of poiſon. To prevent a projected marriage between Elizabeth, the eldeſt daughter of his brother Edward, and the earl of Richmond, Richard determined to marry her himſelf; as this union would have been very detrimental to the earl's intereſt, he haſtened his preparations for another expedition to England, and in Auguſt, 1485, landed an army at Milford-haven. Richard, informed of the advance of his rival, took the field, and met him, with an army of nearly 15,000 men, at Boſworth, in Leiceſterſhire. The battle was fought on the 23d of Auguſt; in which the king, finding his ſituation deſperate, ruſhed againſt his competitor, ſlew his ſtandard-bearer, and was upon the point of encountering the earl himſelf, when he was himſelf ſlain. The body of Richard was found in the field, ſtripped naked, and carried acroſs a horſe to Leiceſter, where he was interred in the Grey friars' church-yard. Thus fell this hated tyrant, after having poſſeſſed the throne about two years and two months. The hiſtorians, ſays Hume, who favour Richard, maintain, that he was well qualified for government, had he legally obtained it; and that he committed no crimes but ſuch as were neceſſary to procure him poſſeſſion of the crown: but this is a poor apology, when it is confeſſed, that he was ready to commit the moſt horrid crimes that appeared to him neceſſary for that purpoſe; and it is certain, that all his courage and capacity, qualities in which he really ſeems not to have been deficient, would never have made compenſation to the people for the danger of the precedent, and for the contagious example of vice and murder, exalted upon the throne. In perſon, Richard has been repreſented as of ſmall ſtature, deformed, and of a forbidding aſpect, but it is probable that the deteſtation of his character has aggravated his bodily defects. His memory lives in popular tradition, as that of the moſt odious tyrant that ever filled the Engliſh throne. For the foregoing articles we are chiefly indebted to the hiſtories of Hume and Henry.

Richard, John, a French advocate and theological writer in the 17th and the early part of the 18th centuries, was born at Verdun, in Lorraine, about the year 1638. The firſt part of his education he received at Pont-a-Mouſſon, and was then ſent to Paris, where he ſtudied law and divinity. Afterwards he was admitted an advocate at Orleans; but more for the ſake of poſſeſſing the rank and privileges connected with that title, than from any deſign to practiſe at the bar. His inclination led him to devote his time and talents to the compoſition and publiſhing of ſermons. By his numerous productions of this deſcription he acquired celebrity. In the year 1700 he began to publiſh a compilation, under the title of "A Moral Dictionary, or, Univerſal Pulpit-Science," which, in 1715, was extended to 6 vols. 8vo. It conſiſts of ſtriking ſentiments and reaſonings on a great variety of ſubjects, ſelected from the works of French, Spaniſh, Italian, German, and other divines, arranged in alphabetical order.

RICHARDIA, in *Botany*, was named by Houſtoun, in honour of Richard Richardſon, M.D. F.R.S. who reſided on his own eſtate at North Bierly, Yorkſhire, and died at an advanced age, about the year 1740. His fortune rendering him independent of medical practice, as a maintenance, he beſtowed great attention on the botany of his own country, and his name occurs continually in the publications of the early part of the 18th century, as the correſpondent of Ray, Sloane, Dillenius, &c. He communicated ſeveral papers, on various ſubjects, to the Royal Society; none of them botanical; ſee Pulteney's Sketches, v. 2. 185.—Linn. Gen. 174. Schreb. 230. Willd. Sp. Pl. v. 2. 222. Mart. Mill. Dict. v. 4. Juſſ. 198. Lamarck Illuſtr. t. 254. Gærtn. t. 25. (Ricardia; Rel. Houſt. 5. t. 9.)—Claſs and order, *Hexandria Monogynia.* Nat. Ord. *Stellatæ*, Linn. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, in ſix deep, erect, pointed ſegments, half the length of the corolla. *Cor.* of one petal, funnel-ſhaped; limb in ſix acute, erect ſegments. *Stam.* Filaments ſix, very ſhort, inſerted into the tube of the corolla, alternate with its ſegments; anthers ſmall, roundiſh, between the ſegments. *Piſt.* Germen inferior, three-lobed; ſtyle thread-ſhaped, the length of the ſtamens, three-cleft in the upper part; ſtigmas obtuſe. *Peric.* none. *Seeds* three, obovate, gibbous, rounded at the outer ſide, angular at the inner, crowned with the calyx.

Obſ. Gærtner has obſerved that the calyx and corolla have ſometimes eight ſegments, with eight ſtamens.

Eſſ. Ch. Calyx in ſix ſegments. Corolla of one petal, funnel-ſhaped. Seeds three, crowned with the calyx.

1. R. *ſcabra.* Linn. Sp. Pl. 470. Willd. n. 1.—Gathered by Houſtoun at Vera Cruz.—A rough hairy plant, with the habit of a *Spermacoce.* The *ſtem* is tall, purpliſh, with oppoſite branches, its hairs curved downwards. *Leaves* oppoſite, crowded, ovate, pointed, entire, hairy, with many ſtraight, parallel ribs. *Flowers* encompaſſed with numerous hairy briſtles. *Calyx* briſtly.

RICHARDSON, Jonathan, in *Biography*, a painter, and a writer on the art of painting, was born about the year 1665. He was intended by his father for the law, but at twenty years of age was permitted to deſert that profeſſion, and follow the bent of his inclination for painting. He then became the diſciple of Riley, with whom he lived four years, and finally connected himſelf by marrying his niece. The degree of ſkill which he attained, by no means corre-

correſponded with the ideas he entertained of the art, which were certainly of a juſt and elevated kind. There are, however, great ſtrength, roundneſs, and boldneſs in the colouring of his heads, which are drawn and marked in the manner of Kneller, with freedom and firmneſs; though the attitudes in which they and his figures are placed, the draperies which clothe the latter, and the back-grounds from which they are relieved, are inſipid and taſteleſs. It is certainly a very curious circumſtance, that, when he wrote with ſo much fire and judgment, as is diſplayed in his Eſſay on Criticiſm, and the Science of a Connoiſſeur, dived ſo deep into the inexhauſtible ſtores of Raphael, and was ſo ſmitten with the native luſtre of Vandyke, he ſhould ſo ill apply to his own practice, the ſagacious rules and hints he gave to others. Full of theory, profound in reflections on the art, and poſſeſſed of a numerous and excellent collection of drawings, he appears to have poſſeſſed no portion of invention, as applicable to the painter's art, and drew nothing well below the head; plainly manifeſting the peculiarity of taſte or feeling which leads to excellence in that profeſſion.

Thus much, however, muſt be ſaid of him, that when Kneller and Dahl were dead, he ſtood at the head of the portrait painters in this country, and practiſed in it ſufficiently long to acquire a tolerable competency. He quitted his occupation ſome years before his death, when Hudſon, who had married one of his daughters, maintained the family honours for a while. Richardſon himſelf, by temperance and tranquillity of mind, enjoyed a life, protracted amidſt the bleſſings of domeſtic friendſhip, to the advanced age of eighty, and then died reſpected and lamented. He had had, a ſhort time previouſly, a paralytic ſtroke that affected his arm, yet never diſabled him from taking his cuſtomary walks and exerciſe; and it was after having been in St. James's park, he departed ſuddenly, at his houſe in Queen-ſquare, on his return home.

The ſale of his collection of drawings, in February 1747, laſted eighteen days, and produced 2060*l.*; his pictures about 700*l.* He left a ſon, who painted and drew alſo, and who appears to have been a perfect pattern of filial reverence and affection.

Richardson, Samuel, in *Biography*, was born in 1689, in ſome part of Derbyſhire, to which county his father had retired from buſineſs, which he had carried on in London. In very early life he was characterized for his love of reading, and while a mere boy, he diſplayed the uncommon qualities of a taſte for letter-writing and female ſociety. At the age of thirteen, he was ſo much in the confidence of three young women, as to be employed by them in making draughts of letters to their lovers; and, at this early period, ſuch were his fidelity and diſcretion, that not one of them ſuſpected him to be the writer for the others. He was apprenticed to a printer, whom he ſerved moſt conſcientiouſly for the full term of ſeven years, ſtealing from the hours allowed to reſt and recreation, his opportunities for mental improvement. After the expiration of his apprenticeſhip, he paſſed ſeveral years as journeyman in a printing-office, and then ſet up in buſineſs for himſelf. His habits of diligence and accuracy, and his honourable dealings, ſoon gained him employers and friends, and he was often applied to by bookſellers for making indexes, and writing prefaces and dedications. The immediate occaſion of his becoming a novel-writer, was an application made to him by two bookſellers, to write for them a volume of letters in a common ſtyle, on ſubjects that might ſerve as models for the uſe of thoſe who had not the talent of inditing for themſelves. He extended the idea to the conveying of inſtruction in thinking and acting upon important occaſions; and in compoſing ſome letters for the ſalutary purpoſe of teaching young women going out to ſervice how to avoid the ſnares that might be laid for their chaſtity, a ſtory which he had heard many years before of a real occurrence came into his mind, and became the parent of "Pamela." This work was publiſhed in 1740, and was received with extraordinary applauſe by readers of all ranks. It brought the author into immediate notice; but his "Clariſſa," of which the firſt two volumes appeared in 1748, placed him in the firſt rank of noveliſts. "A tale ſo varied by character, ſo minutely developing the movements of the human heart, ſo pathetic in its circumſtances, and preſenting ſo ſublime and perfect an image of female purity, had never before been given to the public. The intereſt it excited during its progreſſive appearance, eſpecially among female readers, was incredible, and the fate of no real perſonage could have agitated more boſoms than that of the fictitious heroine." Rouſſeau, in ſpeaking of it, aſſerts, that "nothing was ever written equal or approaching to it in any language." The "Hiſtory of Sir Charles Grandiſon," his concluding work, appeared in 1753, which was intended to give the world an example of a perfect man, uniting the fine gentleman and the Chriſtian.

While he was advancing in the career of his literary fame, he was not inattentive to that improvement of his fortune which his aſſiduity and integrity in his profeſſion ſo well merited. His firſt great public employment was that of printing the "Journals of the Houſe of Commons," in 26 vols. folio, which he obtained through the recommendation of his friend, Mr. Speaker Onſlow. In 1754 he roſe to be maſter of the Stationers' company, and in 1760 he purchaſed a half of the patent of law-printer to his majeſty. He was twice married, and had ſeveral children, but four daughters only grew up to ſolace his declining years. He was the ſubſtantial valuable friend in difficulty, diſtreſs, and ſickneſs. He was moſt exemplary in temperance both of body and mind, and in the faithful diſcharge of every moral duty. He died at the age of ſeventy-two, and was interred by the ſide of his firſt wife in St. Bride's church. The writings of Richardſon, excluſive of the three novels above referred to, were of no great conſequence. They are chiefly the "Familiar Letters" already noticed; an edition of "Æſop's Fables," with reflections. His "Correſpondence," ſelected from the original manuſcripts, was publiſhed in ſix volumes, in the year 1804, with a biographical account of the author, by Mrs. Barbauld, to which the reader is referred for more particulars relating to Mr. Richardſon.

Richardson's *Bay*, in *Geography*, a bay on the S.E. coaſt of Jamaica.

RICHAW, a town of Pruſſia, in the province of Oberland; ſeven miles S. of Liebſtat.

RICHBOROUGH, a hamlet, and a diſtrict of land, in the pariſh of Aſh, lower half hundred of Wingham, lathe of St. Auguſtine, and county of Kent, England, is ſituated about two miles N.W. from the town of Sandwich. It is noted in hiſtory as the ſcite of the Roman poſt which guarded the ſouthern entrance of the Portus Rutupenſis, whence it derived its original name of Rutupium. The fortreſs which defended the northern entrance was called Regulbium; and is noticed under the article Reculver. This port, in Roman times, appears to have been the moſt famous of any in Britain; for it is noticed in the writings of Lucan, Juvenal, and Auſonius; and alſo in thoſe of Tacitus, Ammianus Marcellinus, and Oroſius. It likewiſe occurs in the Geography of Ptolemy, in the Itinerary of

of Antoninus, in the Index of the writer of Ravenna, in the Peutingerian Tables, and in the Notitia of the weſtern empire. In thoſe days the ſcite of Rutupium was a ſmall iſland, though at preſent it is a conſiderable diſtance within land. This is proved by the teſtimony of many ancient writers; by the appearance of the ſurrounding country; and the fact of ſtrata of ſea-ſand being diſcovered by digging into its ſurface. The period when it was deſerted by the ocean was probably between the fourth and ſixth centuries, as about that time the name of Sandwich, which roſe on the ruins of the Rutupian haven, begins to be mentioned in ancient writings as a frequented port.

Richborough was anciently called *Rhutupiæ*, *Portus Trutulenſis*, or rather *Portus Rhutupenſis*, *Rhutupſis Portus*, *Rhutupiæ Statio*, and *Rhutubi civitas et portus*, among the Greek and Roman writers, by the Saxons denominated *Reptaceſter*, and by others *Ruptimouth* and *Richberg*. After the Saxons had commenced their piracies on the coaſt, the legio ſecunda Auguſta, which had been brought from Germany by Claudius, and had been for many years ſtationed at Iſca Silurum, in Wales, was removed hither and commanded by an officer under the count of the Saxon ſhore. Under the Saxons it was ſtill conſiderable, and the place in which king Ethelbert reſided.

Much diverſity of opinion prevails among the learned as to the preciſe ſituation of the Urbs Rutupiæ, ſome identifying it with the caſtle, and others placing it along the adjacent ſhore, while a third claſs of writers fix it at Canterbury. Among thoſe who eſpouſe the laſt opinion is the late biſhop Douglas, who has diſcuſſed the ſubject with great learning and ingenuity, in a paper printed in the firſt volume of the "Bibliotheca Topographica Britannica." With his view of the matter, indeed, we are ſtrongly inclined to coincide; for it ſeems impoſſible that the city could ſtand within the narrow limits of the caſtle, and there are no veſtiges in its vicinity of foundations of extenſive buildings, a circumſtance which could ſcarcely have happened, if ſuch buildings had ever exiſted. Of the fortreſs itſelf, however, much yet remains to ſolicit the examination and excite the amazement of the antiquary. In form it appears to have been, when complete, a regular parallelogram; but the greater part of the eaſtern wall is now deſtroyed. The whole ſcite exterior to the ramparts occupied ſix acres, one rood, and eight perches of ground; and the area within the walls five acres, three roods, and eight perches. The walls were flanked by round projecting towers at the angles, and by ſquare ones at irregular diſtances along the ſides. There are marks of two of theſe in the weſt wall, and of two others, beſides the Porta-Decumana, in the north wall, and of two more in the ſouth wall; in which undoubtedly was a third, that has fallen down the bank. Theſe ſquare towers, projecting about eight feet from the wall, were ſolid nearly eight feet from the foundation, above which they were hollow. In the main wall within theſe towers are four large, round, ſmooth holes in a row, each about nine inches in diameter, and penetrating about eight feet into the ſubſtance of the main wall. Below theſe are ſmaller holes, four inches in diameter, that run about ten inches into the wall; all which ſeem to have ſerved for the inſertion of beams, to ſupport an apparatus of defenſive machinery. Within the area, towards the north-eaſt corner, and beneath the ſurface of the ground, is a ſolid rectangular platform of maſonry 144 feet long, 104 feet wide, and 5 feet thick. It is compoſed of bolders and coarſe mortar; and is covered on the upper ſide with a coat of the ſame ſort of mortar to the depth of ſix feet. In the centre of the platform is the baſe or foundation of a building in the ſhape of a croſs, which riſes about five feet above the level of the platform. The ſhaft of this croſs meaſures 87 feet in length and $7\frac{1}{2}$ feet in breadth; and its tranſverſe is 46 long and 22 wide. In the weſtern wall of the caſtle was a large opening, 34 feet wide, where, about five feet under the ſurface, is part of another platform, conſiſting of large ſquare blocks of ſtone, and meaſuring 24 feet 11 inches in breadth. There is no appearance of any ſuperſtructure having been raiſed from this foundation. Near the middle of the north wall is the oblique entrance, or "Porta-Decumana," which is narrow; and, from the holes remaining in the walls, ſeems to have been furniſhed with good timber defences. The exterior paſſage, running parallel with the main wall, is about four feet and a half wide, having a channel at the bottom for carrying off water from the higher ground within the caſtle. Many Roman coins and other antiquities have been diſcovered as well within the area of the fortreſs, as in its vicinity; and at the diſtance of about 460 yards from its ſouth-weſtern angle, the remains of a Roman amphitheatre are yet diſtinctly viſible, though its banks are much mutilated and levelled by the operations of huſbandry. Leland informs us, in his Itinerary, that there was formerly "a lytle paroche chirch of St. Auguſtine and an hermitage" within the caſtle. The church was a chapel of eaſe to that of Aſh; and is mentioned as ſtanding in the reign of Edward VI. Antiquities of Richborough and Reculver, abridged from the Latin of archdeacon Battely, Lond. 8vo. 1774. Bibliotheca Topographica Britannica, vol. i. 4to. Lond. 1780. Beauties of England, &c. vol. viii. by E. W. Brayley. King's Munimenta Antiqua, vol. iii.

RICHEA, in *Botany*, ſo named by Mr. R. Brown, in memory of M. Riche, one of the naturaliſts who accompanied the expedition in ſearch of La Perouſe, and being in a confirmed conſumption at ſetting out, died in the courſe of the voyage. Labillardiere has dedicated a genus to this companion of his labours, but it proves no other than what Forſter had previouſly publiſhed as CRASPEDIA; ſee that article. Brown Prodr. Nov. Holl. v. 1. 555. —Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Epacrideæ*, Brown.

Eſſ. Ch. Calyx membranous, ſimple, in five deep ſegments. Corolla of one petal, cloſed, hood-like, ſplitting tranſverſely; its abrupt baſe remaining. Stamens inſerted into the receptacle, permanent. Five ſcales under the germen. Capſule ſuperior, of five cells. Receptacles ſeparate, pendulous from the top of the central column.

1. R. *dracophylla*.—Gathered by Mr. Brown, in Van Diemen's iſland. A *ſhrub*, varying remarkably in ſtature, being only eighteen inches high on the ſummits of the mountains, but in woods at their ſides becoming a ſmall *tree*, of the height of ten feet. "It has altogether the habit of Labillardiere's *Dracophyllum montanum*, differing only in the ſingular economy of the *corolla*, which however ſeems ſufficient to mark it for a diſtinct genus." *Brown*. Notwithſtanding the opinion of this judicious author, we preſume to think his *Cyſtanthe*, Prodr. Nov. Holl. v. 1. 555, ſcarcely ſufficiently diſtinguiſhed from the above. Their *corollas* and *capſules* agree; the only difference conſiſting in the foliaceous *calyx* of *Cyſtanthe*, and its want of ſcales below the *germen*. We feel the more diſpoſed to unite theſe genera, as there is but one known ſpecies of either.

RICHEFORT, or RICCIAFORT, JOHN, in *Biography*, a Netherlandiſh muſical compoſer of conſiderable eminence. He is placed by Walther in the middle of the ſixteenth century; but he was certainly a compoſer many years be-

fore that period, as we find his name not only in the ſecond book of "Motetti della Corona," publiſhed at Foſſembrone, 1519, and preſerved in the Britiſh Muſeum, in which collection he was author of the fourth motet, "Miſeremini mei;" but to a motet in a muſic-book, preſerved at Cambridge, of Henry VIII. when prince of Wales. Glareanus ſays, that "great praiſe is due in our times to the vocal compoſitions of John Richefort." In the muſeum collection of French ſongs, in four, five, and ſix parts, printed in the Netherlands during the ſixteenth century, there is one by this author for three tenors and a baſe, which, though it would be thought monotonous by modern ears, has great merit for the artful contexture of the parts, which are moving throughout in cloſe fugue and imitation. The words, indeed, of theſe old ſongs are generally as rude and devoid of meaning as thoſe of our own country, equally ancient; this, however, contains a general cenſure of indiſcriminate urbanity.

RICHELET, Cæsar-Peter, a French writer, was born, in 1631, at Cheminon, in Champagne. He went, when young, to Dijon, where he ſuperintended the education of the ſon of the marquis de Courtivron. About 1660 he went to Paris, was admitted an advocate, and began to plead at the bar. He became connected with d'Ablancourt and Patru, and acquired reputation from the attention he paid to the French language. In 1665 he was admitted to an academy of men of letters, which the abbé d'Aubignac had eſtabliſhed at his own houſe. It appears that he was for ſome time placed about the dauphin, as one who might contribute to inſpire that prince with the love of literature. He afterwards took up his abode in different parts of France, the enemies he made by his ſatirical diſpoſition obliging him frequently to ſhift his reſidence. He died at Paris in 1698, at the age of 67. The principal work of Richelet is his "Dictionnaire François," of which the firſt edition was publiſhed at Geneva in 1680, 4to., and ſeveral have ſince been printed with additions. The laſt is that of the abbé Goujet, Lyons, 1759, 3 vols. fol. Richelet's Dictionary has been popular, though his orthography was much cenſured. He alſo publiſhed "Dictionnaire des Rimes;" "Les plus Belles-Lettres des meilleurs Auteurs François;" of this collection the beſt edition is that of Bruzen de la Martiniere, 1737, 2 vols. 12mo.; "A Tranſlation of Garcilaſſo de la Vega's Hiſtory of Florida;" and other works.

RICHELIEU, Armand du Pleſsis, a famous prime miniſter of France, born at Paris in 1585, was the ſon of Francis du Pleſſis Richelieu, grand provoſt of France, and captain of the guards to Henry IV. He was brought up to the church, and after ſtudying at the Sorbonne, went to Rome. At the early age of 22, he was conſecrated biſhop of Luçon. Though he had obtained ſome diſtinction by his proficiency in ſcholaſtic theology, his great object was to make his way at court. He concealed, under polite and inſinuating manners, a determined diſpoſition, and a ſpirit of intrigue well ſuited to a female regency and a reign of favourites. The queen-mother, Mary of Medicis, in 1616 nominated him her grand almoner and ſecretary of ſtate. On the fall of the marſhal d'Ancre, his protector, Richelieu retired from court, and affected to employ himſelf in writing books of devotion, while he was upon the watch to recover his credit. This point he at length gained, by effecting an accommodation between the queen and her ſon Lewis XIII., and the new favourite de Lugnes rewarded his ſervices by procuring him a cardinal's hat in 1622. After the death of Lugnes, the court and kingdom fell into diſorder through the intrigues of the great, and the contentions of different parties, while all agreed in their defiance of the laws, and encroachments upon the ſupreme authority. A miniſter of equal talents and reſolution was wanted to remedy theſe evils, and he exiſted in Richelieu. He had gained the confidence of the queen-mother, who recovered influence enough to introduce him into the council, notwithſtanding the oppoſition of the other miniſters, who feared him, and the repugnance of the king, who ſuſpected his ambition, and was ſhocked with his licentious manners. In 1624 he found means to ſubvert all his rivals, and to poſſeſs himſelf of the whole authority of the crown.

The government, in his hands, ſoon aſſumed a tone of vigour and deciſion. He concluded the treaty of marriage between the prince of Wales and Henrietta, the French king's ſiſter, in ſpite of the efforts of Rome and Spain, and equally diſconcerted thoſe courts by ſending an army, and preventing the projected union with the Milaneſe. He next turned his arms againſt the French Calviniſts, who, rendered diſaffected by the frequent breaches of the treaties made with them, were become a kind of independent republic within the kingdom. Having firſt ſecured the friendſhip of Holland by pecuniary aid, he obtained the aſſiſtance of its fleet, and that of the Engliſh, againſt their brother Proteſtants of Rochelle, and expelled them from the iſle of Rhé. It is acknowledged that the French monarchy dates from him its ſtrength and independence. One of the principal enemies he had to contend with was Gaſton, duke of Orleans, the king's brother. In conſequence of a conſpiracy entered into by this prince to aſſaſſinate the miniſter, and effect great changes at court, Richelieu arreſted ſeveral of his confidents, and brought ſome of them to the ſcaffold. The danger he had incurred formed a pretext for giving him a body guard; and, by his pretended wiſhes to quit his ſtation, he augmented his influence over his maſter. In 1627 war broke out with England, chiefly in conſequence of the inſolent vanity of the duke of Buckingham; and the Rochellers, with whom an accommodation had been made, were induced to favour the Engliſh. Richelieu thereupon reſolved to reduce to ſubmiſſion a town which had long been the ſeat of an independent power, often leagued with the enemies of the kingdom; and after the duke of Buckingham had been obliged with diſgrace to quit the iſle of Rhé, Rochelle was inveſted on all ſides. Richelieu in perſon took the command of the ſiege, and in order to prevent the arrival of ſuccours by ſea, he cauſed to be conſtructed a vaſt dyke in the ocean, by which all communication from abroad was cut off. This circumſtance has given occaſion to the cardinal's flatterers to compare him with Alexander before Tyre, and the work has been repreſented as one of the prodigies of his genius; but it was really that of the genius of the engineer Metezeau, and Richelieu only deſerves the praiſe of adopting a bold deſign, and finding reſources for putting it in execution. At length, after a noble reſiſtance of eleven months, Rochelle ſubmitted to famine; and the Proteſtants having loſt their great bulwark, and all their other ſtrong places, were rendered incapable of again acting as an armed party. It is to the credit of the policy and moderation of Richelieu that they were ſtill allowed the free exerciſe of their religion.

In 1629 Richelieu received the patent of prime miniſter, and was nominated lieutenant-general of the army employed in the war in Italy, with powers ſo extenſive, that the royal authority was reduced to a ſhadow. All that was great in the nation trembled before him. His foreign politics had chiefly in view the humiliation of the houſe of Auſtria; and by his treaty, in 1631, with Guſtavus Adolphus, he enabled that great king to purſue thoſe plans which brought the

the empire to the brink of ruin. Gaſton, duke of Orleans, in his retreat, with the duke of Lorraine, whoſe ſiſter he had married for his ſecond wife, plotted to excite a civil war for the expulſion of Richelieu, and his own return to conſequence. His intrigues were diſcovered, and all his partizans were declared guilty of treaſon. The duke of Lorraine was compelled to abandon him, and incurred the loſs of ſome of his ſtrongeſt places. Gaſton entered France with a ſmall body of troops, accompanied by the brave duke of Montmorenci, but was defeated at Caſtelnaudari. Montmorenci was taken priſoner, and expiated his crime on the ſcaffold. The queen-mother herſelf was put under arreſt, her ſervants were all ſent to the Baſtille, and ſhe finally ended her days in exile at Cologne. The king ſupported his miniſter in all theſe ſeverities, created him a duke and peer, and gave him the government of Brittany.

France had hitherto acted only as an ally to the Swedes in their hoſtilities againſt the houſe of Auſtria; but after their defeat at Norlingen in 1634, the cardinal thought it neceſſary to enter as a principal into the war; and forming an alliance with Holland, and the dukes of Savoy and Parma, he cauſed war to be declared againſt the king of Spain in 1635. Events were at firſt unfavourable to the French arms, but at length became more proſperous to France, and the enemy was driven from her territories; the public finances were, however, exhauſted, and recourſe was had to the creation of a great number of venal offices, and other objectionable meaſures, to raiſe the neceſſary ſupplies. The talents of a financier do not ſeem to have been among Richelieu's qualifications, and he himſelf gave an example of profuſion which increaſed the public diſcontent. No prime miniſter ever affected more ſtate and ſplendour. The daily expence of his houſehold was eſtimated at a thouſand crowns, a prodigious ſum at that period! His guards and attendants, his equipage and eſtabliſhment, were rather upon the ſcale of a ſovereign prince than of a ſubject, and he much ſurpaſſed his maſter in external pomp. Lewis betrayed a diſſatisfaction on this account, which probably induced Richelieu to make him a preſent of his palace, ſince called the Palais Royal. He incurred great perſonal danger in 1642, from a conſpiracy againſt his power and life, headed by Cingmars. (See his article.) The duke of Bouillon, and the duke of Orleans, entered into the plot, and negociations were opened with Spain for aſſiſtance. The good fortune of Richelieu produced a timely diſcovery of this treaſon, and Cingmars was beheaded. The duke of Bouillon was arreſted, but made his peace by reſigning his principality of Sedan. Gaſton furniſhed proofs againſt his aſſociates. The victim moſt worthy of compaſſion on this occaſion was the ſon of the illuſtrious de Thou, who was capitally condemned only for not revealing a conſpiracy which he diſapproved. Richelieu was at this time lying dangerouſly ſick at Taraſcon. He proceeded to Lyons by water, and was thence carried to Paris in a kind of chamber, borne on the ſhoulders of his guards, breaches being made in the walls of the towns through which he paſſed to admit him. It ſoon appeared that he had not long to live, and he prepared for the final change with great firmneſs. In receiving the ſacrament he declared, that in the courſe of his miniſtry, he had never any thing in view but the good of religion and the ſtate—a declaration which the public opinion did not ratify. He died in December 1642, at the age of 58, worn out with toil and anxiety; but he terminated his career with fortitude and ſerenity, that aſtoniſhed thoſe who had beheld the ſanguinary effects of his adminiſtration. Three mighty and ſucceſsful projects immortalize the period of his government. He humbled the turbulent ſpirits of the great, he ſubdued the ſtubborn zeal of the Hugonots, and he curbed the encroaching power of the houſe of Auſtria. Undaunted and implacable, prudent and active, no combinations of the powerful nobles could withſtand his vengeance; no intrigues could elude his penetration; while he exalted the throne, he controlled a ſovereign impatient to rule, and jealous of his authority; and while he extinguiſhed the liberties of the people, he eſtabliſhed among them diſcipline and order, and opened to them the paths to learning and renown. His own account of his public character is this: "I venture upon nothing till I have well conſidered it; but when once I have taken my reſolution, I go directly to my end; I overthrow and mow down all that ſtands in my way, and then cover the whole with my red mantle." He was fonder of power than money, yet he amaſſed a princely fortune, which he bequeathed to the king. He was the author of ſome ſplendid eſtabliſhments; he rebuilt the Sorbonne, founded the royal printing-houſe, the botanical garden, and the French academy. As a writer, he obtained ſome credit in the controverſy with the opponents of the Catholic church; the moſt famous of his ſuppoſed works is, his "Teſtament Politique," the authenticity of which has been the ſubject of warm controverſy. The letters of Richelieu are ſaid to be intereſting, of which the beſt edition is that of 1696, in two vols. 12mo. Gen. Biog. Hiſt. of France, three vols. 8vo. 1790.

Richelieu, in *Geography*, a town of France, in the department of the Indre and Loire, and chief place of a canton, in the diſtrict of Chinon; 11 miles S. of Chinon; deriving its name from cardinal Richelieu, its founder. The place contains 3600, and the canton 12,525 inhabitants, on a territory of 320 kiliometres, in 21 communes.

Richelieu, a river of Canada, iſſuing from lake Champlain, and firſt called "Chamblee," which name was changed by the French into Richelieu at fort Chamblee, and diſcharging itſelf into the river St. Lawrence, N. lat. 46° 1′. W. long. 72° 56′.

Richelieu *Iſlands*, a cluſter of ſmall iſlands in the river St. Lawrence, about 100 in number, 36 miles above Trois Rivières. N. lat. 46° 22′. W. long. 71° 7′.

RICHEMONT, a town of France, in the department of the Moſelle, on the Orne; 10 miles S. of Thionville.

RICHENBURG, a town of Bohemia, in the circle of Chrudim; 10 miles S.E. of Chrudim.

RICHENVEIR, a town of France, in the department of the Upper Rhine; ſix miles N.N.W. of Colmar.

RICHER, John, in *Biography*, a French aſtronomer and natural philoſopher in the 17th century, of whom little is known, till he was admitted a member of the Royal Academy of Sciences at Paris in the year 1666, under the title of aſtronomer to that body. About 1671, Lewis XIV. ſent him to the iſland of Cayenne in South America, for the purpoſe of making obſervations that might contribute to the improvement of aſtronomical ſcience. After three years he returned, and gave the reſult of his labours in his "Aſtronomical and Phyſical Obſervations made at the Iſland of Cayenne," which are inſerted in the ſeventh volume of the "Memoirs" of the Academy of Sciences. Caſſini ſpeaks of him with commendation in his "Elements of Aſtronomy." He died in the year 1696.

Richer, Claude, a learned prieſt and mathematician in the 18th century, was born at Auxerre in the year 1680. He was intended for the eccleſiaſtical profeſſion when very young, and was ſent to Paris for his education. Here he diſtinguiſhed himſelf in 1701, when only arrived to the years of manhood, by a work which he publiſhed, entitled "Univerſal Gnomonics, or the Science of Dialling," &c. After this he was ordained prieſt, and remained about ten years

years almost an entire stranger to men of letters, engaged in the religious education of the young. About the year 1730 his passion for mathematical studies revived with great ardour, and he produced a work entitled "General Analysis, containing New Methods of resolving Problems of every kind, and of all degrees to infinity." This work was immediately adopted by the Academy of Sciences, and constitutes the eleventh volume of the "Memoirs." This volume was soon to be followed by three others; these, however, did not make their appearance, which was probably owing to a change in M. Richer's studies. By an accidental perusal of a fragment of Manetho, high priest of Heliopolis, in Egypt, he was induced to devote his whole attention to the most profound researches in ancient history. Notwithstanding the obscurity of this relic of antiquity, he conceived that he thoroughly understood it, and that it furnished him with a clue, by the aid of which he could unravel all the difficulties of ancient history, sacred and profane. Under the influence of this persuasion, he laboured night and day in attempting to illustrate it, till he had produced two immense folio volumes, which no one would undertake to print. As a specimen of his labours, he published "A Chronological Series of the Kings of Egypt, determined according to three simple Dynasties, from the Fragment of Manetho." He died about the year 1756.

RICHERIA, in *Botany*, a genus dedicated by Vahl, to the much neglected memory of Peter Richer de Belleval, first professor of Botany, as well as of Anatomy, at Montpellier, to whom Henry IV. of France committed the care of establishing a public garden in that university. This design was executed in the most skilful and splendid manner. Belleval published a catalogue of the garden in 1598, and a French treatise, in 1605, recommending an enquiry into the native plants of Languedoc. This last was accompanied by five plates, intended as a specimen of a future work, for which he subsequently prepared a number of engravings, rude and stiff in execution, but exhibiting many rare species. He never lived to publish these, and the plates remained neglected in the hands of his family, till Gouan recovered them, and sent impressions to Linnæus. At length Gillibert obtained the plates, and published them in 1796. The two pamphlets above-mentioned were republished in 1785, by the celebrated and unfortunate Broussonet; along with a treatise on the White Mulberry, by Olivier de Serres, originally printed in 1603. Richer de Belleval lived to see his garden destroyed by the fury of civil war, and was beginning to restore it, when he died in 1623, aged 65. His nephew accomplished the reestablishment of the garden, on a more extensive scale. M. Dorthes of Montpellier published, in 1786, Recherches sur la Vie et les Ouvrages de Pierre Richer de Belleval, in which every thing, that could be collected on the subject, is recorded. Some writers erroneously mention Belleval as the first botanist who gave copper-plate figures of plants. This honour is due to Fabius Columna, whose *Phytobasanos* appeared in 1592. We must not omit to mention, that Scopoli has named a genus *Bellevalia*, a name, or something like it, which Belleval himself was fond of giving to the Lily of the Valley. Bruguiere, in 1775, called a Madagascar plant *Richeria*, but his genus has not been established.—Vahl Eclog. v. 1. 30. Willd. Sp. Pl. v. 4. 1122. Mart. Mill. Dict. v. 4.—Class and order, *Polygamia Dioecia; Dioecia Pentandria;* or rather *Pentandria Monogynia*. Nat. Ord. *Euphorbiæ*, Juss.

Gen. Ch. Male, *Cal.* Perianth of one leaf, permanent, in four or five ovate, acute, downy segments. *Cor.* Petals four or five, roundish, the length of the calyx. Nectary four or five glands, at the base of the imperfect germen. *Stam.* Filaments four, five, or six, between the glands of the nectary, erect, longer than the calyx; anthers oblong, two-lobed, erect. *Pist.* Rudiment of a germen superior, conical, villous, style and stigma wanting.

Female, *Cal.* and *Petals* like the male. Nectary a rim round the base of the germen. *Stam.* none. *Pist.* Germen superior, ovate; style very short; stigmas three, revolute, channelled above. *Peric.* Capsule coated, ovate, smooth and even, of three cells, with six valves, separating at the base. *Seeds* solitary, pulpy-coated, pendulous from the top of the central column.

Ess. Ch. Male, Calyx four or five-cleft. Petals four or five. Nectary four or five glands, at the base of the imperfect germen. Stamens four or five.

Female, *Cal.* and *Cor.* like the male. Nectary a rim at the base of the germen. Style very short. Stigmas three, revolute. Capsule coated, of three cells and six valves, splitting at the base. Seeds solitary, pulpy.

1. R. *grandis*. Vahl. Eclog. v. 1. 30. t. 4.—Gathered by Ryan, on the sulphur mountain in the island of Montserrat. A *tree* of a great size. *Leaves* alternate, stalked, oblong, acute, entire, coriaceous, smooth, veiny, six or seven inches in length; very much contracted at the base. *Spikes* axillary, solitary, longer than the footstalks, lax. *Capsule* the size of a hazel-nut. The discoverer of this rare tree is said to have found some of the *flowers* perfect as to *stamens* as well as *pistil*. Hence, notwithstanding the slight differences in the *nectary*, we should incline to place the genus in *Pentandria Monogynia*.

RICHFIELD, in *Geography*, a town of America, in Otsego county, New York, taken from Otsego township, and incorporated in 1792.

RICHFORD, the north-easternmost township of Franklin county, Vermont, situated on Missiscou river; containing 442 inhabitants.

RICH-HILL, a post-town of the county of Armagh, Ireland; 62 miles N.W. from Dublin, and four miles E. from Armagh.

RICHLAND, a district of South Carolina, bounded S. and S.W. by Congaree and Broad rivers, and E. by Wateree river, which divides it from Kershaw and Clermont counties.—Also, a township of Bucks' county, in Pennsylvania, containing 1317 inhabitants.

RICHMAN's Island, a small American island on the coast of Cumberland county, in the state of Maine; four leagues N. from Wood island and one league W. of Portland. Few vessels put in here, except coasters. Wood island is in N. lat. 43° 50′. W. long. 69° 37′.

RICHMOND, a borough and market-town in the wapentake of Gilling-West, north riding of Yorkshire, England, is situated on the banks of the river Swale, at the distance of 48 miles N.W. from York, and 293 miles N.N.W. from London. It was anciently much celebrated for its castle, which was founded by the first earl of Richmond, Alan, son of Hoel, count of Brittany. This nobleman, who was nearly related to William, duke of Normandy, accompanied that prince in his expedition to England; and in reward for his services, received from him all the forfeited estates of the brave Edwin, earl of Mercia. This grant was made during the time William was engaged in the siege of York, and is peculiarly remarkable on account of its brevity. Alan immediately after married Hawise, the conqueror's daughter; and being thus loaded both with riches and honour, built the castle, and part of the town of Richmond, to protect his family and his estates against the disinherited and outlawed

outlawed Englishmen in those parts. Having no issue by his lady, the earldom of Brittany devolved to Conan le Grosse, his son by a second wife; and Alan, surnamed the Black, son of Hawise by a former husband, obtained the earldom and estates of Richmond. During the reigns of our Norman kings this title and property were possessed by several different families, some of whom were allied to the blood royal, both of England and France. Edward III. conferred the estate on his third son, John of Gaunt, who afterwards surrendered it in exchange for some other lands. The same monarch gave Richmond, with his daughter, in marriage to John, earl of Montford and duke of Brittany, who was surnamed the Valiant. During the wars of York and Lancaster, both the title and the estates several times changed possessors, and at length were vested in the crown by the accession of Henry, earl of Richmond, to the throne, under the title of Henry VII. By his successor, Henry VIII., Richmond was constituted a duchy in the person of his natural son, Henry, who died without issue in the year 1535.

The town of Richmond is comparatively limited in extent and population; containing, according to the late parliamentary returns, only 512 houses, and 3056 inhabitants. Its fine situation, however, and the character of its buildings, which are in general constructed of stone, give it a dignified and interesting appearance. It occupies the top and declivity of a lofty eminence boldly rising from the river Swale, which winds round the town and the castle in a semicircular direction. The chief trade of this place is that of knit woollen stockings, in which men, women, and children, are employed. The market day is Saturday, weekly; and there are besides four annual fairs. The market here is one of the largest in the north of England for corn; and the fairs are noted for a great supply of horses, horned cattle, and sheep. Richmond is a borough by royal charter, and sends two representatives to parliament, who are elected by "those persons who are owners of ancient burgages in the said borough, having a right of pasture in a common field, called Whitecliff pasture." The government of the town is vested, by the charter of queen Elizabeth, in a mayor, recorder, twelve aldermen, twenty-four common council-men, and other inferior officers. The petty sessions for the wapentake of Gilling-West are holden here.

The castle of Richmond stands on the south side of the town, on a bold eminence, overlooking the Swale, which runs in a deep valley beneath. On all sides the approach to it is steep and difficult, except on the north, where the ascent is gradual. The castle is now in a very ruinous condition, but it still retains the features of former grandeur and importance. The keep-tower, of which the shell is nearly entire, is of great altitude; and its exterior walls are more than eleven feet thick. The lower story is supported by a vast column of stone in the centre, from which spring circular arches closing the top. The staircase only reaches to the first chamber, the rest of it being dilapidated, as the floors of the two upper rooms are fallen in. In this keep is a well of excellent water. The ruins of several other parts of this castle yet remain. In the south-eastern corner of the area is a ruinous tower, below which is a dungeon, about fourteen feet deep. The ground covered by this fortress measures nearly six acres in extent, and is the property of the duke of Richmond and Lennox.

The country around Richmond is extremely picturesque, and affords several objects of interest to the tourist and the antiquary. Close to the town, on the north, are the remains of a house of Grey friars, which was founded, in 1258, by Ralph Fitz-Randal, lord of Middleham; and adjoining is the scite of a nunnery, now totally demolished. About a mile to the eastward are the fine ruins of St. Agatha abbey, seated on the banks of the river Swale. This monastery was established, in 1151, by Roaldus, constable of Richmond castle, and at the time of the reformation maintained seventeen monks of the Premonstratensian order. Richard Scroope, chancellor of England, was a great benefactor to this monastery; for besides his manor of Brumpton-upon-Swale, he granted 150*l.* a-year for the support of ten additional regular canons, two secular canons, and twenty-two poor men. Near this priory stood an hospital, which being decayed in the reign of Henry VI. was restored by William Ayscough, one of his judges, to whom he had given the patronage of it. A cell for Benedictines, dependent on the abbey of St. Mary of York, was situated on an eminence in this neighbourhood. It was founded, in 1100, by Wymer, chief steward to the earl of Richmond. Many other religious foundations occupied the banks of the Swale, which our limits forbid us to enumerate. The circumstance of the waters of this river having been held sacred, on account of the baptism of 10,000 Saxons near Catterick, by bishop Paulinus, in 627, gave occasion to this multiplicity of religious foundations. Catterick is situated at the distance of five miles from Richmond; and is supposed by several antiquaries to be the scite of the Roman Cataractonium, or Cataracton, mentioned in the Itinerary of Antoninus. Dr. Gibson, however, supposes that station stood between the village and the river, and some extensive Roman remains, on the spot, he describes, seems to justify his conjecture. This station continued for some time a Saxon town; but was totally destroyed at an early period by the Danes. The Roman road here divides itself into two branches, one of which leads to Caldwell, distant about eight miles from Richmond, where vestiges of a large town may yet be traced. The Roman name of this station is unknown. A Tour in Scotland 1772, by Thomas Pennant, esq. 4to. Lond. 1790. Beauties of England and Wales, vol. xvi. by John Bigland.

Richmond, a village and parish in the hundred of Kingston, and county of Surrey, England, is situated on the south bank of the river Thames, at the distance of ten miles W.S.W. from St. Paul's cathedral, London. It is a spot of great celebrity, both on account of the beauty of its scenery, as well as from having been the scite of a royal palace during several centuries. The first authentic mention of the manor here occurs in the reign of king John, at which time it was denominated Sheen, and was the property of Michael Belet, who held it by the service of being the king's butler. In the reign of Edward I. it reverted to the crown, and has since been generally possessed either by the king, or some branch of the royal family. At what precise period the original royal palace was erected is uncertain; for though Edwards I. and II. resided for some time in the manor-house, it does not appear to have been a structure entitled to that appellation. Edward III. is said to have built a palace on his "maner of Shene;" but Manning, the author of the "History and Antiquities of Surrey," inclines to the opinion, that he only improved and enlarged the former building. Be this as it may, it had undoubtedly become a fixed regal residence in the reign of that monarch, who died here the 21st of June, 1377; as did queen Anne, the consort of his successor, Richard II. in the year 1394. The latter prince was so much affected by his loss, that he abandoned the palace, and suffered it to fall to ruin; or, as others assert, pulled it down. From this period Sheen remained in a neglected state, till the accession of

of Henry V. to the throne, when the palace was rebuilt in a ſtyle of greater magnificence than before, and in ſuch a manner, as to render it "a delightful manſion of curious and coſtly workmanſhip, and befitting the character and condition of a king." Of Henry VI. we diſcover no trace here, nor does it appear that Edward IV. ever occupied the palace; but it is recorded, that he granted it, in the ſixth year of his reign, to his queen, Elizabeth, to be held by her during her life. Henry VII. gave the cuſtody of the manor to Robert Skeene; and on the death of his own mother-in-law, the queen dowager, in 1486, took poſſeſſion of the palace, which he frequently made his reſidence. In 1492 he held a grand tournament here, at which ſir James Parker, in a controverſy with Hugh Vaughan, for right of coat of armour, was killed in the firſt courſe. Seven years ſubſequent, the king being then at the palace, it was ſet on fire by accident, and almoſt totally deſtroyed. Henry, however, ſoon replaced it by another, which was built in a ſtyle of much "magnificence and elegance;" and on this occaſion changed the name of the manor to Richmond, in reference to his own title before he obtained the crown. The picture of Henry V. and his family, the marriage of Henry VI. and that of Henry VII. in the Strawberry-hill collection, are ſuppoſed to have been painted for this monarch, and intended for the palace of Richmond. It had been finiſhed only a ſhort time, when another fire broke out, which did conſiderable damage. One of the newly erected galleries alſo fell in the ſame year, only a few minutes after the king and his ſon had been walking in it. Philip I., king of Spain, was entertained here with great magnificence in the year 1506; and king Henry VII. died here 21ſt April, 1509. His ſucceſſor kept his Chriſtmas at Richmond the year ſucceeding his acceſſion to the throne; and on the 12th of January enſuing a tournament was held in the park, when the monarch himſelf, for the firſt time, took a part in the exerciſes. Charles V. was lodged at Richmond in the year 1523. King Henry VIII. had a ſon of his own name born here, who died when ſcarcely two months old. Queen Elizabeth was impriſoned in the palace by her ſiſter, queen Mary; and after ſhe was ſeated on the throne, it became one of her favourite places of reſidence. In her reign, Eric IV., king of Sweden, was lodged here, and here ſhe herſelf ended her days, on the 24th of March, in the year 1603. In the autumn of the ſame year the ſeveral courts of juſtice were removed hither from London to avoid the plague, which was then raging with great vehemence in the capital. Henry, prince of Wales, reſided here in 1605, and in 1625 the courts were a ſecond time adjourned to Richmond for the ſame reaſon as before mentioned. Charles I. was frequently at this palace, where he formed a large collection of pictures. In 1636 lord Buckhurſt, and lord Edward Sackville, performed a maſk before his majeſty and his royal conſort. When the ſame monarch was in Scotland, the parliament ordered that the young prince ſhould be ſent to Richmond with his governor, probably biſhop Duppa, who is ſaid to have educated Charles II. at this place. In the month of June, 1647, the palace was prepared for the king's reception, but he is generally ſtated to have refuſed to go to it. Mr. Lyſons, however, quotes a newſpaper of the 29th of Auguſt in that year, as mentioning that the prince elector was then at Richmond, and that the king, with the duke of York, hunted in the New Park, and killed a ſtag and a buck. During the commonwealth, the palace was ſold by the commiſſioners of the houſe of commons, who ordered a ſurvey of it to be taken, as it then exiſted. From this document we learn, that the great hall meaſured 100 feet in length, and 40 in breadth; and that it had a ſcreen at one extremity, and a turret or clock-caſe, covered with lead, at the other. The ſame record deſcribes the privy lodgings as a free-ſtone building, three ſtories high, and ſurmounted by fourteen turrets. A "canted tower," with a ſtaircaſe of 124 ſteps, is likewiſe noticed; alſo a chapel 96 feet long, and 40 broad; and a privy garden, with an open gallery 200 feet in length, over which was a cloſe gallery of the ſame extent; but no mention is made of a library, though a French writer aſſerts, that a royal library was eſtabliſhed at Richmond by Henry VII. and the librarian is enumerated among the officers of this palace in the houſehold eſtabliſhments of queen Mary and queen Elizabeth. The ſurvey further mentions three pipes, which ſupplied the palace with water, one from the white conduit in the New Park, another from the red conduit in the town-fields; and a third from a conduit near the alms-houſes, which are ſituated cloſe to the river. The materials of the palace are there valued at 10,782*l.* 19*s.* 2*d.* It was purchaſed by Thomas Rookeſby, William Goodrick, and Adam Baynes, on behalf of themſelves and other creditors, and ſhortly after reſold by them to ſir George Norton, who had been one of the commiſſioners appointed to ſit in judgment on Charles I. On the reſtoration, this gentleman having been deprived of his eſtates by confiſcation, Richmond palace was beſtowed on the queen mother, but it is probable, that at this period it was in a very diſmantled ſtate. Indeed Fuller, who wrote ſoon after the reſtoration, ſpeaks of it as pulled down; but this could not literally be the caſe, as it ſeems to have been inhabited ſubſequent to his day. Now, however, it is totally demoliſhed, except a few of the out-offices, and its ſcite is occupied by ſeveral houſes, which are held on leaſe from the crown. One of theſe, the property of the late duke of Queenſberry, was built by the third earl of Cholmondeley, who ornamented it with a very fine collection of pictures. The tapeſtry, which hung behind the earl of Clarendon in the court of chancery, ſtill decorates the hall of this manſion. The firſt mention made of a park at Richmond is in the reign of Edward I. This is the park which, in the time of Henry VIII. was called the Old or Great Park, in contradiſtinction to another adjoining, called the New Park, which had been formed by the predeceſſor of that monarch. The lodge belonging to it was for ſome months the reſidence of the celebrated cardinal Wolſey, after he had loſt the favour of his capricious and tyrannical maſter. Charles I. having formed a third park of far greater extent than both the former ones united, they appear to have merged into one ſoon after, as in the ſurvey taken in 1649, only two parks are mentioned, *viz.* that lately incloſed by the monarch, called the New Park, and another ſtyled the Little or Old Park. This laſt was valued at 220*l.* 3*s.* *per annum*, and was purchaſed by William Brome of London for 7048*l.* The lodge already mentioned was afterwards poſſeſſed by ſir Thomas Jervaſe, and the park by ſir John Trevor, in leaſe from the crown, to which the whole manor reverted at the reſtoration. King William afterwards granted the lodge, together with the ſtewardſhip of the manor, to John Latton, eſq., who held them till the death of that prince. In 1707, they were granted by queen Anne to James, duke of Ormond, who rebuilt the lodge, and reſided there till his attainder in 1715, when he privately withdrew to Paris. By act of parliament, paſſed in 1721, the earl of Arran, his brother, having been enabled to purchaſe his eſtates, king George II., then prince of Wales, bought this of Richmond from him, and frequently retired hither, even after his acceſſion to the throne.

throne. His queen, Caroline, was very partial to the ſpot, and had a dairy and menagerie here; ſeveral ornamental buildings were alſo diſperſed by the ſame princeſs throughout the gardens, in one of which, called the Hermitage, ſhe placed the buſts of Newton, Locke, and other eminent literary characters. His preſent majeſty frequently reſided here in the early part of his reign; and was ſo ſtrongly attached to the place, that he ordered the old lodge to be demoliſhed with the view of building a magnificent palace on its ſcite, which, however, has never riſen above the foundation; but an obſervatory has been erected at a ſhort diſtance from it, according to deſigns furniſhed by ſir William Chambers. Here is a mural arc of 140 degrees and eight feet radius; a zenith ſector of twelve feet; a tranſit inſtrument of eight feet; and a ten-feet reflector by Herſchel. On the top of the building is a moveable dome, which contains an equatorial inſtrument. Part of the Old Park forms a grazing and a dairy farm in his majeſty's own occupancy. The remainder conſtitutes the royal gardens, which were firſt laid out by Bridgeman, and afterwards altered to their preſent improved ſtate by Brown. The other park, *viz.* the New or Great Park, made by Charles I. met with great oppoſition to its formation, and may be reckoned among the impolitic meaſures of his reign. It was preſented to the common council of London by the parliament; but was reſtored to the crown in 1660. The rangerſhip of this park is conſidered an office of high dignity and truſt, and has been frequently held by a female branch of the royal family.

Within Richmond pariſh were anciently ſituated ſeveral religious houſes. Edward II. founded here a convent of Carmelite friars, and endowed it with an annual income of 120 marks out of his exchequer; but only two years after its eſtabliſhment he removed the monks to Oxford. Henry V. alſo founded here a houſe for the maintenance of friars of the Carthuſian order, whom he incorporated by the name of the Houſe of Jeſus of Bethlehem, at Shene. The foundation charter deſcribes it as built on the north ſide of the palace; and it appears from records to have been a ſtructure of great extent and magnificence. At the diſſolution its annual revenues were eſtimated at 962*l.* 11*s.* 6*d.*, and ſhortly after its ſcite was granted to Edward, earl of Hertford. A third convent was erected here by Henry VII. about the year 1499, and filled with friars of the Franciſcan order. This eſtabliſhment was ſuppreſſed in 1534, but its value is not recorded.

Richmond church is dedicated to St. Mary Magdalen, and conſiſts of a nave, two aiſles, and a chancel, built of bricks, with a ſquare embattled tower at the weſt end, conſtructed of ſtone and flints in chequers. The principal monuments here are thoſe of Henry, lord viſcount Brounker, cofferer to king Charles II.; admiral Holborn; ſir Matthew Decker; lady Chaworth, relict of ſir Richard Chaworth, who died in 1689; lady Howard, relict of William lord Howard of Eſcrick; James Thompſon, author of the "Seaſons;" and that of Mrs. Yates, the celebrated actreſs, who died in 1787. This church is in the dioceſe of Wincheſter, and in the deanery of Ewell. According to the parliamentary returns of 1811, the pariſh contains 875 houſes, and 5219 inhabitants. Hiſtory and Antiquities of the County of Surrey, by the late Rev. Owen Manning, S.T.P. continued by William Bray, eſq. of Shire, fol. vol. i. 1804. Salmon's Antiquities of Surrey, 8vo. 1732. Lyſons's Environs of London, vol. i. 4to. Maurice's Richmond, a poem, 4to.

Richmond, a townſhip of America, on the W. line of Maſſachuſetts, in Berkſhire county; 17 miles W. by S. from Lenox, and 150 W. of Boſton. Iron ore of the beſt quality is found here; but as it lies deep, it is raiſed at a great expence. It abounds with lime-ſtone, and coarſe, white, and clouded marble. It was incorporated in 1775, and contains an iron-work, three griſt-mills, a fulling-mill, two ſaw-mills, with 1041 inhabitants.—Alſo, a townſhip of Cheſhire county, New Hampſhire, on the Maſſachuſetts line, about 11 miles E. of Connecticut river, and 97 W. by S. from Portſmouth. It was incorporated in 1752, and contains 1290 inhabitants.—Alſo, a townſhip in Waſhington county, Rhode iſland, ſeparated from Hopkington on the W. by Ward's river, a branch of Paucatuck river. It is diſtant about 19 miles W. of Newport, and contains 1330 inhabitants.—Alſo, a county of New York, comprehending the whole of Staten iſland; which ſee.—Alſo, a county of North Carolina, in Fayette diſtrict, bounded S. by the ſtate of South Carolina, and N. by Moore county. It contains 6695 inhabitants. The chief town is Rockingham. The S.E. part of the county is a continued plain, covered in many places by pines, and moſtly inhabited by Scotſmen. The upper part has hills and vallies. In the middle and eaſt parts large tracts remain uncultivated. The inhabitants, with regard to religion, are Preſbyterians, Baptiſts, Methodiſts, and Quakers. Their houſes are logs, covered with ſlabs.—Alſo, a county of Virginia, bounded N. and N.E. by Weſtmoreland, and S. and S.W. by Rappahannock river, which ſeparates it from Eſſex county. It contains 6214 inhabitants. The court-houſe is 273 miles from Philadelphia.—Alſo, the preſent ſeat of government of the ſtate of Virginia, ſituated in Henrico county, on the N. ſide of James' river, at the foot of the falls, and containing between 400 and 500 houſes; built partly on the bank of the river ſo as to be convenient for trade, and partly upon an eminence that overlooks the lower part of the town, and commands an extenſive proſpect of the river and country. The new houſes are well built, and the ſtate-houſe is on the hill. In this town is an elegant ſtatue of the illuſtrious Waſhington, executed at Paris. The lower part of the town is divided by a creek, over which is a convenient bridge. Another bridge of curious conſtruction connects the city with Mancheſter. The public buildings, beſides the ſtate-houſe, are an epiſcopal church, a court-houſe, gaol, theatre, and three tobacco warehouſes. At the W. end of the town are ſeveral mills. Near the mills are a diſtillery and brewery. The falls above the bridge are ſeven miles in length. A noble canal is cut on the N. ſide of the river, which terminates in a baſin of about two acres, in the town of Richmond. Richmond is 626 miles from Boſton, 374 from New York, 176 from Baltimore, 278 from Philadelphia, 247 from Fayetteville, 497 from Charleſton, and 662 from Savannah. N. lat. 37° 40′. W. long. 77° 50′.—Alſo, a county of the upper diſtrict of Georgia, in which is ſituated the city of Auguſta; it is ſeparated from South Carolina on the E. by Savannah river, and contains ſix towns and 6189 inhabitants.—Alſo, a townſhip in Chittenden county, Vermont, eſtabliſhed in 1794: it contains an excellent tract of land, and lies on both ſides of Onion river. It has 935 inhabitants.—Alſo, a town, or rather village, in the iſland of St. Vincent, in the Weſt Indies; ſituated at the head of a deep bay, on the W. ſide of the iſland. Chateaubelair river runs on the S. ſide of the town, which gives name to the bay. Another river on the N. ſide of the town empties into the bay.—Alſo, a townſhip in Lenox county, Upper Canada, N. of Frederickſburgh in the bay of Quinte, and watered in front by the river Appennie.

Richmond *Bay*, a bay on the N. coaſt of the iſland of St. John, in the gulf of St. Lawrence.

RICHOLD, or Richeld, a town of France, in the department of the Roer, near the Meuse; two miles N.W. of Dalem.

RICHTENBERG, a town of Anterior Pomerania; 28 miles E.N.E. of Rostock. N. lat. 54° 11′. E. long. 12° 50′.

RICHTENSWYL, a town of Switzerland, situated on the W. side of the lake of Zurich, in the canton of Zurich, with a convenient harbour; 11 miles S. of Zurich.

RICHTER, Francis-Xavier, in *Biography*. There are six musicians, male and female, recorded in Gerber's Continuation of Walther's Lexicon; among whom, the most celebrated and best known in England was Francis-Xavier, whose works, of various kinds, have great merit. His harmony is correct; the subjects are often new and noble; but his detail and manner of treating them are frequently dry and steril, and he spins and repeats passages in different keys without end. The French and Italians have a term for this tediousness, which is wanting in our language, they call it *rosalie*, or *rosalia*; derived from the name of a female saint, remarkable for repeating her "Pater noster," and stringing her beads more frequently than even St. Dominic himself, or than any other pious person, that has merited a place in the Golden Legend. An Italian cries out, upon hearing a string of repetitions, either a note higher, or a note lower, of the same passage or modulation, *ah santa Rosalia!* Indeed this species of iteration indicates a want of invention in a composer, as much as stammering and hesitation imply a want of wit or memory in a story-teller. He died at Strasburgh in 1789, in the 80th year of his age.

RICIMER, count and patrician of the Western empire, and an important civil and military character in the fifth century, served from his youth in the Roman armies, in which he acquired great reputation by his warlike exploits, and at length came to be regarded as the ablest commander of the age. In the reign of the emperor Avitus, being one of the chief commanders of the Barbarian troops which formed the defence of Italy, he destroyed, in the year 456, on the coast of Corsica, a fleet of Genseric, the Vandal king, destined to ravage the coasts of Gaul or Italy. His success in this instance enabled him to avail himself of the public discontent to depose Avitus, and raise Majorian to the throne in the year 457. Not being raised to the dignity which he expected under this prince, he compelled him to abdicate the purple, which act was soon followed by his death. Ricimer next raised an obscure man, named Libius Severus, to the throne, who bore the title of emperor during four years without performing any one imperial function. In that period, and in an interregnum of two years more, Ricimer exerted sovereign authority, amassing treasures, forming a separate army, and negociating alliances. His own mean birth prevented him from assuming the purple, and in 467 he concurred in the inauguration of Anthemius, whose daughter he married. The new emperor and his son-in-law passed some years in union, but at length dissentions broke out between them, which ended in the murder of the emperor, and Olybrius was proclaimed in his stead. Thus a third, or perhaps a fourth, emperor was added to the number of Ricimer's victims; but in a few weeks after the massacre of Anthemius, "Italy," says Gibbon "was delivered by a painful disease from the tyrant Ricimer, who bequeathed the command of his army to his nephew Gundobald, one of the princes of the Burgundians." Gibbon's Rom. Hist. vol. vi.

RICINA, in *Ancient Geography*, an island situated on the coast of Hibernia, being one of those called Ebudes, according to Ptolemy and Pliny.—Also, a town of Italy, in the Picenum, which became a Roman colony under the reign of the emperor Severus. It was situated S.W. of Auximum.—Also, a town of Italy, in Liguria, S.E. of Genoa.

RICINOCARPODENDRON, compounded of *ricinus*, καρπὸς, *fructus*, and δενδρον, *arbor*, in *Botany*, the name of a genus of plants, established by Dr. Amman, the characters of which are these: the flower is of the roseaceous kind, consisting of three petals, disposed in a circular order, in the centre of which there arises a large and open tube, through which shoots up the pistil, which grows at the bottom of the cup; this pistil, finally, becomes a trigonal fruit, divided into three cells within, and containing each one seed in a rough coat.

The leaves of this tree sometimes resemble those of the ash, being composed of three or four pairs of smaller leaves joined to a middle rib, these are not serrated, and terminate in a sharp point; the flowers grow at the alæ of the leaves, they are white, and are disposed in lax spikes; the fruit is green at first, afterwards it becomes of a yellowish-red, and finally scarlet; it is of the bigness of a walnut, and in shape much resembles the fruit of the ricinus; the covering of the seeds is black on the outside, and red within, and each seed is divided into two lobes; when ripe, the fruit bursts, and the seeds fall out. It is a native of the East Indies. Act. Petropol. vol. iii. p. 214.

RICINOCARPOS, from the resemblance of the fruit to *Ricinus*. See Acalypha, Croton, Mercurialis, Tragia.

RICINOIDES. See Ceanothus, Croton, Jatropha.

RICINUS, so denominated from the resemblance its seed has to the little insect called *a tick*, *Ricinus*; and this, according to Ainsworth, is compounded of *re* and *canis*, because the tick, or tyke, is particularly annoying to dogs, by fixing itself upon their ears and other parts. It is the Κικι or Κροτων of Dioscorides, words expressive of the likeness of its seed to the above-named insect; the former of these appellations, however, is of eastern origin, and of rather uncertain signification, occurring in the prophet Jonah. Pliny mentions an Egyptian herb called *Palma-Christi*, with seeds like a tyke.—Linn. Gen. 503. Schreb. 655. Willd. Sp. Pl. v. 4. 564. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 331. Pursh v. 2. 602. Tournef. t. 307. Juss. 388. Lamarck Dict. v. 6. 200. Illustr. t. 792. Gærtn. t. 107. Loureir. Cochinch. 584.—Class and order, *Monoecia Monadelphia*. Nat. Ord. *Tricoccæ*, Linn. *Euphorbiæ*, Juss.

Gen. Ch. Male, *Cal.* Perianth inferior, of one leaf, cloven into five, ovate, concave segments. *Cor.* none. *Stam.* Filaments very numerous, thread-shaped, united unequally below into various sets; anthers twin, roundish.

Female on the same plant with the male, *Cal.* Perianth inferior, of one leaf, deciduous, cloven into three, ovate, concave segments. *Cor.* none. *Pist.* Germen superior, ovate, covered with awl-shaped bristly bodies; styles three, cloven, erect and spreading, hispid; stigmas simple. *Peric.* Capsule roundish, three-furrowed, generally prickly all over, of three cells and three valves. *Seeds* solitary, nearly ovate.

Ess. Ch. Male, Calyx five-cleft. Corolla none. Stamens numerous. Female, Calyx three-cleft. Corolla none. Styles three, cloven. Capsule three-celled. Seed solitary.

Obſ. Willdenow divides this genus into two ſections; the firſt containing ſuch ſpecies as have *palmate leaves*, the ſecond thoſe which have ſimple, *undivided leaves*.

Sect. 1. *Leaves palmate.*

1. R. *communis*. Common Palma-Chriſti, or Caſtor-oil Plant. Linn. Sp. Pl. 1430. Woodv. Med. Bot. 171. t. 61.—Leaves peltate; lobes lanceolate, ſerrated. Stem herbaceous, pruinoſe. Stigmas three, cloven at the tip.—Native of the Eaſt and Weſt Indies. Firſt cultivated in England, as appears from Turner's Herbal, in 1562. It flowers in July and Auguſt. *Root* biennial or annual, long, thick, and fibrous. *Stems* round, thick, jointed, channelled, glaucous; of a purpliſh-red colour upwards. *Leaves* large, deeply divided into ſeven ſegments, on long, tapering, purpliſh ſtalks. *Flowers* in long, green, and glaucous ſpikes, ſpringing from the diviſions of the branches; the males form the lower part of the ſpike, the females the upper. *Seeds* ovate, ſhining, black dotted with white.

The preſent ſpecies is ſubject to conſiderable variations. In our gardens it is a ſtrong, luxuriant, ſhrubby annual. In Africa it becomes a tree. Cluſius obſerved it in Spain, with a trunk as large as a man's body, and fifteen or twenty feet high. And Ray ſaw it in Sicily as big as our common Elder-trees, woody and long-lived. From the ſeeds of this valuable plant is extracted the *oleum ricini*, or caſtor-oil, ſo important for its medicinal properties as a gentle, though moſt effectual, cathartic.

2. R. *viridis*. Green Palma-Chriſti. Willd. n. 2. Hort. Berol. v. 1. t. 49.—Leaves peltate; lobes oblong, toothed, the midddle one ſlightly three-lobed. Stem herbaceous, pruinoſe. Stigmas ſix.—Native of the Eaſt Indies, flowering at Kew, in Auguſt. Very like the laſt, but always annual, with a taller and ſomewhat leſs pruinoſe *ſtem*. *Leaves* larger, and not ſo diſtinctly palmate.

3. R. *africanus*. African Palma-Chriſti. Willd. n. 3. (R. communis; Desfont. Atlant. v. 2. 355.)—Leaves peltate; lobes oblong, ſerrated. Stem ſhrubby, ſmooth.—Native of the north of Africa. *Stem* arboreous, or rather ſhrubby, not pruinoſe. *Leaves* ſmaller than in the preceding. *Stigmas* ſix, or more properly three, cloven down to the baſe.

4. R. *lividus*. Dark-leaved Palma-Chriſti. Willd. n. 4. Jacq. Ic. Rar. t. 196. Miſc. v. 2. 360.—Leaves peltate, coloured; lobes oblong, ſerrated. Stem ſhrubby, ſmooth, coloured.—Native of the Cape of Good Hope, whence it was introduced at Kew in 1795. A *tree* ten feet or more in height. *Stem*, during the firſt year, blood-red and ſhining, afterwards woody and thick, aſh-coloured and ſtreaked. *Leaves* divided into eight or ten lobes, of a dark blood-red colour, on long, glandular ſtalks. *Flowers* green. *Fruit* of a livid colour, with long, ſoft prickles. *Seeds* ſhining, variegated with black and brown.

5. R. *inermis*. Smooth-fruited Palma-Chriſti. Willd. n. 5. Jacq. Ic. Rar. t. 195. Miſc. v. 2. 362.—Leaves peltate; lobes oblong, ſerrated. Stem ſhrubby, pruinoſe. Capſules without prickles.—Native both of the Eaſt and Weſt Indies. In habit much reſembling the laſt, but altogether ſtouter. *Stem* brown, ſpotted with dark purple. *Leaves* very large, on long ſtalks. *Fruit* ovate, rugoſe, dark green.

6. R. *ſpecioſus*. Beautiful Palma-Chriſti. Willd. n. 6. Burman. Ind. 207. t. 63. f. 2.—Leaves peltate, inclining to digitate; leaflets lanceolate, ſerrated.—Native of Java. We know not that this is any where deſcribed or figured, except as it occurs in the above authors.

Sect. 2. *Leaves ſimple, or undivided.*

7. R. *Tanarius*. Scollop-leaved Palma-Chriſti. Linn. Sp. Pl. 1430. (Tanarius minor; Rumph. Amboin. v. 3. 190. t. 121.)—Leaves peltate, ovate, pointed, wavy, toothed.—Native of the Eaſt Indies, and woods of Cochinchina. It flowers at Kew, from July to September. A middling ſized *tree*, with twiſted, ſpreading *branches*. *Leaves* on long ſtalks, ſcattered, fragrant. *Flowers* in long, ſimple, terminal cluſters.

8. R. *dioicus*. Dioecious Palma-Chriſti. Willd. n. 8. Forſt. Prodr. 67.—Leaves heart-ſhaped, pointed, nearly entire. Flowers dioecious. Capſules muricated.—Native of Tanna iſland. This *ſhrub* has round, ſmooth, brown *branches*, the younger ones white with down. *Leaves* alternate, entire, or very obſcurely toothed; ſmooth above with downy veins; reſinous and dotted beneath. *Female flowers* in ſmall, axillary, ſtalked *cluſters*. *Bractea* ſolitary, ovate, pointed, very large, at the baſe of every flower.

9. R. *globoſus*. Globular Palma-Chriſti. Willd. n. 9. (Croton globoſum; Swartz Ind. Occ. v. 2. 1181.)—Leaves ovate, obtuſe, entire. Flowers dioecious. Capſules globular.—Native of lofty mountains in Jamaica. A branched, erect *ſhrub*, four or five feet high. *Branches* round, ſtriated, aſh-coloured. *Leaves* alternate, ſtalked, coriaceous. *Flowers* in terminal, ſhort, erect *cluſters*. *Capſule* roundiſh, the ſize of a pea.

10. R. *integrifolius*. Simple-leaved Palma-Chriſti. Willd. n. 10.—Leaves ovate, pointed, entire, coriaceous.—Native of the Mauritius. Adopted ſolely on Willdenow's authority, who deſcribes it as "a *ſhrub* with round, brown, ſmooth, divided *branches*. *Leaves* ſmooth, on channelled ſtalks two or three inches long. *Cluſters* axillary. *Flowers* and *Fruit* unknown. It appears to be dioecious."

Ricinus, in *Gardening*, contains plants of the tall, herbaceous, tender, annual kind, of which the ſpecies cultivated is the common palma-Chriſti (R. communis).

This plant becomes a tree in its native ſituation, and the ſeeds afford the caſtor-oil of the ſhops.

And there are ſeveral varieties of it, as the great American palma-Chriſti, which has brown ſtalks that divide into two or three branches, and riſe ſix or ſeven feet high; the leaves are broader, and not ſo deeply divided; they are of a deep green on both ſides, and are unequally ſerrate. The ſpikes of flowers are ſhorter, the ſeed-veſſels rounder and of a browniſh colour, and the ſeeds are much leſs, and brown. This ſort is a native of the Weſt Indies.

Alſo the green-ſtalked American palma-Chriſti, which has a thick herbaceous ſtem, of a greyiſh-green, with the joints not ſo far aſunder as in the preceeding ſort: it riſes about four feet high, and is divided at the top into three or four branches, which ſpread out almoſt horizontally; the leaves are large, of a deep green on their upper ſide, but greyiſh on their under; they are deeply cut into ſix or ſeven (ſometimes eight) lanceolate ſegments, which are unequally ſerrate: the petioles ſpread out more horizontally than thoſe of the common ſort, and are much ſhorter: the principal ſtalk and branches are terminated by looſe ſpikes of flowers; the covers of the capſules are green, and cloſely armed with ſoft ſpines; the ſeeds are ſmaller and lighter coloured than thoſe of the preceding ſort. This is alſo a native of the Weſt Indies.

Likewiſe the wrinkled-capſuled palma-Chriſti, which riſes with an herbaceous ſtalk about four feet high; the lower part is purpliſh, and the upper deep green, the joints pretty far aſunder; the leaves are of a deep green on their upper ſide, but paler underneath; they are not ſo deeply divided as ſome of the others, and are more regularly ſerrate; the ſpikes of flowers are large; the males have more ſtamens, with yellow anthers; the capſules are oval and wrinkled,

RICHOLD, or Richeld, a town of France, in the department of the Roer, near the Meuse; two miles N.W. of Dalem.

RICHTENBERG, a town of Anterior Pomerania; 28 miles E.N.E. of Rostock. N. lat. 54° 11′. E. long. 12° 50′.

RICHTENSWYL, a town of Switzerland, situated on the W. side of the lake of Zurich, in the canton of Zurich, with a convenient harbour; 11 miles S. of Zurich.

RICHTER, Francis-Xavier, in *Biography*. There are six musicians, male and female, recorded in Gerber's Continuation of Walther's Lexicon; among whom, the most celebrated and best known in England was Francis-Xavier, whose works, of various kinds, have great merit. His harmony is correct; the subjects are often new and noble; but his detail and manner of treating them are frequently dry and steril, and he spins and repeats passages in different keys without end. The French and Italians have a term for this tediousness, which is wanting in our language, they call it *rosalie*, or *rosalia*; derived from the name of a female saint, remarkable for repeating her "Pater noster," and stringing her beads more frequently than even St. Dominic himself, or than any other pious person, that has merited a place in the Golden Legend. An Italian cries out, upon hearing a string of repetitions, either a note higher, or a note lower, of the same passage or modulation, *ah santa Rosalia!* Indeed this species of iteration indicates a want of invention in a composer, as much as stammering and hesitation imply a want of wit or memory in a story-teller. He died at Strasburgh in 1789, in the 80th year of his age.

RICIMER, count and patrician of the Western empire, and an important civil and military character in the fifth century, served from his youth in the Roman armies, in which he acquired great reputation by his warlike exploits, and at length came to be regarded as the ablest commander of the age. In the reign of the emperor Avitus, being one of the chief commanders of the Barbarian troops which formed the defence of Italy, he destroyed, in the year 456, on the coast of Corsica, a fleet of Genseric, the Vandal king, destined to ravage the coasts of Gaul or Italy. His success in this instance enabled him to avail himself of the public discontent to depose Avitus, and raise Majorian to the throne in the year 457. Not being raised to the dignity which he expected under this prince, he compelled him to abdicate the purple, which act was soon followed by his death. Ricimer next raised an obscure man, named Libius Severus, to the throne, who bore the title of emperor during four years without performing any one imperial function. In that period, and in an interregnum of two years more, Ricimer exerted sovereign authority, amassing treasures, forming a separate army, and negociating alliances. His own mean birth prevented him from assuming the purple, and in 467 he concurred in the inauguration of Anthemius, whose daughter he married. The new emperor and his son-in-law passed some years in union, but at length dissentions broke out between them, which ended in the murder of the emperor, and Olybrius was proclaimed in his stead. Thus a third, or perhaps a fourth, emperor was added to the number of Ricimer's victims; but in a few weeks after the massacre of Anthemius, "Italy," says Gibbon "was delivered by a painful disease from the tyrant Ricimer, who bequeathed the command of his army to his nephew Gundobald, one of the princes of the Burgundians." Gibbon's Rom. Hist. vol. vi.

RICINA, in *Ancient Geography*, an island situated on the coast of Hibernia, being one of those called Ebudes, according to Ptolemy and Pliny.—Also, a town of Italy, in the Picenum, which became a Roman colony under the reign of the emperor Severus. It was situated S.W. of Auximum.—Also, a town of Italy, in Liguria, S.E. of Genoa.

RICINOCARPODENDRON, compounded of *ricinus*, καρπὸν, *fructus*, and δενδρον, *arbor*, in *Botany*, the name of a genus of plants, established by Dr. Amman, the characters of which are these: the flower is of the roseaceous kind, consisting of three petals, disposed in a circular order, in the centre of which there arises a large and open tube, through which shoots up the pistil, which grows at the bottom of the cup; this pistil, finally, becomes a trigonal fruit, divided into three cells within, and containing each one seed in a rough coat.

The leaves of this tree sometimes resemble those of the ash, being composed of three or four pairs of smaller leaves joined to a middle rib, these are not serrated, and terminate in a sharp point; the flowers grow at the alæ of the leaves, they are white, and are disposed in lax spikes; the fruit is green at first, afterwards it becomes of a yellowish-red, and finally scarlet; it is of the bigness of a walnut, and in shape much resembles the fruit of the ricinus; the covering of the seeds is black on the outside, and red within, and each seed is divided into two lobes; when ripe, the fruit bursts, and the seeds fall out. It is a native of the East Indies. Act. Petropol. vol. iii. p. 214.

RICINOCARPOS, from the resemblance of the fruit to *Ricinus*. See Acalypha, Croton, Mercurialis, Tragia.

RICINOIDES. See Ceanothus, Croton, Jatropha.

RICINUS, so denominated from the resemblance its seed has to the little insect called *a tick*, *Ricinus*; and this, according to Ainsworth, is compounded of *re* and *canis*, because the tick, or tyke, is particularly annoying to dogs, by fixing itself upon their ears and other parts. It is the Κικι or Κροτων of Dioscorides, words expressive of the likeness of its seed to the above-named insect; the former of these appellations, however, is of eastern origin, and of rather uncertain signification, occurring in the prophet Jonah. Pliny mentions an Egyptian herb called *Palma-Christi*, with seeds like a tyke.—Linn. Gen. 503. Schreb. 655. Willd. Sp. Pl. v. 4. 564. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 331. Pursh v. 2. 602. Tournef. t. 307. Juss. 388. Lamarck Dict. v. 6. 200. Illustr. t. 792. Gærtn. t. 107. Loureir. Cochinch. 584.—Class and order, *Monoecia Monadelphia*. Nat. Ord. *Tricoccæ*, Linn. *Euphorbiæ*, Juss.

Gen. Ch. Male, *Cal.* Perianth inferior, of one leaf, cloven into five, ovate, concave segments. *Cor.* none. *Stam.* Filaments very numerous, thread-shaped, united unequally below into various sets; anthers twin, roundish.

Female on the same plant with the male, *Cal.* Perianth inferior, of one leaf, deciduous, cloven into three, ovate, concave segments. *Cor.* none. *Pist.* Germen superior, ovate, covered with awl-shaped bristly bodies; styles three, cloven, erect and spreading, hispid; stigmas simple. *Peric.* Capsule roundish, three-furrowed, generally prickly all over, of three cells and three valves. *Seeds* solitary, nearly ovate.

Ess. Ch. Male, Calyx five-cleft. Corolla none. Stamens numerous. Female, Calyx three-cleft. Corolla none. Styles three, cloven. Capsule three-celled. Seed solitary.

Obſ. Willdenow divides this genus into two ſections; the firſt containing ſuch ſpecies as have *palmate leaves*, the ſecond thoſe which have ſimple, *undivided leaves*.

Sect. 1. *Leaves palmate.*

1. R. *communis*. Common Palma-Chriſti, or Caſtor-oil Plant. Linn. Sp. Pl. 1430. Woodv. Med. Bot. 171. t. 61.—Leaves peltate; lobes lanceolate, ſerrated. Stem herbaceous, pruinoſe. Stigmas three, cloven at the tip.—Native of the Eaſt and Weſt Indies. Firſt cultivated in England, as appears from Turner's Herbal, in 1562. It flowers in July and Auguſt. *Root* biennial or annual, long, thick, and fibrous. *Stems* round, thick, jointed, channelled, glaucous; of a purpliſh-red colour upwards. *Leaves* large, deeply divided into ſeven ſegments, on long, tapering, purpliſh ſtalks. *Flowers* in long, green, and glaucous ſpikes, ſpringing from the diviſions of the branches; the males form the lower part of the ſpike, the females the upper. *Seeds* ovate, ſhining, black dotted with white.

The preſent ſpecies is ſubject to conſiderable variations. In our gardens it is a ſtrong, luxuriant, ſhrubby annual. In Africa it becomes a tree. Cluſius obſerved it in Spain, with a trunk as large as a man's body, and fifteen or twenty feet high. And Ray ſaw it in Sicily as big as our common Elder-trees, woody and long-lived. From the ſeeds of this valuable plant is extracted the *oleum ricini*, or caſtor-oil, ſo important for its medicinal properties as a gentle, though moſt effectual, cathartic.

2. R. *viridis*. Green Palma-Chriſti. Willd. n. 2. Hort. Berol. v. 1. t. 49.—Leaves peltate; lobes oblong, toothed, the midddle one ſlightly three-lobed. Stem herbaceous, pruinoſe. Stigmas ſix.—Native of the Eaſt Indies, flowering at Kew, in Auguſt. Very like the laſt, but always annual, with a taller and ſomewhat leſs pruinoſe *ſtem*. *Leaves* larger, and not ſo diſtinctly palmate.

3. R. *africanus*. African Palma-Chriſti. Willd. n. 3. (R. communis; Desfont. Atlant. v. 2. 355.)—Leaves peltate; lobes oblong, ſerrated. Stem ſhrubby, ſmooth.—Native of the north of Africa. *Stem* arboreous, or rather ſhrubby, not pruinoſe. *Leaves* ſmaller than in the preceding. *Stigmas* ſix, or more properly three, cloven down to the baſe.

4. R. *lividus*. Dark-leaved Palma-Chriſti. Willd. n. 4. Jacq. Ic. Rar. t. 196. Miſc. v. 2. 360.—Leaves peltate, coloured; lobes oblong, ſerrated. Stem ſhrubby, ſmooth, coloured.—Native of the Cape of Good Hope, whence it was introduced at Kew in 1795. A *tree* ten feet or more in height. *Stem*, during the firſt year, blood-red and ſhining, afterwards woody and thick, aſh-coloured and ſtreaked. *Leaves* divided into eight or ten lobes, of a dark blood-red colour, on long, glandular ſtalks. *Flowers* green. *Fruit* of a livid colour, with long, ſoft prickles. *Seeds* ſhining, variegated with black and brown.

5. R. *inermis*. Smooth-fruited Palma-Chriſti. Willd. n. 5. Jacq. Ic. Rar. t. 195. Miſc. v. 2. 362.—Leaves peltate; lobes oblong, ſerrated. Stem ſhrubby, pruinoſe. Capſules without prickles.—Native both of the Eaſt and Weſt Indies. In habit much reſembling the laſt, but altogether ſtouter. *Stem* brown, ſpotted with dark purple. *Leaves* very large, on long ſtalks. *Fruit* ovate, rugoſe, dark green.

6. R. *ſpecioſus*. Beautiful Palma-Chriſti. Willd. n. 6. Burman. Ind. 207. t. 63. f. 2.—Leaves peltate, inclining to digitate; leaflets lanceolate, ſerrated.—Native of Java. We know not that this is any where deſcribed or figured, except as it occurs in the above authors.

Sect. 2. *Leaves ſimple, or undivided.*

7. R. *Tanarius*. Scollop-leaved Palma-Chriſti. Linn. Sp. Pl. 1430. (Tanarius minor; Rumph. Amboin. v. 3. 190. t. 121.)—Leaves peltate, ovate, pointed, wavy, toothed.—Native of the Eaſt Indies, and woods of Cochinchina. It flowers at Kew, from July to September. A middling ſized *tree*, with twiſted, ſpreading *branches*. *Leaves* on long ſtalks, ſcattered, fragrant. *Flowers* in long, ſimple, terminal cluſters.

8. R. *dioicus*. Dioecious Palma-Chriſti. Willd. n. 8. Foreſt. Prodr. 67.—Leaves heart-ſhaped, pointed, nearly entire. Flowers dioecious. Capſules muricated.—Native of Tanna iſland. This *ſhrub* has round, ſmooth, brown *branches*, the younger ones white with down. *Leaves* alternate, entire, or very obſcurely toothed; ſmooth above with downy veins; reſinous and dotted beneath. *Female flowers* in ſmall, axillary, ſtalked *cluſters*. *Bractea* ſolitary, ovate, pointed, very large, at the baſe of every flower.

9. R. *globoſus*. Globular Palma-Chriſti. Willd. n. 9. (Croton globoſum; Swartz Ind. Occ. v. 2. 1181.)—Leaves ovate, obtuſe, entire. Flowers dioecious. Capſules globular.—Native of lofty mountains in Jamaica. A branched, erect *ſhrub*, four or five feet high. *Branches* round, ſtriated, aſh-coloured. *Leaves* alternate, ſtalked, coriaceous. *Flowers* in terminal, ſhort, erect *cluſters*. *Capſule* roundiſh, the ſize of a pea.

10. R. *integrifolius*. Simple-leaved Palma-Chriſti. Willd. n. 10.—Leaves ovate, pointed, entire, coriaceous.—Native of the Mauritius. Adopted ſolely on Willdenow's authority, who deſcribes it as "a *ſhrub* with round, brown, ſmooth, divided *branches*. *Leaves* ſmooth, on channelled ſtalks two or three inches long. *Cluſters* axillary. *Flowers* and *Fruit* unknown. It appears to be dioecious."

Ricinus, in *Gardening*, contains plants of the tall, herbaceous, tender, annual kind, of which the ſpecies cultivated is the common palma-Chriſti (R. communis).

This plant becomes a tree in its native ſituation, and the ſeeds afford the caſtor-oil of the ſhops.

And there are ſeveral varieties of it, as the great American palma-Chriſti, which has brown ſtalks that divide into two or three branches, and riſe ſix or ſeven feet high; the leaves are broader, and not ſo deeply divided; they are of a deep green on both ſides, and are unequally ſerrate. The ſpikes of flowers are ſhorter, the ſeed-veſſels rounder and of a browniſh colour, and the ſeeds are much leſs, and brown. This ſort is a native of the Weſt Indies.

Alſo the green-ſtalked American palma-Chriſti, which has a thick herbaceous ſtem, of a greyiſh-green, with the joints not ſo far aſunder as in the preceeding ſort: it riſes about four feet high, and is divided at the top into three or four branches, which ſpread out almoſt horizontally; the leaves are large, of a deep green on their upper ſide, but greyiſh on their under; they are deeply cut into ſix or ſeven (ſometimes eight) lanceolate ſegments, which are unequally ſerrate: the petioles ſpread out more horizontally than thoſe of the common ſort, and are much ſhorter: the principal ſtalk and branches are terminated by looſe ſpikes of flowers; the covers of the capſules are green, and cloſely armed with ſoft ſpines; the ſeeds are ſmaller and lighter coloured than thoſe of the preceding ſort. This is alſo a native of the Weſt Indies.

Likewiſe the wrinkled-capſuled palma-Chriſti, which riſes with an herbaceous ſtalk about four feet high; the lower part is purpliſh, and the upper deep green, the joints pretty far aſunder; the leaves are of a deep green on their upper ſide, but paler underneath; they are not ſo deeply divided as ſome of the others, and are more regularly ſerrate; the ſpikes of flowers are large; the males have more ſtamens, with yellow anthers; the capſules are oval and wrinkled,

but have no prickles; the feeds are ſmall and brown. This is a native of both the Indies.

Farther, the red-ſtalked palma-Chriſti, which riſes with a large reddiſh ſtalk to the height of ten or twelve feet, with many joints, and dividing into ſeveral branches; the leaves are very large, ſome meaſuring more than two feet and a half in diameter; are of a dark green, unequally ſerrate, and not ſo deeply cut as in ſome of the varieties; the ſpikes of flowers are large, and brown, with whitiſh anthers; capſules large, oval, and cloſely ſet with ſoft prickles; the ſeeds are very large, and beautifully ſtriped. This ſort is a native of Africa and both the Indies.

And the ſmall American palma-Chriſti, of which there are two ſub-varieties, one with a red, the other with a pale-green ſtalk, diſtinguiſhed in America by the names of red and white oil-ſeed; the ſtem ſeldom riſes more than three feet high, ſometimes dividing at the top into two or three branches; the leaves are much ſmaller and more deeply divided than in the other varieties; their borders are unequally ſerrate, and the ſegments of the leaves are frequently cut on the ſides; the ſpikes of flowers are ſmaller and more compact; the capſules are alſo ſmaller, rounder, of a light green, and cloſely ſet with ſoft prickles; the ſeeds ſmall, and finely ſtriped. This is a native of Carolina, and ſome other places.

Laſtly, the livid leaved palma-Chriſti, which is an evergreen tree, ten feet in height, and more; the trunk, during the firſt year, is blood-red and very ſhining; afterwards it becomes woody, as thick as the wriſt, hollow with tranſverſe ſepta, pithy, with circular warts at the joints from fallen ſtipulas, aſh-coloured, interruptedly and ſlightly ſtreaked: before the leaves come out, they are wrapped up in red ſtipulas like ſheaths, that fall off ſoon after; the leaves are divided half way into eight, ſometimes ten lobes, which are ſerrate and acute, and the petiole is long; they are of a dark blood-red colour on the upper ſurface, and livid on the lower, with blood-red veins, the largeſt leſs than a foot in diameter, quite ſmooth, without any hairineſs whatever; the fruit of a livid colour, with long ſoft prickles; the ſeed ſhining, variegated with black and brown. This is a native of the Eaſt Indies.

Method of Culture.—All theſe ſorts of plants are capable of being increaſed by ſeeds, which ſhould be ſown upon a hot-bed in the ſpring, and when the plants are come up, be each planted into a ſeparate pot filled with light freſh earth, and plunged into a freſh hot-bed, watering and ſhading them until they have taken root; after which they muſt have a great ſhare of free air when the ſeaſon is mild, otherwiſe they draw up tall and weak. As the plants grow faſt, and their roots in a ſhort time fill the pots, they ſhould be ſhifted into larger pots, filled as above; and about the end of May, when the ſeaſon is warm, be hardened to endure the open air by degrees; when, if ſome of the plants be ſhaken out of the pots, and planted out into a very rich border, and in dry weather duly watered, they grow to a large ſize, and produce a great quantity of flowers and ſeeds. If it be intended to preſerve any of the plants through the winter, they muſt not be planted out in the full grouud, but be ſhifted into larger pots occaſionally, as their roots require, placing them in the open air during the ſummer ſeaſon in ſome warm ſituation, where they may remain until October, when they muſt be removed into the green-houſe with other exotic plants, watering them ſparingly in winter, and admitting free air in mild weather, as they only require to be protected from froſt and cold winds.

In common, they have a fine ornamental effect in their leaves among other potted green-houſe plants, and alſo in the large open border or clumps, when cultivated as annuals; but they require room.

Ricinus *Communis*, or common Palma-Chriſti, in the *Materia Medica*. See Castor *Oil*.

RICITOSA, in *Geography*, a town of Moldavia; 20 miles W. of Birlet.

RICK, in *Rural Economy*, a term applied to a pile of corn, hay, ſtraw, &c. regularly heaped up in the open air, and ſheltered from wet by thatch. See Stack, and Stand, *Corn*.

Rick-*Yard*, a term ſometimes given to that part of the farm-yard in which the ſtacks are placed. They ſhould be ſufficiently large, well ſheltered from winds, and perfectly ſecured from all ſorts of vermin, eſpecially rats and mice.

RICKBAD, in *Geography*, a town of Hindooſtan, in Oude; 20 miles N.W. of Lucknow.

RICKETS, in *Medicine*, a diſeaſe affecting children, and principally characteriſed by enlargement and flexure, or diſtortion of the bones.

The origin and etymology of this word are equally unknown. It has occurred in this, as in ſeveral other inſtances, that the vulgar had recognized and given a name to the diſeaſe, before medical men had diſcriminated its nature, or at leaſt had taken the pains to point out its peculiarities by any written document. The firſt account of the diſeaſe is that of Dr. Gliſſon, publiſhed in the year 1650, which was the reſult of ſome communications on the ſubject in a private medical ſociety. In this treatiſe we are informed, that the *rickets* had firſt been noticed in the counties of Dorſet and Somerſet, about thirty years before, where it was vulgarly known by this name, and that it ſpread from thence over all the ſouthern and weſtern parts of the kingdom, but was not yet commonly known in the north. The rapidity of its progreſs, and the extent and fatality of its prevalence, are ſcarcely leſs extraordinary than its general and ſpeedy diſappearance in later times, as no aſſignable cauſe has ever been pointed out either for its origin or its ceſſation. Its firſt appearance, as a cauſe of death, in the bills of mortality of London, was in the year 1634, when the total number of deaths under this head was only 14; but an extraordinary increaſe ſoon took place. For, in 1649, the deaths from rickets amounted to 190; in 1650, to 260; in the following year, to 329; and in 1660, 521 perſons died of this diſeaſe. At the commencement of the 18th century, the mortality from this diſorder was 393 (A. D. 1700); and it ſubſequently decreaſed rapidly; for in the year 1750, the number of deaths, recorded in the bills under the head of rickets, is only 21; and at the end of the century (1799), the deaths, under the head of "evil and rickets" conjoined, do not exceed 7. (See Ann. Medical Regiſter, vol. i. for 1808, p. 324.) At preſent, indeed, the diſeaſe is almoſt unknown to medical practitioners, except by name.

With the view of accommodating a claſſical name both to the vulgar appellation and to the ſymptoms of the diſeaſe, Gliſſon invented the term *rachitis*, ῥαχίτις, *i. e. ſpinal* diſeaſe; ſince the curvature of the ſpine, which enſues, is one of the moſt prominent ſymptoms. This appellation has been adopted by the noſologiſts, and all ſubſequent writers, who have uſed a Latin nomenclature. (See Gliſſon, de Rachitide, cap. i.) Whether the diſeaſe was really unknown, or did not exiſt, until modern times, is a queſtion which it would be very unprofitable to diſcuſs; ſince there are few ſatisfactory documents to be found on the ſubject. We ſhall therefore proceed to deliver a hiſtory of the ſymptoms.

This diſeaſe ſeldom commences before the ninth month, and rarely after the ſecond year, of a child's age; but it may

may appear at any interval between these two periods. Its progress is at first usually very slow. The early appearances of its approach are a flaccidity of the muscular flesh, and a certain degree of emaciation of the body, notwithstanding that the appetite for food is rather increased than impaired; together with a paleness and loss of colour in the complexion, and a slight degree of fulness, or tumefaction in the face. The head at the same time appears large with respect to the body, and the fontanelle, and even the sutures of the skull, are more open than is usual in children of the same age. The head continuing to increase in size, the forehead especially, becomes unusually prominent, and the neck appears very slender in proportion to the head. The progress of dentition is also slow, or much later than usual; and those teeth which protrude themselves soon become black, decay, and often fall out. Their ribs lose their convexity, and become flattened at their sides, while the sternum, or breast-bone, is pushed forward, so as to form a sort of ridge. At the same time, or sometimes sooner, the epiphyses at the several joints of the limbs become swelled, while the limbs between the joints appear, or perhaps actually become, more slender. The bones now are obviously every where, to a certain degree, flexible, becoming variously bent and distorted, and especially the legs and the spine of the back are incurvated in various directions. If the child had already acquired the power of walking before the commencement of the disease, it becomes daily more feeble in its motions, and more averse to exertion, and at length loses the power of walking altogether.

While these symptoms go on increasing, the abdomen always appears preternaturally full and tumid, and the stools are generally frequent and loose; yet the appetite often remains good. The faculties of the mind often exhibit a premature advancement, and the power of speech is early acquired; but in some cases the understanding is impaired, and stupidity or actual fatuity ensues. There is usually no febrile affection accompanying the disease at its commencement; but it seldom continues long before the pulse becomes frequent, and other symptoms of fever ensue.

With these symptoms the disease proceeds, and continues in some instances for several years; but, in many cases, in various stages of that progress, it ceases to advance, and the child gradually recovers its health and strength, except that the distortion of the limbs, produced by the disease, continues during the remainder of life. In other cases, however, the malady proceeds, continually increasing, until it has affected almost every function of the animal economy, by the derangement of the viscera and the impediment to their operations, which the distortion of the bones occasions. The most material danger and distress thus produced arise from the distortion of the spine, ribs, and sternum, by which the cavity of the chest is greatly diminished, and the action of the lungs and of the heart much impeded, or altogether arrested. The functions of the liver, stomach, &c. and those of the uterus and bladder, under distortions of the pelvis, are thus also often rendered morbid and distressful for the rest of life. When the head, too, is greatly enlarged, the existence of water is to be apprehended. It is unnecessary to enter into any detail of all the variety of symptoms, which are the secondary effect of these impediments to the action of particular organs; since relief is not to be obtained effectually while the mechanical impediment exists incurably, and the origin of each particular symptom will be easily explained from the circumstances of each case. The organs themselves, however, become seriously deranged under this state of pressure and obstructions; and morbid conditions have been discovered in various parts internally in the bodies of those who have died. Thus, most of the viscera of the abdomen, the liver, spleen, and mesenteric glands, have been found to be preternaturally enlarged; the lungs have been found in a morbid state, apparently from some inflammation that had come on towards the termination of the disease. The brain has been commonly found in a flaccid state, with effusions of a serous fluid into its cavities. The bones very universally have been commonly found in a flaccid state, with effusions of a serous fluid into their cavities. The bones very universally have been found to be soft, so much so indeed, as to be readily cut by a knife; and the muscular parts also soft and tender, the whole of the dead body being without that degree of rigidity which is so common in almost all others. Cullen, First Lines, par. 1724.

The great peculiarity, then, of this disease, appears to consist in a deficiency of that matter which forms the solid parts of the body, especially of the bones, or in a faulty state of the process of ossification, by which that matter is deposited in the membranes and substances destined to become bony, to give them their due firmness, hardness, and strength. There is obviously a defect in the quantity of this matter, the place of which is supplied, especially about the epiphyses of the bones, by a soft substance which increases their bulk. What this deficiency of ossific matter depends upon, it is difficult to ascertain: it may originate either in the faulty action of the organs of digestion and assimilation, by which the nutritive fluids are prevented from being properly prepared; or from a fault in the organs of secretion and nutrition, which prevents the proper elaboration of the circulating fluids. Of the nature of this latter process, however, we are totally ignorant; and practitioners have more generally referred to the former, and ascribed the disease to the actual deficiency of bony matter in the circulating fluids, as furnished by the digestive organs: yet they have been generally also compelled to refer this deficiency to some general laxity or debility of the system. But admitting the existence of such a debility, it is altogether impossible to account for its operation in diminishing the ossific matter, being limited to the early portion of childhood; for though a *mollities ossium*, or softness and flexibility of the bones, has occurred in adult life, it is a circumstance of extreme rarity. In a word, the essential nature of the disease is beyond our investigation.

Causes of Rickets.—Neither are the causes of the disease very clearly demonstrated. Great stress was laid by the earlier writers upon the *hereditary* predisposition which descended from parents to their children; but the very rapid increase of the disease among children, soon after the disorder was first noticed, and therefore the necessary primary origin of it in many whose parents must have been free from the taint, renders the opinion untenable. Indeed the rise, prevalence, and disappearance of the disease, during a certain period of time, including about a century and a half, would seem to connect its existence with some more general cause; but no one has been able to point out any peculiar physical condition of the people of England, during that period, to which such a malady can be attributed. Some have imputed it to the multiplication of manufactures and other unwholesome occupations; but the manufactures continue while the disease has nearly vanished. It is certain, however, that in later times the disease has been principally known among the children of the poor, living in close and uncleanly situations, and in dirty ill-ventilated apartments; and especially among those children who are ill-nursed, that is, in whom constant washing and proper exercise,

exercise, as well as good feeding, have not been attended to. Damp air, and residence in a cold and humid situation, have also been enumerated among the predisposing causes of rickets; and in this respect, as well as in the practice of better modes of management in infancy, the change of circumstances in the present state of great towns, and even in the habitations of the peasantry, when compared with those of the preceding century, will be deemed sufficient at least to have greatly diminished the general sources of infantile disease and mortality. See HEALTH.

Cure of Rickets.—Observation of the circumstances under which the rickets occurred, as well as of those with which it was accompanied, suggested the only means that were resorted to for the cure of this disease, until modern chemistry proposed the administration of a substitute for the deficient ossific matter; a proposal, however, which does not appear to have led to the advantages which were anticipated. The method suggested from observation of the circumstances just alluded to, was rather of a preventive than of a curative nature; and turned upon the plan of invigorating the constitution of the infant from the period of its birth. This is to be accomplished by remedies which may improve the tone of the stomach in particular, and through that medium of the system at large, or by those which operate directly upon the latter. Of these general tonic remedies, the *cold bath* seems to have been commonly found to be the most effectual, at least as a preventive of the disease. Since it became a general custom in this country, through the recommendation of medical men, to wash young childen with cold or tepid water daily, the rickets seem to have been less and less prevalent. Indeed Dr. Cullen declared long ago, that he had never met with the rickets where this practice was adopted; and that where the disease had already begun, this remedy often checked the progress of the disease, and sometimes cured it entirely.

With the same view internal medicines of a tonic quality have been generally prescribed, to remove or arrest the disease; and among these, the preparations of *iron* have been most frequently employed. A preparation of this kind was long ago recommended by Mr. Boyle, and universally adopted, under the appellation of *ens veneris*, which, notwithstanding its name, was iron. The rust of iron, and other preparations, as well as those of zinc, have been also used for the cure of rickets, in preference to the Peruvian bark, on account of the difficulty of administering this substance to infants in any useful quantity; De Haen, however, has borne testimony to the efficacy of the latter.

Much is also to be done by good nursing; that is, by a proper regulation of the exercise, diet, and clothing, by all of which the healthy performance of the functions of an infant is greatly assisted. Exercise, indeed, even in the only form in which young children can enjoy it, *viz.* that of gestation, is one of the most powerful general tonics; and even friction with dry flannels would probably contribute to the same end. The diet of children is now reduced to a much more rational standard than during the last century, and the proper mode of administering it is now too well understood to require any minute instructions in this place. (See INFANTS.) The supposition of the pernicious acidity, arising from the use of that most natural food milk, to which Zeviani and some other writers ascribed the origin of the disease, is altogether without foundation.

It is highly proper, also, where there is a ricketty tendency present, to attend to the symptoms which accompany its approach, and to correct any influence which these symptoms may have upon the general health. Above all, it is advisable to administer remedies against the derangements of the abdominal viscera, connected with tumid abdomen and irregularity of bowels, which so commonly attend that disposition. For this purpose the testaceous powders, combined with small doses of some mercurial alterative, or with rhubarb, or the latter united with steel and soda, may be prescribed with benefit. The use of emetics, which was resorted to by some practitioners, appears to be of no beneficial tendency, unless they may act on the bowels as laxatives; and a system of active purging, which was also generally employed, as it contributes to much debility, should be avoided.

It remains only to mention the chemical proposal, which M. Bonhomme of Paris proposed, of administering the component parts of bone in the way of medicine, upon the supposition that the disease depends upon the mere deficiency of these substances in the circulating blood. M. Bonhomme therefore suggested the administration of phosphate of lime and phosphate of soda in substance; and formed a powder, consisting of equal parts of these substances, of which he gave a scruple twice a day to infants. He contends that the calcareous phosphate, when taken internally, is really transmitted by the lymphatic vessels, and is applied to the purposes of ossification, and that this administration of it powerfully contributes to restore the natural proportions in the substance of the bones, and thus accelerates the cure of rickets. In support of these opinions, he relates various experiments made on young fowls, to which it was given mixed with their food, and in which, he maintains, the progress of ossification was accelerated, in comparison with others to which it was not given. (See his Memoir on Rachitis; and Duncan's Annals of Medicine for 1797.) These physiological experiments, however, lead to no legitimate deductions as to the operations of disease in the human body; and, experience in the latter has not apparently supported the doctrines of M. Bonhomme.

RICKETS is also a disease affecting sheep, as well as some sorts of vegetable crops.

RICKETY GRAIN, in *Agriculture*, a sort of vegetable disorder that often attacks wheat crops. It is, according to Dr. Anderson, a kind of disease which is totally different from that of *smut* or *rust*. The grain affected with this disease assumes a small shrivelled appearance, and irregular form; its colour is somewhat darker than good wheat of the same kind, but is different from that which is affected with either of the two other diseases. Water, when poured upon wheat of this kind, soon, he observes, moistens it, and brings to life a number of eel-shaped animals in various stages of their growth, which had taken up their residence there while the grain was yet in its succulent state, and thus occasioned the disease which produced the alteration in its form. As the grain ripens and dries, these animalcules are arrested in their progress, their life totally suspended, and their destructive operations upon the corn of course obstructed, so long as it remains in this dry state. But no sooner does this grain become soft, in consequence of being moistened with water (whether after being sown in the ground or otherwise), than these creatures are restored to life and activity; they soon begin to feed upon the grain while it is moist, and, if not interrupted in their progress by another deficcation, quickly lay their eggs (for they are oviparous), and go through the ordinary evolutions of nature. The young, when hatched in the corn that was sowed, after living upon it for some time, begin, he asserts, to eat their way up the growing stalk, and establish themselves at length in the grain itself, while it is advancing towards maturity, where they are arrested in their progress in the manner above described when it is fully ripened.

And

And in respect to the nature of the animalcule that produces these effects, it is remarked, that it can be preserved alive in a quiescent dried state, for twenty-eight years at least, as has been shewn by experiment, after the lapse of which period it was found to revive as readily as if its vital functions had been thus suspended only for one day. It is further stated as worthy of remark, that the eggs of this creature cannot be preserved for a length of time in a dry state, and still retain their prolificacy, neither can those among them which are very young, or those which have attained their full size, be revived after they have been dried up. It is only those individuals that are in the full vigour of life, and in a state soon to produce young, that are endowed with this singular faculty. In this case, the obvious intention of nature is to preserve the species, by keeping them in life until the grain shall be sown, and thus to have a proper food provided for their progeny, however long that may be.

RICKMAN, George William, in *Biography*, a member of the Imperial Academy of Sciences at Petersburgh, was born at Pernau in 1711, after the decease of his father, who was treasurer to the king of Sweden. Having acquired the rudiments of a good education in the gymnasium at Revel, he prosecuted his studies at the universities of Halle and Jena, but applied chiefly to mathematics and natural philosophy, to which he shewed a particular attachment. In the year 1735 he was made a member of the Imperial Academy of Sciences; in 1741 he became extraordinary professor, and in 1745 he was elected ordinary professor of experimental philosophy. He was from this period particularly attached to the new science of electricity, and applied himself particularly to atmospherical electricity. On the discoveries made in this branch of knowledge he had composed a treatise, which he intended to read on the 6th of September 1753, at a public meeting of the Academy; and in order to demonstrate what he might advance in the discourse, he made a great number of experiments on divers thunder clouds. In one of these the professor was struck dead by a flash of lightning, drawn by his apparatus into his room. Of this fatal accident there are two accounts in the Transactions of the Royal Society.

The professor had provided himself with a gnomon, an instrument to measure the strength of the electricity of the passing clouds. He was, on the 6th of August, N.S. 1753, a little before noon, at the Academy, when it thundered at a considerable distance, the sky being then clear and the sun shining bright. In the hope of confirming his former observations, or of making some new ones, he hurried home, accompanied by Solokow an engraver, that the latter might make himself master of the leading circumstances of the electrical experiments, in order to be the better enabled to represent it on a copper plate, which was to be annexed to his dissertation. The philosopher led the engraver to his apparatus, but while examining for his own use, or perhaps describing the effect of the electricity on the gnomon to his friend, with his head inclined towards it, he received a violent shock, which instantly deprived him of existence. M. Solokow observed, he said, a globe of blue fire, as big as his fist, jump from the rod of the gnomon towards the head of the professor, which was at the instant about a foot from the rod. This flash killed M. Rickman, but M. Solokow could give no account of the particular manner in which he was immediately affected by it; for, at the same time that the professor was struck, there arose a sort of steam, or vapour, which entirely benumbed him, and made him sink to the ground, so that he did not even remember to have heard the clap of thunder, which was very loud. The globe of fire was, however, attended with a report as loud as that of a pistol: a wire, which brought the electricity to his metal rod, was broken in pieces, and its fragments thrown upon M. Solokow's clothes. Upon examining the effects of the lightning in the room, it was found that the door-case was half split through, and the door torn off and thrown into the room. An attempt was made to bleed the breathless body, but no blood followed. The shoe belonging to the left foot was burst open, and uncovering the foot at that place, they found a blue mark, from which it was inferred that the electrical fluid, having entered the head, made its way out again at the foot.

Upon the body were several red and blue spots, but the hair of the head was not singed. The stocking was entire though the shoe was ripped up; the coat was uninjured though the waistcoat was much singed; and there appeared on the back of M. Solokow's coat long narrow streaks, as if red-hot wires had burnt off the nap. On opening the body the cranium was entire, and the brain perfect, but the transparent pellicles of the windpipe were excessively tender, gave way, and were easily rent. There was some extravasated blood in it, as likewise in the cavities below the lungs; those of the breast being quite sound, but those towards the back were of a brownish colour, and filled with more of the above-mentioned blood: otherwise none of the entrails were touched, but the throat, the glands, and the thin intestines, were all inflamed. After two days the body was in such a state of putrefaction that it was with difficulty got into a coffin. Phil. Trans. vol. xlix. pt. 1. Priestley on Electricity.

RICKMANSWORTH, or Rickmeresworth, in *Geography*, a small market-town in the hundred of Cashio and county of Hertford, England, occupies a low, moorish situation near the confluence of the rivers Gade and Colne, at the distance of 19 miles N.W. from London. The manor was an ancient demesne of the Saxon kings, and was given by king Offa to the abbey of St. Alban's, to which it was confirmed by succeeding monarchs, and had the charter of a weekly market and two annual fairs granted by Henry III. The church is a spacious edifice, consisting of a nave, aisles, and chancel: it was repaired in the year 1677, and again in 1802: the large gallery at the west end was probably erected about the former period. Previous to the late repairs, a large altar-tomb, in memory of Henry Cary, baron of Lepington and earl of Monmouth, stood against the south wall of the chancel; but being supposed to disfigure the place, it was removed; and a memorial slab of black marble, which was affixed to the tomb, was let into the south wall, with sculptures in white marble of the family arms. Against the north wall is a mural monument, to commemorate sir Thomas Fotherly (gentleman of the privy chamber to Charles I.), and his son and grandson. Several others of the family are recorded on a slab on the floor. In the east part of the south aisle are three large altar-tombs, in which are deposited the remains of the families of Colte, Salter, and Whitfield, inhabitants of this town. In the north aisle a neat mural monument records the memory of Timothy Earle, esq. of Moor-house, who died in May 1787, aged 80; and also of Dorothy his wife. A marble tablet against the north wall commemorates admiral William Bladwell, formerly of Money-hill in this parish, who died in March 1783, at the age of 80.

Rickmansworth, by the vicinity of several streams, is rendered very convenient for trades that require the assistance of water: several mills have consequently been erected for various purposes in its neighbourhood: a large cotton and flour-mill at the south entrance to the town; one for flock and

and ſilk at a ſmall diſtance to the weſt; and ſeveral for paper, &c. towards the north, on the rivulet that flows from Cheſham. Additional employment, particularly for females, is derived from the manufacture of ſtraw-plat. The market was formerly diſtinguiſhed for its corn trade, but is now little frequented, though toll free: the market-houſe is a mean wooden ſtructure, raiſed on pillars, and open beneath. The population, as aſcertained under the act of 1811, was 3230, the number of houſes 589.

The manor of the *Moor* in Rickmanſworth pariſh, being anciently parcel of the poſſeſſions of St. Alban's abbey, was, about the year 1431, with other contiguous manors, held under that foundation by a tenant named Flete, who had for ſeveral years refuſed either to pay the quit-rent, or to perform the covenanted ſervices claimed by the abbot; one of which was finding for his uſe, and that of his ſucceſſors, "one nag-horſe to carry him to Tynemouth, whenever he or they ſhould viſit that cell:" the diſpute was at length decided in favour of the abbot by ſir William Babyngton, chief juſtice of the common pleas; and Flete was compelled to the obſervance of the accuſtomed homage and fealty. The next poſſeſſor on record was Ralph de Boteler, lord of Sudely in Glouceſterſhire. It is now held by Robert Williams, eſq. banker of London.

Moor-Park houſe, the ſplendid reſidence of this gentleman, is a magnificent building of the Corinthian order, ſtanding in a finely wooded park about five miles in circumference, and having two fronts, reſpectively facing towards the north and ſouth. The height of the ground to the ſouth contracts the view; but the northern front commands an extenſive proſpect; the hill, which had previouſly obſtructed the ſight, having been lowered about the year 1725, at the expence of 5000*l.* This was effected by B. H. Styles, eſq. to whom the preſent manſion is indebted for its chief grandeur, as he new caſed and fronted it with Portland ſtone; and having built the magnificent portico, erected two wings for the chapel and offices, and connected them with the centre by colonnades of the Tuſcan order. The charge of the carriage of the ſtone from London, amounted to upwards of 15,000*l.*, and the entire expence, including the improvements in the park, was more than 150,000*l.* Beauties of England and Wales, vol. vii. by E. W. Brayley.

RICKSGÖLD, in *Commerce*, one of the two ſpecies of paper currency in Sweden, the other being *banco*. The latter is iſſued by the national bank, and the former by the Rickſgöld bank, which is under the direction of government. Banco is 50 *per cent.* better than Rickſgöld; that is, two dollars of the former are worth three dollars of the latter. Banco is a legal tender, and has lately been declared, by royal authority, the national currency. Rickſgöld is current in all payments; but as no freſh iſſues of this paper have been lately made by government, it is continually decreaſing in circulation, while banco increaſes. Both currencies are made payable to bearer on demand, and are accordingly diſcharged when preſented for payment.

RICLA, in *Geography*, a town of Spain, in Aragon, on the Xiloca, anciently called "Nertobriga;" 14 miles N.E. of Calatayud.

RICOCHET Battery, in *Fortification*. See Battery *à Ricochet*.

Ricochet *Firing*, in the *Military Art*, is a method of firing with pieces elevated from three to ſix degrees, and loaded with a ſmall charge, ſo that the ball may bound and roll along the inſide of the parapet. The ball or ſhot, thus diſcharged, goes rolling and bounding, killing, maiming, or deſtroying all it meets with in its courſe, and creates much greater diſorder, by moving thus ſlowly, than if thrown from the piece, whoſe elevation is greater, with greater violence.

The word *ricoche* ſignifies *duck and drake*, terms applied to the bounding of a flat ſtone thrown almoſt horizontally into the water.

RICOTE, in *Geography*, a town of Spain, in the province of Murcia; 20 miles N.W. of Murcia.

RICOTIA, in *Botany*, a Linnæan name whoſe origin no one has been able to explain, nor can we throw any light upon it. It has the appearance of a proper name, and was probably given in honour of ſome obſcure botaniſt.—Linn. Gen. 337. Schreb. 440. Willd. Sp. Pl. v. 3. 477. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 98. Juſſ. 239. Lamarck Dict. v. 6. 210. Illuſtr. t. 561. Gærtn. t. 142. —Claſs and order, *Tetradynamia Siliquoſa*. (*Siliculoſa*; Brown.) Nat. Ord. *Siliquoſæ*, Linn. *Cruciferæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, deciduous, of four, oblong leaves, approximating in a parallel manner. *Cor.* cruciform, of four, obcordate petals, ſpreading. *Stam.* Filaments ſix; four the length of the tube; two ſomewhat ſhorter: anthers oblong, acute. *Piſt.* Germen ſuperior, cylindrical, the length of the ſtamens; ſtyle ſcarcely any; ſtigma acute. *Peric.* Pod ſeſſile, lanceolate-oval, with one or two cells, and two flat valves. *Seeds* moſtly four, orbiculate, compreſſed.

Eſſ. Ch. Pod of one cell, oblong, compreſſed: valves flat.

1. R. *ægyptiaca*. Egyptian Ricotia. Linn. Sp. Pl. 912. (Lunaria foliis ſupradecompoſitis: foliolis trifidis, ſiliquis oblongis pendulis; Mill. Ic. v. 2. 113. t. 169.)—Native of Egypt, flowering in June and July.—*Root* annual. *Stem* a foot high, ſmooth and branching. *Leaves* unequally pinnate; leaflets various, ſome undivided, others three-lobed, of a lucid green. *Flowers* purple, on long ſtalks, at the ſides and ends of the branches, in ſmall, looſe *cluſters*. *Pods* drooping, when ripe of a pale brown colour.

This genus is very nearly allied to *Lunaria*, from which indeed it chiefly differs in having a ſeſſile, not ſtalked, pod.

RICZIWOL, in *Geography*, a town of the duchy of Warſaw; 30 miles N. of Poſen.

RIDA, a town of the Valais; 4 miles S.E. of Sion.—Alſo, a town of Sweden, in the province of Upland; 24 miles N.E. of Stockholm.

RIDALE, or Risdale, a river of England, in the county of York, which runs into the Swale, near Richmond.

RIDAL-HEAD, a mountain of England, in Cumberland; 2 miles N. of Ambleſide.

RIDDERHUDE, a town of the duchy of Bremen; 8 miles N. of Bremen.

RIDDLE. See Ænigma.

Riddle, in *Rural Economy*, a ſort of ſieve uſed to ſeparate duſt and the ſeeds of plants from corn. They are made of different forms and ſizes, for different uſes.

RIDE of hazle, or other wood, is a group or cluſter of ſprigs ſhooting out of the ſame root or ſtock.

Ride, or *Riding*, in the *Manege*. To ride ſignifies to learn to ride. Thus, he rides under a good maſter. For an account of the origin and hiſtory of the art of riding, we refer to the article Horse.

In addition to the obſervations which occur under that article, in proof of the antiquity of the art of riding, we ſhall here introduce ſome other conſiderations, which tend to evince the priority of riding to the uſe of chariots. Egypt appears to have been the ſpot in which the horſe ſeems to have been firſt ſubdued and diſciplined by man; and

and it is evident from the Mosaic history, that in the first instance where mention is made of Pharaoh's chariots, he is likewise said to have had his horseman: which word, in the Hebrew language, is explained by the commentators to mean one who sits upon and guides a horse. Besides, the Hebrew word, "parash," horseman, is derived, as Buxtorf says, from a Hebrew root, which signifies to *prick* or *spur;* and the rider, or spurrer, was so denominated, because he used to prick or spur the horse. Aben-Ezra says, that the horseman was so called from wearing spurs on his heels. By this account and explanation of the word, which in the Hebrew signifies a "horseman," we are informed of the great antiquity of spurs; and may reasonably conclude, that the art of riding was not only known, but, from the invention of spurs, had also received an improvement, not unworthy of the discovery of more discerning times; and seems to imply, that riding was not only familiar, but even advanced in those primitive times to a degree of exactness, perhaps, not hitherto suspected. The arguments here, and also under the article Horse, alleged in proof of the seniority of horsemanship to that of the use of chariots, may be strengthened by the following passage in the book of Job, where, speaking of the ostrich, he says, "she lifteth herself on high, she scorneth the horse and its rider;" which expression seems to imply that it was a custom, as it is now in some nations, to hunt this bird on horseback, and that she was superior to the swiftest horse. Hence it must be granted that riding was practised in his country, and at the time in which he lived; nor is it to be forgotten, that he lived in a country distinguished above others for its horses, and in which no chariot was ever known to have been used. We may also add to the same purpose, the noble description which he gives of the horse, so known and so admired, in which he speaks of him only as being rode, and not driven in a carriage: and if this writer, as some learned persons have thought, lived long before the time of Moses, what he says in relation to this subject must be anterior to the Mosaic history; and if that be the case, the antiquity of equitation will be carried so high, as to put it beyond the reach of inquiry and investigation. In the description just referred to, the English translators make Job say, "that this animal's neck is clothed with *thunder;*" an expression no less false than absurd. The true rendering of this passage is, that his neck is clothed with a *mane.* Thus Bochart, Le Clerc, Patrick, and other commentators translate it. Bochart says, that the word, which in Hebrew signifies *thunder*, is synonimous with that for the *mane* of the horse; but this being the case, it is astonishing that the translator should have set aside the just and natural signification, and have chosen to cover the horse's neck with *thunder*, instead of a *mane;* nor is it less amazing, that this nonsense should have been extolled by the author of the "Guardian," and others, as an instance of the sublime. We shall here observe, that the Grecians, in many instances, chose mares for riding before horses. Ælian says, they thought them fitter for the course; and Virgil only names the mares of Epirus, as running in the Olympian race. Pliny says, they were swifter than horses. Berenger's Hist. and Art of Horsemanship, vol. i. p. 12, &c.

The knowledge and utility of the art of riding consist in being able to discern, and dextrous to employ, the means by which the horse may be brought to execute what the rider requires of him, with propriety, readiness, and safety: and this knowledge in the man, and obedience in the horse, should be so intimately connected, as to form one perfect whole; this union being so indispensably necessary, that, where it is not, there is no meaning between the man and horse: they talk different languages, and all is confusion.

The Greeks, who excelled in the art of riding, were accustomed to mount and dismount, by vaulting and leaping from and upon the backs of their horses, as well as from one horse to another. These feats of activity seem to have been first practised in battle, and in those ages when saddles, and consequently stirrups, were unknown. The utility of this method must be acknowledged; for if one horse was tired, wounded, or killed, his master had another for his service; two or three being led into the field, which were used as occasion required. These exercises, so essentially necessary in war, were, after a time, performed in the public games, and other occasional exhibitions, merely to shew the nimbleness and address of the horseman; and the modern art of vaulting, in all its variety of postures and methods, and which has *now* little more in view than to display the activity of the performer, is, without doubt, derived from this ancient practice; as well as the whole modern manege, except some few experiments, calculated merely for grace and pleasure, is borrowed from the different motions and evolutions performed by men and horses in battle. To this likewise we owe the solemnities and sports of tilts, tournaments, and justs; invented as a mock-war, to fill up the lazy hours of peace, to inspire and keep alive a martial spirit, and to render the body active, robust, and expert in the feats of arms.

It is well known that the Romans were indebted to Greece for many arts and useful improvements, and particularly horsemanship, which was received and adopted by them with such eagerness, and cultivated with such diligence and zeal, that they soon were able to excel their masters. Romulus, at a very early period, instituted his order of "equites," or horsemen, as Athens and Sparta had done before, on purpose to encourage the practice of riding, and engage his new subjects to keep horses at their own expence, which, in those times, were so costly, that the rich alone were equal to the charge of maintaining them. Among the Romans they had a horse called "singularis," or single, upon which a man rode without a saddle, using only a cloth, like the Greeks, fastened with a surcingle, or else sitting upon the bare back. The riders were also, occasionally, tied and bound to their horses by these girths, that they might sit more firmly and securely; but the practice was imprudent and dangerous, as they were thus liable to be dragged and torn by the horse, in case they were unseated, like the warrior described by Silius Italicus (lib. 4. Punic.):

"——— Rapiturque pavore
Tractus equi, vinctis connexa ad cingula membris."

Lock saddles, now but little used, are liable to the same objection.

The art of riding subsists in various modes and different degrees of skill and perfection among different nations. In Arabia, where the horses are the finest and best of their kind, their owners manage them with singular dexterity. Their saddles have the back part, or "cantle," so high, that it reaches more than half-way up the rider's back. The stirrups are flat, in the Turkish manner, and contain the whole foot. They never use a girth, which makes it more difficult to mount and keep their seat. The Arabian youth understand the equilibre, and keep their body in a just counterpoise; being so dextrous, that they will stand on the saddle, while the horse runs at full speed, fling their lances, turn round, throw themselves over, and stand upon their heads; the horse continuing his career all the time.

Similar evolutions were practiſed by the ancient Romans. The Turks ride with their ſtirrups ſo ſhort, that their knees are almoſt as much bent, as when they ſit upon their hams upon a ſofa. Their ſaddles are as large and unwieldy as a pack-ſaddle: they faſten and ſecure them upon the horſe by a large girth, which paſſes over them, and prevents the ſaddles from turning, which their great weight would otherwiſe make them do. The bridles are generally gilt and ornamented, but otherwiſe very clumſy and ill-made. The Turks ſeldom uſe ſpurs, or carry a whip or ſwitch; and yet they have an abſolute command over their horſes, and make them do whatever they pleaſe. In riding, they uſe only a ſtick, about three feet in length, and of the ſize of a large cane. This they hold by the middle, and ſtrike the horſe with it on his neck with either end, to direct and compel him to turn; making them run at full ſpeed, and laying them out ſo rapidly, as almoſt to make their bellies touch the ground; the riders, at the ſame time, ſtriking their darts into a turban, or toſſing them in the air, riding after, and catching them before they fall to the ground. Others, eſpecially the Arabs belonging to the ſultan, will leap from one horſe to another, running at their utmoſt ſpeed. Others will creep under the belly, and up to the ſaddle again; others will turn two or three times round the horſe's neck, and others will ſtand upright upon the ſaddle, and turn their faces to the tail, the horſes all the time going at their utmoſt ſtretch.

The Perſians have great perſonal addreſs and activity on horſeback. They play at "Mall" mounted on their horſes, and ſtrike the ball with certainty and ſurpriſing ſkill. They place alſo upon the top of a tree, or high pole, an apple, as a mark to ſhoot at with arrows. They ſet off at full ſpeed, and when they are got beyond the mark, turn themſelves round towards the croupe, draw their bows, and in this pace, and this attitude, ſeldom fail to hit the apple. The Tartars have, in all ages, been famous, under different names, for their love of horſes, whoſe fleſh they eat, drinking the milk of the mares, and ſkill in riding. It is a practice with them to tie the reins of their bridles to their girdles, and by the motion of their bodies alone to govern and direct their horſes; pulling them into different attitudes, and making them perform a variety of evolutions. By this method they have their hands at liberty for the uſe of their weapons, which they manage with a ſkill ſurpaſſing that of other nations. Some will hold their bows in the ſame hand in which they hold their bridles, and at the ſame time draw the bow, and guide their horſe with great addreſs, always riding with their ſtirrups very ſhort, in order to collect themſelves better, and be able to riſe up, as it were, when they are going to attack an enemy, and ſtrike a blow.

The venerable Bede ſays, that the Engliſh began to uſe ſaddle-horſes about the year 631, when prelates and others rode on horſeback, who till that time were accuſtomed to go on foot; but that if, upon urgent occaſions, they were obliged to ride, they uſed mares only, in token of their humility; the mare not being ſo full of pride or ſpirit as the horſe. In the reign of Edward III. the horſes called "Dextrarii," correſponding to thoſe that are now termed *managed* horſes, or horſes *dreſſed* and diſciplined for war, were held in the higheſt eſtimation, and appropriated to military exerciſes; and upon common occaſions, perſons of rank and conſideration always rode upon horſes of inferior degree, diſtinguiſhed by the names of "Courſers, Amblers, Palfreys, Hackneys, Nags, and Poneys," recommended by their eaſy paces and quiet temper. In ſeveral countries it was a cuſtom, rigorouſly obſerved, that no knight of chivalry, or other gentleman, ſhould ride upon a mare, it being thought diſhonourable and vile. The mares were always devoted to the cart, and all the ignoble ſervices. The Spaniards, Turks, and ſome other nations, ſtill adhere to this abſurd notion, upon all occaſions. The Dextrarii above-mentioned were called "magni equi," or great horſes, being of the largeſt ſize, and intended to ſerve in war or for the exerciſe of the tournament; and as theſe great horſes were required to be *dreſſed* or taught, that they might perform their taſks with readineſs and fidelity; and as it is neceſſary that the rider ſhould have knowledge and ſkill to guide his horſe, thoſe perſons who profeſſed the ſcience of arms were obliged to learn the art of managing their horſes, in conformity to certain rules and principles; and hence came the expreſſion of learning to "ride the great horſe."

After an ample review of the ſtate of horſes in England, Berenger takes occaſion to diſtribute them into two general claſſes, which may be arranged under two diſtinct periods of time. In the firſt era, as it was an univerſal cuſtom for horſemen to fight in armour, the burden was ſo heavy, and the ſervice ſo ſevere, that none but *large* and *ſtout* horſes were equal to the taſk. The practice of raiſing ſuch a breed of horſes began about the time of Henry II., or ſomewhat earlier, and continued till towards the end of the reign of Elizabeth. About the reign of James, armour, being rendered uſeleſs by the invention of fire-arms, was laid aſide; and the *great* horſe became uſeleſs, and, on many occaſions, even improper. *Lighter* and more *nimble* horſes were therefore brought into uſe, and here begins the era which comprehends the ſecond claſs of horſes, called the *light* or *ſwift* breed. This ingenious writer cloſes his review with obſerving, that, however highly gifted the horſes may be, there are *duties* incumbent alſo upon thoſe who are to ride them, without an attention to which all the talents of the horſe, inſtead of being called forth and improved, will be cruſhed, extinguiſhed, and nature have been kind in vain. Theſe duties are comprehended under the "art of riding." This art has been, as this author regrets, ſo long neglected and deſpiſed, that one would be almoſt prompted to conclude that a fatality had conſtantly attended it in this country; favoured as it is with every advantage for breeding, nouriſhing, and procuring the fineſt horſes of all ſorts, and with a nobility and gentry, whoſe love of exerciſe, activity, courage, perſonal endowments, and commanding fortunes, would qualify them to take the lead, and "witch the world with noble horſemanſhip;" yet, with all theſe high privileges, they have ſuffered it to languiſh, and almoſt periſh in their hands; for a length of time it has been able to boaſt but of a very few perſons who have ſtood forth as its avowed friends and protectors. The duke of Newcaſtle honoured it with his practice, and greatly enriched it with his knowledge. Sir Sidney Medows, ſir William Hope, and the earl of Pembroke, are alſo mentioned with approbation and reſpect. Our author adds, that ſince the acceſſion of his preſent majeſty, the proſpect has brightened, and better times begin to dawn. Since this happy event, the art has manifeſted ſigns of recovery; public riding houſes have been opened, encouraged, and frequented; and the art has been ſo far protected and honoured by his majeſty, that, as our author ſays, we may expect to ſee the golden age of horſemanſhip revive, and that men will no longer "complain of the want of excellent horſes, nor the horſes *groan* for want of worthy riders." This art has been much indebted to the publication of "The Hiſtory and Art of Horſemanſhip," by Richard Berenger, eſq., which has furniſhed various extracts, to be found under their appropriate titles, in our Cyclopædia. We ſhall here ſubjoin ſome particulars that

that have not elſewhere been introduced, and cloſe the article with ſuitable references for the direction of the reader.

The poſture of the body is an object of primary conſideration in the art of riding. In reference to this object, the body may be divided into three parts, two of which are moveable, and the other immoveable. Of the two moveable parts, the firſt is the trunk or body, down to the waiſt; the ſecond is from the knees to the feet; and the remaining immoveable part is that between the waiſt and the knees. The parts which ought to be without motion are the fork or twiſt of the horſeman, and his thighs; and for this purpoſe, they ought to have a certain hold or centre upon which to reſt, ſo that no motion of the horſe may diſturb or looſen them; this point or centre is the baſis of the hold which the horſeman has upon his horſe, and is called the "ſeat;" and hence it muſt appear, that not only the grace, but the ſymmetry and true proportion of the whole attitude depends upon thoſe parts of the body that are immoveable. Let the horſeman then place himſelf at once upon his twiſt, ſitting exactly in the middle of the ſaddle; let him ſupport this poſture in which the twiſt alone ſeems to ſuſtain the weight of the whole body, by moderately leaning upon his buttock; let his thighs be turned inward, and reſt flat upon the ſides of the ſaddle; and in order to this, let the turn of the thighs proceed directly from the hips, and let him employ no force or ſtrength to keep himſelf on the ſaddle, but truſt to the weight of his body and thighs: this is the exact equilibre: in this conſiſts the firmneſs of the whole building, a firmneſs which young beginners are never ſenſible of at firſt, but which is to be acquired, and will always be attained, by exerciſe and practice. A moderate ſtreſs upon the buttocks is neceſſary, becauſe a perſon that ſits full upon them can never turn his thighs flat upon the ſaddle; and the thighs ſhould always lie flat, becauſe the fleſhy part of the thigh, being inſenſible, the horſeman would not otherwiſe be able to feel the motions of his horſe; the turn of the thigh ſhould be from the hip, becauſe this turn can never be natural; but as it proceeds from the hollow of the hip-bone, the horſeman never avails himſelf of the ſtrength or help of his thighs, becauſe, beſides their being then leſs ſteady, the cloſer he preſſed them to the ſaddle, the more would he be lifted above the ſaddle; and with reſpect to his buttock and thighs, he ought always to be in the middle of the ſaddle, and ſit down full and cloſe upon it. With regard to the poſition of the body or trunk, which is the firſt of the moveable parts, and which comprehends the head, the ſhoulders, the breaſt, the arms, the hands, the reins, and the waiſt of the horſeman, we ſhall begin with the head. This ſhould be free, firm, and eaſy, and thus prepared for all the natural motions which the horſeman may make in turning it to one ſide or the other. The ſhoulders only influence, by their motions, that of the breaſt, the reins, and the waiſt. The horſeman ſhould preſent or advance his breaſt, by which his whole figure is opened and diſplayed; he ſhould have a ſmall hollow in his reins, and puſh his waiſt forwards to the pommel of the ſaddle, becauſe this poſition correſponds, and unites him to all the motions of the horſe. The mere throwing of the ſhoulders back produces all theſe effects in the degree that is requiſite; whereas if we were to look for the particular poſition of each part ſeparately, and by itſelf, without examining the connection ſubſiſting between the motions of one part with thoſe of another, there would be ſuch a bending in the reins, that the horſeman would be hollow-backed; and by forcing his breaſt forward and his waiſt towards the pommel of the ſaddle, he would be flung back, and muſt ſit upon the rump of the horſe. The arms ſhould be bent at the elbows, and the elbows ſhould reſt equally upon the hips. It is indeed the bridle-hand which ought to be ſteady and immoveable, and hence it might be concluded, that the left elbow only ought to reſt upon the hip; but grace conſiſts in the exact proportion and ſymmetry of all the parts of the body; and having the arm on one ſide raiſed and advanced, and the other kept down and cloſe to the body, would preſent an aukward and diſagreeable appearance. It is this which determines the ſituation of the hand which holds the whip, the left hand being of an equal height with the elbow; ſo that the knuckle of the little finger and the tip of the elbow be both in a line; this hand then being rounded neither too much nor too little, but ſo that the wriſt may direct all its motions, the right hand, or the whip-hand, ſhould be placed lower and more forward than the bridle hand. It ſhould be lower than the other hand, becauſe if it were on a level with it, it would reſtrain or obſtruct its motions, and if it were higher, it could not take ſo great a compaſs as the bridle-hand, which muſt be always kept over-againſt the horſeman's body; it is abſolutely neceſſary to keep the proportion of the elbows, that it ſhould be lower than the other. The ſecond diviſion of the moveable parts includes the legs and feet. The legs ſerve for two purpoſes; they may be uſed as aids or corrections to the animal; they ſhould therefore be kept near the ſides of the horſe, and in a line with the rider's body; for being near that part of the horſe's body where his feeling is moſt delicate, they are ready to perform their office at the moment when they are wanted. Beſides, as they are an appendage to the thighs, if the thigh is upon its flat in the ſaddle, they will neceſſarily be turned juſt as they ought, and will infallibly give the ſame turn to the feet, becauſe the feet depend upon them, as they depend upon the thighs. The toe ſhould be held a little higher than the heel, for the lower the toe is, the nearer will the heel be to the ſides of the horſe, and muſt be in danger of touching his flank. Many perſons, however, when they raiſe their toe, bend and twiſt their ankle, as if they were lame in that part. The reaſon is plain; it is becauſe they make uſe of the muſcles in their legs and thighs, whereas they ſhould employ only the joint of the foot for this purpoſe; a joint given by nature to facilitate all the motions of the foot, and to enable it to turn to the right or left, upwards or downwards. Such, according to Mr. Berenger, is the mechanical diſpoſition of all the parts of the horſeman's body.

The hand, in horſemanſhip, admits of five different poſitions, in order to guide and govern the motions of a horſe. The firſt is that general poſition from which proceed, and indeed ought to proceed, the other four.

Hold your hand three fingers breadth from your body, as high as your elbow, in ſuch a manner that the joint of your little finger be upon a right line with the tip of the elbow; let your wriſt be ſufficiently rounded, ſo that your knuckles may be kept directly above the neck of your horſe; let your nails be exactly oppoſite your body, the little finger nearer to it than the others, your thumb quite flat upon the reins, which you muſt ſeparate by putting your little finger between them, the right rein lying upon it: this is the firſt and general poſition.

Does your horſe go forwards, or, rather, would you have him go forwards? Yield to him your hand, and, for that purpoſe turn your nails downwards, in ſuch a manner as to bring your thumb near your body; remove your little finger from it, and bring it into the place where your knuckles were in the firſt poſition, keeping your nails directly above your horſe's neck: this is the ſecond.

Would you make your horſe go backwards? quit the firſt poſition; let your wriſt be quite round; let your thumb be in the place of the little finger in the ſecond poſition, and the little finger in that of the thumb; turn your nails quite upwards, and towards your face, and your knuckles will be towards your horſe's neck. This is the third.

Would you turn your horſe to the right? leave the firſt poſition, carry your nails to the right, turning your hand upſide down, in ſuch a manner, that your thumb be carried out to the left, and the little fingers brought in to the right. This is the fourth poſition.

Laſtly, would you turn to the left? quit again the firſt poſition; carry the back of your hand a little to the left, ſo that the knuckles come under a little, that your thumb may incline to the right, and the little finger to the left. This makes the fifth poſition.

Theſe different poſitions, however, alone are not ſufficient; we muſt be able to paſs from one to another with readineſs and order.

Three qualities are eſſentially neceſſary to the hand. It ought to be firm, gentle, and light. We call that a firm or ſteady hand, whoſe feeling correſponds exactly with the feeling in the horſe's mouth, and which conſiſts in a certain degree of ſteadineſs, conſtituting that juſt correſpondence between the hand and the horſe's mouth, which every horſeman wiſhes to find.

An eaſy or gentle hand is that which, by relaxing a little of its ſtrength and firmneſs, eaſes and mitigates the degree of feeling between the hand and horſe's mouth, which we have already deſcribed.

Laſtly, a light hand is that which leſſens ſtill more the feeling between the rider's hand and the horſe's mouth, which was before moderated by the gentle hand.

The hand, therefore, with reſpect to theſe properties, muſt operate in part, and within certain degrees, and depends upon being more or leſs felt or yielded to the horſe, or withheld.

It ſhould be a rule with every horſeman not to paſs, at once, from one extreme to another, from a firm hand to a ſlack one; ſo that in the motions of the hand you muſt, upon no account, jump over that degree of ſenſation which conſtitutes the eaſy or gentle hand. Were you at once to go from a firm hand to a ſlack one, you would then entirely abandon your horſe, you would ſurpriſe him, deprive him of the ſupport he truſted to, and precipitate him on his ſhoulders, ſuppoſing you do this at an improper time. On the contrary, were you to paſs from the ſlack to the tight rein, all at once, you muſt jerk your hand, and give a violent ſhock to the horſe's mouth; which rough and irregular motions would be ſufficient to falſify the firmeſt appui, and ruin a good mouth.

It is indiſpenſably neceſſary, therefore, that all its operations ſhould be gentle and light; and, in order to this, it is neceſſary that the wriſt alone ſhould direct and govern all its motions, by turning and ſteering it, if we may ſo ſay, through every motion that it is to make.

In conſequence, then, of theſe principles, we inſiſt that the wriſt be kept ſo round that your knuckles may be always directly above the horſe's neck, and that your thumb be always kept flat upon the reins. In reality, were your wriſt to be more or leſs rounded than in the degree we have fixed, you could never work with your hand but by the means of your arm; and, beſides, it would appear as if it were lame; again, were your thumb not to be upon the flat of the reins, they would continually ſlip through the hand, and by being lengthened, would ſpoil the appui; and, in order to recover them, you would be obliged every moment to raiſe your hand and arm, which would throw you into diſorder, and make you loſe that juſtneſs and order without which no horſe will be obedient, and work with readineſs and pleaſure.

Thoſe motions, which are called deſcents of the hand, are made three different ways, either by dropping the knuckles directly, and at once, upon the horſe's neck, or by taking the reins in the right hand, about four fingers' breadth above the left, and letting them ſlide through the left, dropping your right hand at the ſame time upon the horſe's neck, or elſe by putting the horſe under the button, as it is called; that is, by taking the end of the reins in your right hand, quitting them entirely with your left hand, and letting the end of them fall upon your horſe's neck. Theſe motions, however, which give a prodigious grace to the horſeman, never ſhould be made but with great caution, and exactly at the time when the horſe is quite *together*, and in the hand; and you muſt take care in counterbalancing, by throwing back your body, the weight of the horſe upon his haunches.

The appui being always in the ſame degree, would heat the mouth, would dull the ſenſe of feeling, would deaden the horſe's bars, and render them inſenſible and callous; this ſhews the neceſſity of continually yielding and drawing back the hand, to keep the horſe's mouth freſh and awake. See APPUI.

The effects produced by the ſeveral poſitions and motions of the hand above deſcribed, are as follow: the hand directs the reins, the reins operate upon the branches of the bit; the branches upon the mouth-piece, and the curb; the mouth-pieces operate upon the bars, and the curb upon the chin of the horſe.

The right rein guides the horſe to the left, the left rein to the right. Would you go to the right? you paſs to the fourth poſition of the hand, that is, you carry and turn your nails to the right; now, in carrying thus your nails to the right, and reverſing your hand in ſuch a manner that your thumb points to the left, and your little finger being raiſed turns to the right; you, by this means, ſhorten your left rein; it is this left, therefore, that turns and guides the horſe to the right. Would you go to the left? paſs to the fifth poſition; you will carry the back of your hand to the left, ſo that your nails will be turned downward a little, your thumb will be to the right, the little finger to the left; this will ſhorten the right rein; the right rein, therefore, determines your horſe to the left.

We have already ſaid, that the effect which the mouth-piece has upon the bars, and of the curb upon the chin, depends upon the branches of the bitt; when the branches riſe, or are turned upwards, the mouth-piece ſinks; and when the branches ſink, the mouth-piece riſes; ſo that when your horſe is going ſtraight forward, if you keep your hand low, and cloſe to your body, the mouth-piece then preſſes ſtronger upon the bars; and the chain or curb having, in conſequence, more liberty, acts leſs upon the beard. On the contrary, if you keep your hand high, a little forward, and conſequently a little out of the line of the end of the branches, the mouth-piece then ſinks, and the branches, of neceſſity, operate upon the curb, which preſſes then very ſtrongly upon the beard. Now, in order to place, and bring in your horſe's head, you muſt hold your hand low; and, in order to raiſe and lighten a horſe that weighs upon the hand, and carries his head too low, you muſt advance your hand a little, and keep it high.

Would you have your horſe go back, come to the third poſition? but take care to round your wriſt exactly, in order to work equally with both your reins; and by this means aid your horſe more effectually to go back ſtraight and balanced

lanced between your legs, which he could never do, if one rein were to operate ſtronger than the other.

There are particular caſes where the reins are ſeparated, and one held in each hand; it is uſual to ſeparate them, when you trot a young horſe, or when you are to work one who is diſobedient and reſiſts his rider; upon theſe occaſions, keep both your hands upon a level, low, and near your body. To turn to the right, uſe your right rein; to go to the left, uſe your left rein; but in order to make them have their effect, move your arm gently, turning it a little from your body, keeping your hand always low, and even near your boot.

Every horſeman, who would be perfect in his art, ought to know the diſpoſition of his horſe, the vices to which he is ſubject, the cauſes from which they proceed, and the proper method of reſtraining or amending them. Sometimes a horſe will rebel, when you preſs him to do ſomething of which he is ignorant; in this caſe he ſhould be taught what you expect. If he knows, but cannot, through inability, perform what you require, endeavour to aſſiſt nature by the help of art; but if he knows, and is able to do what you expect, firſt try every method which patience and perſeverance can ſuggeſt, and if you fail, compel him by force and ſeverity. A horſe may be imperfect and bad from four cauſes: weakneſs, heavineſs in his make, want of courage, and ſloth; and four qualities muſt conſpire to make a good horſe, *viz.* ſtrength, activity, courage, and judgment. By a combination or mixture of theſe different qualities, are the various diſpoſitions of horſes produced; and the remedy ought to be adapted to the nature of the animals as well as to the diſorder which the horſeman propoſes to rectify. A horſe may be difficult to be mounted; examine the ſource of this vice. It may be owing either to the ignorance, or the brutality, of thoſe who have firſt had to do with him, or perhaps that the ſaddle may have hurt him, or elſe to a temper naturally bad. To whatever cauſe it may be owing, remember never to beat him; for inſtead of curing him, you would certainly confirm him in his vice; clap him gently when you approach him, ſtroke his head and mane, talk to him, and as you talk, clap the ſeat of the ſaddle; keep yourſelf ſtill all the while, put your foot only in the ſtirrup to encourage your horſe, without doing any more, in order to make him familiar, and to loſe all apprehenſion and fear when he is going to be mounted; by little, and by degrees, at laſt, he will let you mount him; you will immediately get down, and remount, and ſo ſucceſſively for ſeveral times together, without attempting to do any thing elſe; but ſend him back to the ſtable. If it happens that when you are upon him, he runs from the place where you got upon him, bring him to it immediately, keep him there ſome time, coax him, and ſend him away. The firſt leſſons ought to be well weighed, when you undertake to bring a young horſe to obedience, and to reclaim him from liberty to the ſubjection of the bridle, ſaddle, and the weight of his rider; ſo reſtrained, it is not ſurpriſing if he ſhould employ all his ſtrength againſt you in his own defence.

The generality of colts are difficult to be turned and guided as you would have them go; we ought not, however, to be ſurpriſed at this their firſt diſobedience. It muſt be imputed to the habit they acquire from their birth, of conſtantly following their dams; indulged in this liberty, and ſubjected all at once by the bit, it is but natural they ſhould rebel. There is no way of eradicating theſe firſt impreſſions, but by gentleneſs and patience. A horſeman who ſhould make uſe of force and correction, and employ it all at once upon a young horſe, would diſcourage and make him be vicious ever after. If, therefore, your horſe refuſes to go forward, you muſt lead another horſe before him; the perſon who rides the colt will try from time to time, and, inſenſibly, to make the colt go abreaſt with him, and afterwards get before him. If, being ſurpriſed at ſeeing the horſe no longer, he ſtops, or runs back, the rider muſt endeavour to drive him forward either by his voice, or ſome kind of ſlight inſtrument, or he that rides the other horſe may give him a ſtroke with the chambriere, in order to make him go forward; if theſe methods ſhould not ſucceed, he will go before him again with the other horſe; by degrees (for one leſſon will not be ſufficient) the colt will grow accuſtomed to it, and, at laſt, will go on of himſelf.

Moſt horſes who ſtart have ſome defect in their ſight, which makes them fear to approach the object. The horſeman, upon theſe occaſions, inſtead of having recourſe to puniſhment, which often ſerves only to alarm the horſe, and extinguiſh his courage and vigour, ſhould firſt endeavour to lead him gently towards the object that terrifies him, either by encouraging him with his voice, or by cloſing his legs upon him, to make him go up to the object that terrifies him. If he will not go towards it, you may give him the ſpurs, but with diſcretion; and by coaxing and careſſes, puſh him towards it inſenſibly. Severe correction will never cure him of this fearful temper, which is a fault inherent in his nature; nor of any imperfection in his ſight, which is a diſorder belonging to him; but the habit of view and ſmelling may, in time, remedy the defects of nature.

If, notwithſtanding, you perceive that ſloth and malice are added to theſe faults, you muſt uſe, as you find it neceſſary, both mildneſs and ſevere correction; and you will beſtow them in proportion to the effect they produce. For the reſt, be careful never to ſurprize and alarm a young horſe which is ſhy, and apt to ſtart; never terrify him with what he moſt fears; never beat him in order to make him come up to an object of which he is afraid; accuſtom him by degrees to it, and have patience; the fear of puniſhment does oftentimes more harm, and is more dreaded by him, than the very object which firſt alarmed him.

There are ſome horſes who are ſtruck with ſuch terror at the ſight of a ſtone, or wooden-bridge, at the ſound and echo of the hollow part of it, that they will fling themſelves headlong into the water, without the rider's being able to reſtrain him. They are to be cured of this apprehenſion, by covering the pavement of their ſtall with wooden planks, between two and three feet high. The horſe ſtanding conſtantly upon them, his feet will make the ſame noiſe as they do when he goes over a bridge; and he will, of courſe, grow familiar to the ſound, and loſe all apprehenſion of it.

To accuſtom them likewiſe to the noiſe of the water running under the bridge, lead him to a mill, fix two pillars directly over-againſt the wheels, and tie your horſe conſtantly for two hours together, ſeveral times in the day. Having done this, bring him back to the bridge, and let an old horſe, that is not afraid, go before him upon the bridge, by degrees you will find him go over a bridge as readily and quietly as if he had never had the leaſt apprehenſion.

For horſes that are addicted to lie down in the water, you muſt provide yourſelf with two little leaden balls, and tie them to a piece of packthread, and, in the moment that he is lying down, you muſt drop theſe into his ears; and if he riſes inſtantly, or forbears to lie down, draw them back; but this method is not leſs ſure than that of breaking a flaſk filled with water upon his head, and letting the water run into his ears.

Fire, ſmoke, the ſmell of gunpowder, the noiſe of guns, or other arms, naturally ſurpriſe and frighten a horſe. There

There are few that will come near fire, or paſs by it, without difficulty. There are many occaſions, however, in which it is neceſſary; it is therefore proper to accuſtom your horſe to it. In the firſt place, begin with your horſe by letting him ſee it, and for that purpoſe tie him between two pillars, and hold before him, at about thirty paces diſtant, a burning whiſp of ſtraw; this ſhould be continued for ſome days together, repeating it ſeveral times each day. Let the perſon who holds the brand advance towards the horſe ſtep by ſtep; and let him take care to advance, or ſtop, often, as he perceives the horſe is moved, or leſs frightened, who, in a ſhort time, will be emboldened, and no longer afraid of the fire. After this, get upon him, carry him ſlowly, and as it were inſenſibly, towards the brand, the perſon who holds it taking care not to ſtir; if your horſe comes up to it without being frightened, let the man on foot walk on, and let the horſe follow the fire. Would you bring your horſe to go acroſs a fire, lay upon the ground ſome ſtraw about half burnt out, and he will paſs over it.

With reſpect to the noiſe of arms and drums, let your horſe hear them before you give him his oats; do this regularly every day, for ſome time, and he will be ſo uſed to them as not to mind them.

A horſe is ſaid to be *entier*, in its natural ſenſe whole, entire; and, in the figurative meaning, obſtinate, ſtubborn, opinionated, to that hand to which he refuſes to turn. A hurt in his foot, leg, or ſhoulder, may often be the cauſe of his refuſing to turn to that ſide where he feels any pain. A hurt in his reins, or haunches, a curb or ſpaving, which, by hindering him to bend, and reſt upon his hocks, may make him guilty of this diſobedience. Art can do little towards curing theſe evils; conſequently, a horſe ſo affected will never dreſs well, becauſe he never can be made ſupple and ready; beſides, every horſe is naturally inclined to go to one hand more than the other, and then he will go to that hand on which he finds himſelf the weakeſt, becauſe with the ſtrongeſt he can turn more eaſily.

It is a known fact that horſes are naturally inclined to go better to one hand than to the other. The halter, the bridle, the ſaddle, and the girths, are all put on, and tied on the left ſide; when they are rubbed or curried, the man ſtands on their left ſide; the ſame when they are fed; and when they are led out, the man holds them in his right hand, conſequently their head is pulled to the left; here is a chain of reaſons ſufficient to induce us to believe, that if they are readier to turn to one hand than the other, it is owing to a habit and cuſtom which we ourſelves have given them.

We ſeldom meet with horſes that are readier to turn to the right hand than the left; and when it ſo happens, it oftentimes denotes an ill temper; it demands much time and pains to cure them of this fault.

Note.—It is not proper to uſe ſevere correction to make a horſe obey who refuſes to turn to one hand; if he is cold and dull, he will loſe all his vigour and courage; if he is of an angry temper, hot, and briſk, you would make him deſperate and mad; work him then upon the principles of art, and purſue the method you think moſt likely to reform his ill habits, and reduce him to obedience. If he obſtinately refuſes to turn to one hand, begin the next leſſon by letting him go to his favourite hand a turn or two; finiſh him on the ſame hand, and by degrees you will gain him; whereas, were you to do otherwiſe, you might make him be ever after rebellious. A horſe that ſtrenuouſly reſiſts his rider, if he has vigour and courage after he is reduced and conquered, will, nevertheleſs, ſucceed in what you want of him, provided he is under the direction of an able and knowing perſon, who underſtands the aids of the hands and legs, and their mutual harmony and correſpondence. Such a horſe is even preferable to one who never rebels, becauſe, in this laſt, nature may be deficient, if we may be allowed the expreſſion, with reſpect to his want of ſtrength and reſolution.

In order to teach your horſe to turn to both hands, you muſt ſeparate your reins, as we have already mentioned; do not confine him too much, ſupport him moderately, ſo that you may eaſily draw his head to one ſide or the other, as you would have him go, and to give him the greater liberty to turn.

If he refuſes to obey, examine him; if he is by nature impatient, hot, and vicious, by no means beat him, provided he will go forward; becauſe being held in hand, and kept back a little, is puniſhment enough; if he ſtops, and tries to reſiſt, by running back, drive him forward with the chambriere.

The reſiſtance of a horſe whoſe mouth is faulty, diſcovers itſelf more in going forward than backward, and in forcing the hand. A horſe of this ſort ought never to be beat, he ought to be kept back, as we have juſt now ſaid; you muſt endeavour to give him a good and juſt appui, and put him upon his haunches, in order to cure him of the trick of leaning upon his bit, and forcing the hand. If your horſe is heavy, never preſs or put him together, till you have lightened his fore-part, and put him upon his haunches, for fear of throwing him ſo much upon his ſhoulders, that it may be very difficult afterwards to raiſe him. Take particular care to lighten every horſe that is heavy before, and has malice in his temper at the ſame time; for if you were to preſs him, he would reſiſt you through vice; in which caſe, by his want of ſtrength on one hand, and being heavy and unwieldy on the other, you would be expoſed to evident danger.

A reſtive horſe is one that refuſes to go forward, who ſtanding ſtill in the ſame place, defends himſelf and reſiſts his rider in ſeveral different manners; it is much to be feared that one ſhould loſe all temper with ſuch a horſe, ſince it requires a great deal of patience to cure ſo capital a fault, and which, perhaps, by habit and time, is ſo rooted in him as to be almoſt natural to him. Treat a horſe of this ſort, who has been too much conſtrained and tyrannized over, with the ſame lenity that you would ſhew to a young colt. The ſpurs are as improper to be uſed to one as the other; make uſe of your ſwitch, in order to drive him forward, as you will alarm him leſs, for the ſpurs ſurprize a horſe, abate his courage, and are more likely to make him reſtive, than oblige him to go forward, if he refuſes to do ſo.

There is likewiſe another method to puniſh a reſtive horſe, it is to make him go backward the moment he begins to reſiſt; theſe corrections often ſucceed; but the general rule is to puſh and carry your horſe forward, whenever he refuſes to advance, and continues in the ſame place, and defends himſelf either by turning or flinging his croupe on one ſide or the other; and, for this purpoſe, nothing is ſo efficacious as to puſh him forward vigorouſly.

The moſt dangerous of all defences a horſe can make, is to riſe directly upon his hinder legs, and ſtand almoſt quite ſtraight, becauſe he runs a riſk of falling backward, and in that caſe the rider would be in danger of his life. People have endeavoured to correct this vice by a method of puniſhment, which might prove dangerous unleſs given in time, and with the greateſt exactneſs.

Whenever the horſe riſes ſtraight up, throw your body forward, and give him all the bridle; the weight of your body upon his fore-parts will oblige him to come down; in the minute that his fore-feet are coming to the ground, give

give him both the ſpurs firm, and as quick as you can. Theſe aids and corrections, however, muſt be given with the greateſt caution and exactneſs; for were you to give him the ſpurs when he is in the air, he would fall over, whereas if you watch the time ſo as not to ſpur him but when he is coming down, and his fore-feet near the ground, it is then impoſſible he ſhould fall backward, for then his balance is deſtroyed, and he is upon all his legs again, and cannot riſe without firſt touching the ground, and taking his ſpring from thence; if, therefore, you give him the ſpurs before he is in a ſituation to riſe again, you will puniſh him, and drive him forward at the ſame time.

This defence is ſtill more dangerous in horſes who are of a fiery temper, and weak in their haunches at the ſame time. Theſe are continually apt to riſe; and whatever precautions the rider may take, he is in continual danger of their coming over; the way to correct them is this; tie your horſe between the pillars very ſhort, put on a good caveſon of cord, and do not ſuffer him to be mounted. Prick him upon the buttock with a ſpur, or ſharp piece of iron, in order to make him ſtrike out behind; encourage him when he kicks, and continue to make him kick, encouraging him from time to time, when he obeys; do this for a quarter of an hour every day. When you perceive that he begins to kick the moment after you ſo prick him, without waiting till he feels it, get upon him, hold your reins long, prick him, and let a man ſtand by and prick him at the ſame time; encourage him when he kicks, and continue to prick him, to make him do it, till he will kick readily only at the offer you make of pricking him; he ought to be brought to this point in five or ſix days. After this, take him out of the pillars, mount him, and trot him in the longe, and make him kick by pricking him behind; after that, let him walk two or three ſteps, then make him kick again, and ſo work him by degrees. Put him to the gallop, and if he offers to riſe, prick him behind, and make him kick; nothing excels this method, to break a horſe of this terrible and dangerous vice.

Thoſe horſes who are ſubject to kick, either when they go forward, or ſtand ſtill, muſt be kept much together, or held in cloſely, to make them go backward, and you will cure them of this vice.

He who would ſucceed in correcting the vices of horſes ſhould never depart from this maxim; always to obſerve a juſt medium between too indulgent lenity and extreme ſeverity; work your horſe according to his ſtrength and capacity; give your leſſons in proportion to his memory; and diſpenſe your puniſhments and rewards ſuitably to his courage and diſpoſition. See Berenger's Hiſt. and Art of Horſemanſhip, vol. ii. ch. 1, 2, 3. See alſo Aids, Airs, Appui, Ballotades, Caprioles, Corrections, Croupades, Curvets, Entier, Epaule *en Dedans*, Gallop, Hand, Mezair, Passade, Passage, Pesade, Pillars, Pirouette, Ramingue, Restive, Step *and Leap*, Stop, Terre-a-terre, Trot, Union, Volte.

Ride, among ſheep farmers, a term applied to rams, which, when they are put to the ewes, are ſaid to be at ride. See Ram.

Ride, in the *Sea Language*, a term variouſly applied. Thus, a ſhip is ſaid to ride, when her anchors hold her faſt, ſo that ſhe drives not away by the force of the wind or tide.

A ſhip is ſaid to *ride well* or *eaſy*, when ſhe does not labour heavily, or feel a great ſtrain, when anchored in an open road or bay. On the contrary, when ſhe pitches violently into the ſea, ſo as to ſtrain her cables, maſts, or hull, ſhe is ſaid to *ride hard*, and the veſſel is termed a bad roader.

A ſhip *rides acroſs*, when ſhe rides with her main-yards and fore-yards hoiſted up to the hounds, and both yards and arms topped alike.

She is ſaid to *ride a-peek*, when one end of the yard is peeked up, and the other hangs down: this is alſo ſaid of a ſhip, when, in weighing, ſhe is brought directly over her anchor.

She is ſaid to *ride athwart*, when her poſition lies acroſs the direction of the wind and tide, when the former is ſo ſtrong as to prevent her from falling into the current of the latter: and to *ride betwixt wind and tide*, when the wind hath equal force over her one way, and the tide another, ſo that ſhe is in a manner balanced between them, and rides without the leaſt ſtrain on her cables. If the wind have more power over her than the tide, ſhe is ſaid to *ride wind-road*.

She is ſaid to *ride hawſeful*, when, in ſtreſs of weather, ſhe falls ſo deep, that the water runs in at her hauſes.

She is ſaid to *ride portoiſe*, when her yards are ſtruck down upon the deck, or when they are down a-port-laſt.

To Ride *land-locked*, at ſea. See Land-*locked*.

To Ride *by the Stoppers*. See Stoppers.

RIDEAU, in *Fortification*, a ſmall elevation of earth, extending itſelf lengthways on a plain; ſerving to cover a camp, or give an advantage to a poſt.

The word, in its original French, ſignifies a *curtain* or *cover*, formed from the Latin *ridellum*. Borel derives it from *ridere*.

A rideau is alſo convenient for thoſe who would beſiege a place at a near diſtance, and to ſecure the workmen in their approaches to the foot of a fortreſs.

Rideau is ſometimes alſo uſed for a trench, the earth of which is thrown up on its ſide, to ſerve as a parapet for covering the men.

Rideau, in *Geography*, a river in the eaſtern diſtrict of Canada, which runs into the Utwas, or Ottawa. N. lat. 45° 15′. W. long. 76°.

RIDER, a town of Arabia, in the province of Hadramaut.

Rider, in *Artillery Carriages*, a piece of wood, ſomewhat higher than it is broad, and of a length equal to that of the body of the axle-tree, upon which the ſide-pieces reſt in a four-wheel carriage; ſuch as the ammunition-waggon, block-carriage, and ſling-waggons.

Rider is alſo uſed for after-clauſes, added to bills, whilſt they are depending in parliament.

Rider-*Roll*. See Roll.

Riders, *Out*. See Out-*Riders*.

Riders, in *Ship Building*, interior ribs, to ſtrengthen and bind the parts of a ſhip together, being fayed upon the inſide ſtuff, and bolted through all. They are moſtly uſed in ſhips of war, and are variouſly ſituated, as the *floor-riders*, which are fayed athwart the keelſon, and ſhould be placed over the firſt futtocks. The next are the *firſt futtock-riders*, which fay alongſide the floor-riders, and give ſcarph above them: theſe are connected by croſs-chocks athwart their heels, that ſcarph to each ſide with hook and butt. The next are *ſecond futtock-riders*, which fay alongſide of the firſt futtock-riders, down to the floor-riders, and run up under the orlop beams. The *third futtock-riders* fay alongſide the ſecond futtock-riders, ſcarph or meet the heads of the firſt futtock-riders, and run up to the gun-deck beams. The whole are bolted together fore and aft. Breadth and top-riders, which were above the former, ſeem now to be diſcontinued

tinued in the navy, as they could only be uſeful in wake of the main and fore-chains, as the midſhips is much better ſtrengthened now by uniting the ſides and *ſkid-beams* together by the knees.

Theſe riders ſtood diagonally, ſo as to faſten through two or more timbers, the ſtrength depending much thereon. The top-riders came up to the top of the ſide, and the breadth-riders between them and the third futtock-riders, or on the broadeſt part of the ſhip, and hence their name. Riders are not ſo much required in merchant-ſhips as in ſhips of war, excepting floor and lower riders in large ſhips (which are generally of iron, ſo as not to interrupt the ſtowage), becauſe the cargo being ſtowed low down, and the rigging lighter, the upper works are not ſo liable to ſtrain and labour, like thoſe ſhips of war having their heavy ordnance above the line of floatation.

RIDGE, in *Buildings*, the higheſt part of the roof or covering of a houſe.

Ridge is particularly uſed for a piece of wood, in which the rafters meet.

Ridge-*Tyle*. See Tyle.

Ridge, in *Sea Language*, is a long aſſemblage of rocks, lying near the ſurface of the ſea, ſo as to intercept the paſſage of a ſhip under ſail.

Ridge-*Tackle*. See Tackle.

Ridge-*Ropes*. See Ropes.

RIDGEFIELD, in *Geography*, a poſt-town of America, in Fairfield county, Connecticut; 10 miles S.W. of Danbury. This townſhip was called by the Indians "Caudotowa," or high land. It was ſettled in 1709, and contains 2103 inhabitants.

RIDGES, in *Agriculture*, are pieces of ground laid up between two furrows, having always conſiderable length, but different ſmall breadths, according to circumſtances.

It is ſtated by the author of the Preſent State of Agriculture in Great Britain, that in many of the more fertile and populous diſtricts, the ridges are found remarkably crooked, unequal in breadth, and made to riſe towards the middle, or crown, to the height of ſeveral feet above the furrows, on either ſide. And he ſuppoſes that theſe are formed in the worſt manner, to anſwer the purpoſes which are now intended by dividing a field into ridges. But this, he thinks, could not have eſcaped the notice of all the farmers of former periods; but that, on the contrary, from the practice being ſo general, it is more than probable that ſuch form, though now conſidered abſurd, was formerly ſuppoſed an improvement, as in the caſe of many other practices of antiquity; as in many of the hilly ſituations in Scotland, where the ſoils are dry, and in a tolerably level ſtate, and where cultivation had without doubt taken place at a very early period, although at preſent abandoned to the growth of heath, the ridges are found as ſtraight as thoſe in the beſt cultivated diſtricts in the kingdom. The reaſon which induced the cultivators of theſe times to conſtruct the ridges in ſuch forms, may, he thinks, be explained in this way; that as the lands were moſtly cultivated in the open field, or run-ridge ſtate, the furrows of the ridges were, for the moſt part, the mark or boundary between one farmer and another. The portion of land belonging to a tenant in any one place being on this account ſo ſmall, as to prevent him from employing any other mode of drainage, than that of raiſing the ridge to ſuch a height, as to permit the water to diſcharge itſelf by the furrows, without injuring the crop. It is ſtated, that all the ridges that are broader at one end than the other, will generally be diſcovered to be the narroweſt at that end which is ſtill the moſt wet and ſpouty. It is of courſe conceived, that this form was purpoſely given them, as the only means by which lands in ſuch a ſtate could be drained. And that, as the moſt crooked ridges are found on the ſteep and ſloping grounds, it may be ſuppoſed that that form and poſition were adopted by the firſt cultivators, as the beſt for preventing the ſoil from being waſhed away by ſudden falls of rain, which muſt no doubt have been the caſe to a greater extent, had the ridges been ſtraight. Each furrow, by becoming a ſort of ſmall rivulet, without any thing to impede its courſe, muſt have done more miſchief to the ſoil than if it had been gradually taken off the circuitous courſe of the crooked ridges.

But from the change in the nature of poſſeſſing lands, proprietors and tenants having now, except in a few open field diſtricts, the means of draining and forming the ridges in the moſt effectual manner, theſe old forms of ridges, which can only be uſeful in ſuch caſes as the above, are not only rendered uſeleſs, but operate ſtrongly againſt the full improvement of the ſoil. But notwithſtanding this, there is, it is conceived, no ſort of buſineſs in which the farmer can be engaged, that demands more judgment and caution than that of levelling and altering the direction of ſuch ſorts of ridges. However, before the mode of managing this in the cheapeſt and moſt effectual manner is explained, it may be proper to ſhew the moſt ſuitable forms and directions in different ſorts of ſoil, and under different circumſtances of the grounds.

In forming ridges, great attention is neceſſary to the nature and quality of the ſoil, and the particular ſituation of it, as the ſize, height, and direction muſt, in a great meaſure, be governed by them. It has been obſerved by a late practical writer, that where the land is of ſuch a nature as to be highly retentive of moiſture, or, from the peculiarity of its poſition, liable to become too wet for the growth of uſeful crops, the ridges ſhould in general be made narrower, and have a more rounded or convex form, than in the contrary caſe, or where it is expoſed to injury from becoming too dry. But, in the firſt caſe, they ought not, however, to be raiſed ſo very high as is ſometimes the practice, as by ſuch means much inconvenience is often ſuſtained from the crowns becoming too dry, and the grain ripening in a ſlow and partial manner. Beſides, narrow ridges, with but a little elevation, are, in general, much more effectual in taking away the water that may be injurious.

It has been remarked by the writer of the Perthſhire Agricultural Report, in reſpect to the height of ridges in lands of more dry deſcription, that as the furrows, in general, produce leſs crop than any other part of the ground, the fewer furrows the better, provided the land can bear it. If the field be dry, there is not only more produce by fewer furrows, but the ridges are cloven by every ploughing (a thing that cannot be done in raiſed ridges with deep furrows), which keeps them in an uniform level ſurface, and greatly facilitates the labour of ſpring and harveſt. Perſons who are not accuſtomed to inveſtigate the cauſe of what they daily ſee, are deterred from making their ridges nearly flat by the waters that ſtagnate, in the ſtrips of graſs and ſprits that lie between the ridges, which they have raiſed greatly in the middle: never conſidering that they are working againſt nature, becauſe the more the ridges are rounded the deeper are the furrows, till they become like ditches, and the more readily do clods fall down, ſo that they are with their own hands producing the very evil which they wiſh to prevent. Whereas, were the ſtrips of flags and other trumpery torn up, were the furrows leſs deep, and kept

kept perfectly clean and open, to allow a free paſſage to the water, the whole would flow to the open drain at the extremity of the field; and the higher the furrows are, in reſpect to this drain, their relative height would make the water flow the faſter. Care ſhould always be taken that the clods that fall back into the furrows, and dam the water in ſuch land, ſhould be removed with the ſpade. The ſlovenlineſs of men in this particular circumſtance, more frequently produces the ſtagnation complained of, and all its baneful conſequences, than either ridges moderately raiſed, or any other cauſe. This he conſiders as perfectly ſatisfactory, in reſpect to laying out ſuch lands into ridges in the firſt inſtance. But that, in caſes in which neither the circumſtances of the ſoil, nor the nature of its ſituation, require that the ridges ſhould be formed in a particular manner, or of any certain breadth, that of making them about eighteen feet may be the moſt ſuitable, as they are found to anſwer well in the way of keeping the ground properly dry, and of the moſt convenient dimenſions for turning the teams at the ends in ploughing. And that beſides, the ſeed, where this method is purſued, can eaſily be ſown by one caſt up and another down; an operation which, in other circumſtances, would be attended with conſiderably more labour. That, in the covering of the ſeed by means of harrowing, the work is alſo accompliſhed with more facility and diſpatch, as by employing double implements of this kind, one turn may wholly finiſh the buſineſs. And that in the reaping, too, they have advantages, in allowing the number of reapers that are neceſſary to work with convenience, and without being in the way of each other. This, though a great advantage in ſome caſes, is of leſs conſequence ſince the mowing of grain is become more general.

But it is ſtated, that wet, clayey, or any ſtiff and tenacious loamy ſoils, where the under ſtratum is clay, ſhould be ploughed as much as poſſible into ridges of much leſs ſize, in order that they may be kept in a ſtate of dryneſs, ſuitable to the growth of the crops that are to be put upon them. Three or four feet, according to the degree of tenacity and wetneſs, may, in ſuch ſorts of land, be fully ſufficient. And it is added, that in the counties of Eſſex and Hertford, on this ſort of wet ſoils, three feet are found to anſwer the purpoſe in a very effectual manner. And that it has been obſerved in the Middleſex Agricultural Report, on the authority of much experience, that their ſuperiority over ridges of greater breadths, for taking the water off without waſhing the land, is incontrovertible. That, in ſhort, as there is much variation in lands of theſe kinds, the width and flatneſs of the ridges ſhould be increaſed as they recede from the nature of clay or clayey loam, and approach that of ſand, in order that a larger proportion of moiſture may be preſerved: while, on the contrary, as they are becoming more of a clayey quality, they ought to be narrower, and to have a more high and rounded form, that the diſcharge of injurious moiſture may be more expeditious. In loamy ſoils they ſhould be either broad and flat, or narrow and round, in ſome meaſure, according to the degree in which they approach the ſandy or clayey ſoils. And that, in very wet clayey ſoils, where they reſt upon a ſubſoil of ſome porous kind, great advantage in the way of drainage may often be obtained, by ſinking the furrows ſo deep, as to reach it. But ſome perſons, on theſe ſorts of clayey ſoils, ſuppoſe the beſt breadth to be ten or twelve feet, as where they are narrower there is much diſadvantage, though they keep the land drier. Alſo, in lands of the marſhy or fenny kinds, as moſtly approaching in ſome degree to the nature of theſe, the ridges ſhould be made narrow, and rather round in their forms.

But that as the principal defect of lands of the ſandy kind is that of parting with their moiſture too readily, and of courſe becoming quickly in a ſtate of too much dryneſs for the purpoſe of healthy vegetation, it is the moſt adviſable to plough them into very broad ridges, or even in ſome caſes quite flat, without the leaſt degree of furrow being made; as, in this way, the moiſture may be more effectually retained in ſuch ſoils, to the great advantage of the crops which are grown upon them. But in the conſtructing of ridges on ſuch ſoils as are of the boggy or moſſy kinds, ſome attention is neceſſary in reſpect to their depth, and the proportion of wetneſs that may be preſent; as where they are thin, and have but little injurious moiſture, they may be more broad and flat than where they are deep of moſs, and more retentive of moiſture: ſix or ſeven yards may, in general, be the beſt. It is obſerved, that even in the deeper ſorts, long experience has ſhewn that, in the firſt inſtance, it is improper to make them too high or too narrow; as, in the former caſe, they throw the water off from their ſides, without admitting it to penetrate their ſubſtance, the top of courſe gets too dry; while, in the latter, there is a loſs of ſurface, from too many diviſion furrows. The breadths already mentioned are found to be the beſt; and when the improvement is completed, the ridges appear like ſegments of wide circles, with a clean well-defined diviſion furrow between each of them. The moiſture is thus cauſed ſlowly to filtrate through the moſs, rendered friable by lime, until it reaches the diviſion furrows. It is generally neceſſary to clean theſe out before winter, and at the time the crop is ſown, until the moſs acquires ſolidity. This has been fully ſhewn in a paper, in the ſecond volume of Communications to the Board of Agriculture. See the work.

And it has been remarked, that ridges in theſe ſoils are generally formed by the ſpade, the workmen beginning nearly in the middle of the part which is to form the ridge, only leaving the ſpace of about eighteen or twenty inches, upon which the materials raiſed from the trenches on each ſide are depoſited, ſo as to conſtitute the crown; and in this way, digging up and turning over narrow ſpits on each ſide, the workman proceeds till he comes to the diviſion furrows, which are cut out and laid on the ſides: in which way, the ridge, when completed, appearing as if done by the plough. And in the deeper moſſy ſoils, eſpecially of the more ſpongy kind, it is probable the breadth of the ridges may be increaſed with advantage, after they have collapſed and become ſufficiently firm; as, by ſuch means, they will be more ſuitable for being laid down to graſs or ſward, for the purpoſe of paſturage.

Further, in what reſpects the general diſpoſition of ridges, where there is not a neceſſity of giving them any particular direction, either for the purpoſe of drainage, or other circumſtances, they ſhould be formed as much as poſſible in the direction of north and ſouth; as, by that means, much advantage may be gained in the crops attaining maturity, and in becoming dry, from their having the more full influence of the ſun and wind. And it has been remarked by Mr. Marſhall, in his Midland Economy, that the ſhocks, after grain has been reaped, ſhould be ſet in the ſame direction, and not have an eaſt and weſt poſition; as, in this caſe, the ſheaves on the north ſide are many days later in being in a proper condition for being conveyed to the ſtack, than thoſe on the ſouth. From further experience, he is alſo convinced of the bad effects of ridges having an eaſt and weſt direction; it having been found that corn, on the ſouth ſides of ſuch as were not by any means high, ſhot into ear, and changed and ripened a week at leaſt earlier than that on the north; and that at the time of reaping, the wheat on the

the ſouth ſides was, in ſome patches, too ripe; while that on the north ſides was, in many parts, abſolutely in a green ſtate.

But where the ridges are to be conſtructed in ſuch lands as are hilly in their ſituation, or have much declivity, it is neceſſary that they be neither made too ſteep, nor have too much of a horizontal direction given them; being drawn in ſuch a manner, as that they may have that ſort of eaſy ſloping direction, by which the water may be taken off in a gradual eaſy manner; as, in this way, there will not only be great advantage in the ſaving of labour in ploughing, nearly one-third leſs power in the team being ſufficient; but the injury and inconvenience of heavy rains waſhing down the ſoil and manure will in a great meaſure be obviated. It has been ſtated by the author of the Gentleman Farmer, that in a hanging field, that had been carefully dreſſed with lime and dung for turnips, and in which the turnips were fairly above the ground, a heavy ſummer ſhower ſwept down the crop, together with the lime, dung, and a portion of the looſe ſoil, leaving the land naked and expoſed. Therefore, in the forming ridges in lands that have ſuch ſituations, it has been well obſerved by the author of the Agricultural Report of Perthſhire, that when the fields hang ſo much as to be accounted ſteep, the ridges ought neither to be drawn parallel to the bottom of them, nor at right angles, ſtraight up and down; either of which would be inconvenient in the ploughing, and injurious to the ſoil; but they ought to be drawn diagonally. The great point is to underſtand in what direction this diagonal ſlope of the ridges ought to run. In this reſpect the tenants of Balgowan, in this diſtrict, are perfectly correct; and it is his wiſh that their example were followed by all farmers, whoſe land has a great declivity, of which there is a conſiderable proportion, not only in that, but in all hilly countries whatever. The form and direction of the ridges are, he thinks, contrived with ſuch judgment, that the furrow (or, as lord Kaimes with more accuracy calls it, the furrow-ſlice) falls eaſily away from the mould-board, as well in aſcending as in deſcending the field, which is the principal ſecret. There can be no more than two diagonal lines in any four-ſided figure, which is generally the form of incloſures; and if you bring a ſenſible ploughman to each of the angles below, deſiring him to look towards each of the oppoſite angles above, he will at once tell you which of theſe diagonal directions is eaſieſt for himſelf and his horſes, and will accordingly fix on that line by which the furrow, *in aſcending*, will fall moſt readily into its place, having his right hand and the mould-board of his plough with a ſide-aſpect to the bottom of the field. But, with the view of rendering this more obvious, ſuppoſe the field to have a ſteep deſcent and a ſouthern aſpect, the ridges are drawn from ſouth-weſt to north-eaſt; which is the caſe in the inſtance alluded to. Suppoſe, again, the field to have a northern aſpect, the ridges are drawn in the ſame direction, but with this difference in ploughing, that you *aſcend* ſouth-weſt in the laſt caſe, whereas you *deſcend* ſouth-weſt in the firſt. If the field fronts the eaſt, you aſcend north-weſt; or invariably four points forward from the ſlope of the field, in going up the hill. Beſides the vaſt ſaving in reſpect to the power or ſtrength of the team in this way, and that of the ſoil being leſs liable to be carried away by rains, by the running of the water in the furrows; where the ridges are made parallel to the bottom of the field, all the dexterity of a man and force of cattle that could be applied would be inſufficient to turn every ſecond furrow up againſt the hill.

It is remarked, that the expedient univerſally employed, according to the old ſyſtem, in ploughing fields of this kind, was either to plough with a double mould-board, or, if the mould-board were ſingle, to plough only one furrow in going twice the length of the ridge; but moſt frequently the laſt. Both are, he thinks, bad huſbandry. In the former method, you loſe none of your time, indeed; but one half of your labour is loſt by the latter. His principal objection, he is of opinion, holds equally againſt both. All the ſoil is, year after year, rolling downward; and in proceſs of time, the upper part of the field will be peeled to the bone, and quite bare of ſoil, while a great bank is accumulating at the bottom, like a dunghill, compoſed of the richeſt land in the field; and withal, the furrows are laid ſo completely on their backs, that little benefit is derived from the manure, excepting it be laid on the ſurface the firſt year.

The ſame writer further ſtates, that where a hill is to be dreſſed, in order to be laid down to graſs, it ought to receive the latter furrow by going round in a ſpiral line, without ever turning the plough, beginning at the baſe, and ending at the top. This requires leſs labour, and is more beautiful. In preparing the ground for this laſt furrow, it may be ploughed diagonally, to keep the ſoil from tumbling down hill, as has been mentioned above, in reſpect to declivities: for this purpoſe, the ſurface of the hill may be divided into three or more ſections. And it is remarked by a late practical writer, in addition, that, in this way, no more ſtrength of team is required in ploughing ſuch elevations than in that of ploughing on a level; while, where the ſoil is of the gravelly or ſandy kind, the great inconvenience of the moiſture going off too quickly is guarded againſt, by its being detained in the furrows. And the ſpiral furrow is, according to the firſt writer, the neateſt method of finiſhing off a lawn, even of flat land, near a gentleman's houſe; as it brings the whole ſurface to an uniform appearance, and pleaſes the eye more than having the lawn ſtriped with furrows.

In regard to ſuch lands as are level, or have but little inequality of ſurface, the beſt general practice, it is obſerved by the author of a late work, is to form the ridges as ſtraight and as regular in reſpect to breadth as poſſible; as, by having them crooked, and of irregular breadths, the water is not only liable to ſtagnate and injure the ſoil, but the friction in ploughing is greatly increaſed, and the furrow-ſlice is not ſo well laid over, being more diſpoſed to fall back. And, beſides, many unneceſſary turnings are requiſite, on account of the inequalities of breadth, by which much time is loſt, as well as much trouble given to the ploughman in managing the plough while at work.

In ſome of the leſs improved counties in the northern parts of the kingdom, as Lancaſhire, and thoſe adjoining it, the ridges on the old lands are often narrow, crooked, and very ill laid out, being for the moſt part too much rounded in the middle parts, and in the form of butts, which are the ſtates in which they are at the preſent time, few or no attempts having been made to alter them in any way. However, from the nature and depths of the ſoils, it would not appear that there would be any danger or difficulty in doing it; though this may be the caſe in ſome other ſituations, where it ought to be attempted with proper caution. In ſome parts of the above diſtrict, as that of the field, the term *farring* or furrowing is often made uſe of, inſtead of that of ridge.

Method of Levelling and Straightening old Ridges.—In ſuch kind of land as has been long in a cultivated ſtate, high, crooked, and irregular ridges are frequently met with, that often become neceſſary to be altered, ſo as to be rendered more ſtraight and level. This, though apparently ſimple, is

is a matter of more difficulty and trouble, and which demands more knowledge and care in its execution, than is commonly ſuppoſed by perſons unacquainted with the buſineſs. Various obſtacles have been thrown in the way of this ſort of improvement by farmers in different diſtricts. By ſome the expence is conſidered as very great, while others oppoſe it on the ground of the injury done to the land for ſome years afterwards. And according to the Agricultural Report of the county of Perth in Scotland, the objection made by ſome farmers in the Carſe of Gowrie is this: in the action of levelling ridges, that have been, time immemorial, raiſed high in the crown, much ſoil is brought up, which for ages had neither ſeen the ſun nor ſmelled the air. This, like moſt other ſoils, which has been ſo long and ſo deep buried, is very unproductive at firſt, and blaſts all their expectations. It is perfectly conſonant to the proceſs of nature, the writer ſuppoſes, that this ſhould, in ſome meaſure, happen; and, as far as it has any weight, is an argument not only againſt levelling, but againſt ſtraightening the ridges of ſuch land. But was not, he aſks, every particle of that ſoil, which is ſo much reprobated, on the ſurface of the ground before the ridges were ſo raiſed by the hand of man? Was not this very ſoil, at that time, as good as any ſoil in the field? Nay, was it not much more fertile before it was buried in the middle of the ridge, than the *new* ſoil, which the ploughman was digging up year after year, out of the ſterile furrow, to aſſiſt in gradually raiſing his ridge higher? Every man muſt anſwer in the affirmative. If you therefore bring back your land nearly to the level in which the hand of nature left it, you will find the very ſoil, which had been fertilized by the deciduous parts of plants, from the creation, until it came into cultivation; the ſoil which Providence intended for the production of grain for the uſe of man, this ſoil has not ſurely loſt its fertility, although that fertility has lain long dormant by its being covered up in the bowels of the earth, and removed from the benign influence of heaven. The fertility of a ſoil cannot be exhauſted by any other means, but by over-cropping. It may be ſuſpended, as in this inſtance, but not annihilated. Reſtore the ſoil to its native place, and to that influence of which it was deprived, and it will ſoon become equally productive as at firſt. It is not pretended that its fertility will be exerted all at once. Clay is a ſtubborn ſoil: it is neither ſo eaſily ſtimulated by manure, nor by the benignity of the atmoſphere, as other ſoil. It requires time and labour and expence to ſet it in motion; but when moved it retains its powers longer and makes very ample returns. And in addition to theſe obſervations, vaſt benefits muſt in many caſes reſult from bringing ill-formed ridges into a proper ſituation for the advantageous culture of crops upon them.

With regard to the time or ſeaſon for the execution of this ſort of work, it has been remarked that the moſt ſuitable period for accompliſhing it where the plough is employed, is when the land is undergoing a courſe of repeated ploughings, as in the caſe of a fallow; as under ſuch circumſtances the more elevated parts of the field may be ploughed over as often, and in ſuch directions, as is moſt ſuitable for bringing them into a level ſtate. Where the ridges are not raiſed to any very conſiderable height in their middles, but badly formed in other reſpects, they may ſometimes be readily brought into proper order by being ſplit, or cloven down occaſionally; a mode which is performed by beginning at the furrows and terminating at the crown or middle of the ridge, ſo that the former furrows become the crowns, and the new furrows are made in the middle of the old ridges, which being filled by a furrow from each ſide, has the tendency of ſoon bringing them into a more equal and level form. But that in caſes where the ſoil is of the light, gravelly, or open and mellow kind, the plough may be conveniently employed in levelling the ridges, without producing any injury of conſequence to the crops that may afterwards be put upon the land. It is proper, however, even in lands of theſe kinds, to uſe ſuch caution in performing the operation, in order to avoid the injury that might be cauſed by too large a proportion of the under ſoil being brought to the ſurface in different parts of the ground, and in that way rendering it leſs productive in crops than it was before.

It has been contended, however, by Dr. Anderſon, in the firſt volume of his Eſſays, that where this ſort of work is done by ſuch implements as are contrived for expeditiouſly bringing high ridges to this ſituation, as ploughs, harrows, drags, &c. the farmer of neceſſity buries all the good mould that was on the top of the ridges in the old furrows; by which he greatly impoveriſhes one part of his field, while he too much enriches another; inſomuch, that it is a matter of great difficulty, for many years thereafter, to get the field brought to an equal degree of fertility in different places: which makes it impoſſible for him to get an equal crop over the whole of his field by any management whatever: and he has the mortification frequently, by this means, to ſee the one half of his crop rotted by an over-luxuriance, while other parts of it are weak and ſickly, or one part ripe or ready for reaping, while the other is not properly filled; ſo that it were, on many occaſions, better for him to have his whole field reduced at once to the ſame degree of poorneſs as the pooreſt of it, than have it in this ſtate. An almoſt impracticable degree of attention, in ſpreading the manures, may indeed in ſome meaſure, he thinks, get the better of this diſeaſe: but it is ſo difficult to perform this properly, that he has frequently ſeen fields that had been thus levelled, in which, after thirty years of continued culture and dreſſings, the marks of the old ridges could be diſtinctly traced when the corn was growing, although the ſurface was ſo level that no traces of them could be perceived when the corn was off the ground. But this, he remarks, is a degree of perfection in levelling that cannot be uſually attained by following this mode of practice, and therefore it is but ſeldom ſeen; for all that can be expected to be done by any levelling machine is to render the *ſurface* perfectly ſmooth and *even* in every part at the time that the operation is performed: but as in this caſe the old hollows are ſuddenly filled up with looſe mould to a great depth, while the earth below the ſurface, upon the heights of the old ridges, remains firm and compact, the new-raiſed earth, after a ſhort time, ſubſides very much, while the other parts of the field do not ſink at all; ſo that in a ſhort time the old furrows come to be again below the level of the other parts of the field, and the water, of courſe, is ſuffered in ſome degree to ſtagnate upon them, inſomuch that in a few years it becomes neceſſary once more to repeat the ſame levelling proceſs, and thus renew the damage that the farmer ſuſtains by this pernicious operation. He therefore thinks that on theſe accounts, if the farmer has not a long leaſe, it will be found, in general, to be more for his intereſt to leave the ridges as as he found them, than to attempt to alter their direction: and if he attends with due caution to moderate the height of theſe old ridges he may reap very good crops, although, perhaps, at a ſomewhat greater expence of labour than he would have been put to upon the ſame field, if it had been reduced to a proper level ſurface, and divided into ſtraight and parallel ridges. However, where a man is ſecure of poſſeſſing his ground for any conſiderable length of time, the advantage that he will reap from having level and well laid

out fields are ſo conſiderable, as to be worth purchaſing if it ſhould even be at conſiderable expence. But the loſs that is ſuſtained at the beginning by this mechanical mode of levelling ridges, if they are of conſiderable height, is ſo very great, that it is, perhaps, doubtful if any future advantage can ever fully compenſate it. On theſe grounds he rejects the uſe of machinery in theſe operations, and recommends the method deſcribed below as being more efficacious and ſucceſsful. There have, however, of late been many valuable machines contrived for the purpoſe of accompliſhing the work in an eaſy and cheap manner, and which have been found to anſwer in practice. An implement of this ſort has been deſcribed under the head machine. See MACHINE *Land Levelling*.

But where the lands are of the clayey, loamy, or tenacious wet quality, there is much greater difficulty, as well as greater attention required, in levelling down and changing the forms of the ridges, as it frequently happens that in ſuch ſoils, after the earth from the crowns has been removed in order to render them level, a coarſe, unfriendly, ſtiff ſoil is brought up, as has been ſeen above, that requires a great length of time and much amelioration to bring into a ſtate capable of ſupporting good crops of any ſort of grain. In theſe caſes and ſorts of ſoils, in the ſtraightening and bringing down the ridges on the coarſe lands in the northern parts of the iſland, the author of the Perth Agricultural Report adviſes it as proper to begin the operation by removing the made or ameliorated ſoil on the crown of the ridge to one ſide, which may, he thinks, be done by two or three ploughings in one direction, turning the furrow always one way. This is eaſier than doing it with the ſpade. Then ſuch a quantity of the buried ſoil may be caſt with the ſpade from the crown of the ridge, as will fill up the furrows at pleaſure; and, laſtly, the ameliorated ſoil may be ſpread over the ſurface of the whole. If it is not thought enough to ſave the ameliorated ſoil on the crown of the ridge alone, firſt one ſide of the ridge may be taken, and then the ſame proceſs repeated on the other; by which means almoſt all the wrought ſoil may be kept on the ſurface. A good ſummer fallow and a hearty doſe of lime, and the mixture of wrought mould, will reanimate the new ſoil, and reſtore its vegetative power to its primitive ſtate; and a very few ſeaſons will naturalize the whole ſoil, while the farmer has the advantage of ſtraight ridges, moderately raiſed. Some, however, think that this buſineſs may be beſt performed by the ſpade, though it is now obviouſly impoſſible in many ſituations from the vaſtly increaſed expence of labour. Where this mode is to be employed, it is adviſed by Dr. Anderſon, in his Eſſays on Agriculture and Rural Affairs, to let a number of men be collected, with ſpades, according to the extent of work, and then ſet a plough to draw a furrow directly acroſs the ridges of the whole field intended to be levelled. Divide this furrow into as many parts as labourers, allotting to each a ridge or two, more or leſs, according to the number and height of the ridges, and other circumſtances. Let each of the labourers have orders, as ſoon as the plough has paſſed that part aſſigned him, to begin to dig in the bottom of the furrow that the plough has *juſt* made, about the middle of the ſide of the old ridge, keeping his face towards the old furrow, working backward till he comes to the middle of the old ridge, going deeper as he advances, ſuitable to the height he has to bring down; then let him turn towards the other furrow, and repeat the ſame on the other ſide of the ridge, ſo as to leave the bottom of the trench he has thus made acroſs the ridge, entirely level, or as nearly ſo as poſſible. When he has finiſhed that part of the furrow allotted to him, which the plough has made in going, let him then go and finiſh in the ſame manner his own portion of the furrow which the plough makes in returning. In this manner each man performs his own taſk through the whole field, gradually raiſing the old furrows as the old heights are depreſſed.

And the old furrow ought to be raiſed to a greater height than the middle of the old ridges, ſo as to make allowance for the ſubſiding of that looſe earth. And the operation is thus finiſhed at once. He recommends the making of theſe temporary or croſs ridges 40 or 50 yards broad at leaſt: for although ſome time will be loſt in turning at the ends of the broad ridges, the advantage that is reaped by having few open furrows is more than ſufficient to counterbalance this loſs: and in order to moderate the height that would be formed in the middle of each of theſe great ridges, it will always be proper to mark out the ridges, and draw the *furrow* that is to be in the middle of each, ſome days before you collect your labourers to level the field, to prevent any hurry or loſs of labour in the future operation of levelling. The field will thus be reduced at once to a proper level, and the rich earth that formed the ſurface of the old ridges will ſtill be kept on the ſurface of the field to be formed into new ridges. And the ſame writer adds, that the direction of the ridges, as noticed before, ought to be north and ſouth, if the field will permit, by which means the eaſt and weſt ſides of the ridges, dividing the ſun equally between them, will ripen at the ſame time. Alſo further, that when the ſoil is ſo wet as to require the raiſing of the ridges, they ought to be made twelve feet wide, and twenty inches high, and to be preſerved always in the ſame form, by *caſting*, that is, by ploughing two ridges together, beginning at the furrow that ſeparates them, and ploughing round and round till the two ridges be finiſhed. The ſeparating furrow is indeed raiſed a little higher than the furrows that bound the two ridges, but at the next ploughing that inequality is corrected by reverſing the operation, which is eaſily done.

And in regard to the expence of the different methods, the following ſtatements are given by the ſame writer, which, though far below the preſent price of labour, may furniſh the means of calculation to the improver. Suppoſing the price of labour in Scotland to vary in different places from ſixpence to one ſhilling, and that the medium price be fixed at nine-pence a day; and that the hire of a plough, with four horſes and two ſervants (for ſo many, in general, will be requiſite to labour properly ground in the condition that this is ſuppoſed to be in), varies in like manner from three to five ſhillings *per* yoking, and that the medium price of this be called four ſhillings; in this caſe the comparative expence of levelling, by theſe two different modes, would be as follows.

Expence of Levelling by Spade.

	£	s.	d.
For wages to eleven labourers one day, at nine-pence each - - - -	0	8	3
For the hire of a plough $2\frac{1}{2}$ yokings, at four ſhillings each - - - - -	0	10	0
Total expence of one day's work - -	0	18	3

Expence of Levelling by Plough and Harrows.

For two yokings and a half of a plough, as before - - - - - -	0	10	0
For harrowing ditto, ſuppoſed at one-fourth of the ploughing - - - -	0	2	6
Total	0	12	6

	£	s.	d.
Total for once ploughing, &c. - -	0	12	6
The same five times more repeated -	3	2	6
Total expence of levelling by plough and harrow - - - - - - -	3	15	0
Total expence of levelling by the spade	0	18	3
Difference	2	16	9

But another method practised by Mr. Paterson of Castlehuntley is, according to Dr. Robertson, first to open up with the spade a trench of about ten feet broad, from end to end of the field, in the same direction that the ridges are to be made. The upper surface of the ten-feet trench is laid upon one side, to be removed afterwards. Then the under soil of this trench is levelled and dressed by the spade and wheel-barrow, or carts, if necessary, at the same time giving the land a gentle fall at both ends, to enable the water to run off in the furrows towards the main drains. When this under soil has got its proper shape, he marks off another ten-feet trench, and with the spade throws the upper soil of the second trench on the new-formed under soil of the first trench, so as to cover it completely and equally: and so on through the whole field. The upper soil of the first trench was carried round in carts, and laid on the under soil of the last trench. The appearance of the field was then regular, rising in the middle and falling at both ends. He recommends ridges eighteen feet wide. The whole expence is supposed to be 8*l.* an acre. And it is observed in the third volume of the Farmer's Magazine, that ridges in enclosed lands are capable of being straightened with profit, or at least without loss, by wearing down the high ridges by the preceding crops, so as not to leave too much to the fallow, which is by turning one field at least into turnip or fallow every year until the whole is gone over. For as the land is ploughed and harrowed over and over in all directions, until it is brought to a close fine mould, the ridges may then be laid off just as the farmer pleases, without any loss. But that in straightening without this previous operation, the loss cannot be calculated. The advantages are therefore obvious to every man.

A writer in the fifth volume of the same work also observes, that in wet clayey soils, where the operation is undoubtedly most difficult to execute, he has accomplished the business with facility in this way. On dry soils, very little judgment or skill is required to do it, with safety to the ground, and advantage to the occupier. He states, that in 1794 he fallowed and straightened a field of about thirty acres, which had been oats the preceding year. The soil was a wet clay, and the ridges were very unequal in breadth, from ten to thirty feet, intermixed with *butts* or *gussets*, which are always detrimental to such lands, as they occasion the ploughs, &c. to turn often upon the other ridges, by which means the prints or marks of the horses' feet are left unfilled up. The first operation consisted in cleaving down the ridges. The field was then ploughed across, and thoroughly harrowed; but before the broad ridges could be brought to a level, several ploughings were necessary, which were accordingly given. The season, however, was far advanced before these necessary operations could be effected; and, as lime could not at this time be applied with advantage, he was under the necessity of laying it up in heaps, in an adjacent grass field, so as it might be expeditiously laid on whenever the field was straightened. The next consideration was, to form the ridges in such a manner as to prevent water from stagnating upon the ground. With this view, he run them partly east and west, and partly north and south, as the level would admit. When the ridges were thus formed and gathered up, the lime was applied, and a good cross-harrowing given, in order to fill up the furrows. And it being now the latter end of October, and the weather very wet, he thought it advantageous, in giving the seed furrow, to yoke the horses in line, and not a-breast, as is the usual practice. The whole field was sown on the 6th and 7th of November, and the braird appeared about the beginning of December. The weather having been wet for some days after the wheat was sown, it appeared rather thin in March, but always retained a dark green colour. It improved much during the summer months; and at harvest, turned out as good a crop as ever he saw upon such poor wet soil, the produce *per* acre being from thirty-two to thirty-four Winchester bushels of good marketable grain. Next year he ploughed the field again, and sowed one half with oats, and the other half with peas, both which were as good crops as could be expected. Perhaps it may be thought that he should have sown grass seeds among the wheat; but it is his opinion, that when ridges have been altered, a second fallowing is necessary before the field can be profitably laid down to grass. Last year he straightened a field in the above-mentioned way, which has answered his expectations to the full. It was sown with grass seeds, which at present promise well. He concludes by observing, that the advantages resulting from the practice of straightening ridges are obviously many and great. More work is performed both by plough and harrows, and to better purpose, in a given space of time: much seed too is saved; for when the ridges are at or below eighteen feet in breadth, which they ought never to exceed, two casts will suffice: whereas, in their former state, three, or even four casts, will be necessary in some parts, and in others one will be too much. Straightening ridges, and making them all of one size, also greatly furthers harvest work, as it is well known, that shearing is more expeditiously performed upon them, than upon those that are unequal with one another, or such as are broad at one end and narrow at the other. The last, though not the least advantage, which he shall notice at present, is, that wheat is not so apt to canker upon straight as upon crooked ridges. He will not now inquire how this comes to be the case; but leave it to the consideration of those who delight in abstract philosophical researches: it is sufficient for him to be assured, from experience, that it is so. The business of straightening and levelling ridges, in many situations, certainly demands much more attention than it has hitherto met with by the farmer and land proprietor.

But besides these modes of ridging, which are necessary in laying out lands for the purpose of tillage, there are others that become requisite in consequence of the growth of particular sorts of crops, and the particular methods of husbandry by which they are cultivated. Thus we have one, two, and three, or more *bout* ridges, according as the crops are grown to most advantage, on one or other of these sorts of small ridges, or as they suit the different sorts of tools by which they are put into the ground. Some other local modes likewise occur in tillage districts, of forming small ridges, for the cultivation of different kinds of crops. See TILLAGE.

RIDGES, in *Gardening*, portions of ground laid up by means of the spade in a narrow strip, to the height of one, two, or more feet, for the purpose of receiving the benefit of frosts and the influence of the atmosphere, and thereby become more mellow, light, and friable, as well as more fertile and productive. See RIDGING.

RIDGE-*Work*, in *Agriculture*, that sort of tillage which is executed

executed in the ridge method, or by raiſing the ſurface of the land into ſome kind of ridges.

Ridges *of a horſe's mouth*, are wrinkles or riſings of the fleſh in the roof of the mouth, running acroſs from one ſide of the jaw to the other, with interjacent furrows.

It is commonly in the third or fourth ridge that the farriers ſtrike with the horn, in order to bleed a horſe whoſe mouth is overheated.

RIDGIL, in *Rural Economy*, a male ſheep, in which the teſticles do not come properly down into the ſcrotum.

Ridgil *Lambs*, ſuch as have none, or only one teſticle, in the ſcrotum or cod. There is often great trouble and danger in theſe ſorts of animals being mixed with other ſheep ſtock, as they not only teaſe the ewes, but frequently injure them. The lambs ſhould, of courſe, always be cut while young, as from ſix to ten or twelve weeks old, though the operation may be performed with ſafety at a much later period, and even when a year or more old. Mr. Marſhall, in his Norfolk Economy, deſcribes the manner of doing it in this way, where only one of the teſticles had come down or entered the cod. Having cut off the end of the ſcrotum, bag, or cod, the teſticle was drawn out in the uſual manner of gelding. The other was taken out at the ſide contrary to that on which the palpable teſticle was placed. In performing which, the lamb is laid flat on its ſide upon the ground, being held in that poſition by one man, keeping its neck and fore legs cloſe down, while another ſtretches it out by drawing the hind legs backwards, keeping them tight down, ſo that the animal cannot ſtir. The operator then clips off a ſmall patch of wool, about the ſize and ſhape of a duck's egg, cloſe below the loin, and in the middle between the huckle and the ſhort ribs; after which he makes an inciſion, ſufficiently wide to admit his forefinger, with which he ſearches for the ſtone and brings it out, diſengaging it from the tunic or coat in which it is encloſed by a knife, drawing out the cord or ſtring. The orifice after this is carefully ſewed up, and the wounded parts anointed with elder or ſome other ointment.

And it is ſtated as remarkable, that the concealed teſticles all laid on the ſame ſide, namely the right ſide; the contrary ſide to that on which females are cut, in the caſes he had the operation performed in. And that in one the operation was rendered difficult by the teſticle being very ſmall, and braced up cloſe to the vertebræ. It is likewiſe added, that the palpable teſticle being priorily extracted, increaſes the difficulty of the operation, as the perſon who performs it does not know which ſide to cut on, and is ſometimes obliged to cut on both before he finds the concealed teſticle.

This is a nice operation, which requires much care and attention in the perſon who performs it.

RIDGING *of Ground*, in *Gardening*, the practice of throwing it up into high ridges in order to lie fallow in winter, &c. to mellow, and improve in its quality and fertility.

It may be noticed, that this is a work of great utility in the kitchen garden, as well as in other parts, but more eſpecially in ſtiff heavy ſoils, and cold wet lands. It is accompliſhed by trench-digging the ground over, laying the earth of each trench in a raiſed, rough ridge, lengthways, that by thus lying as high, open, and hollow as poſſible, it may meliorate and fertilize more effectually by the weather during the winter. And it receives further improvement from the levelling it down again, which is expeditiouſly effected, for the reception of the intended ſeeds, plants, roots, &c. which breaks, divides, and pulverizes the earth ſtill more effectually.

And this ſort of ridging is generally performed, either in the latter end of autumn, or any time in winter, or early in the ſpring, as the ground is the moſt vacant at thoſe ſeaſons, and not generally immediately wanted for any principal ſowing or planting.

This ſort of work is executed by beginning at one end of the plat of ground, and digging out a trench one or two ſpades in width, and a full ſpade's depth, removing the crumbs from the bottom, in the lengthways acroſs the ground, and wheeling the earth to the finiſhing end, to be ready to fill up the laſt trench: ſo marking out a ſecond trench cloſe to the firſt, of the ſame width, then proceeding in the trenching and ridging, previouſly paring the top of the ſecond trench, with all weeds, rubbiſh, or dung thereon, if any, into the bottom of the firſt, and then digging the ground of the ſecond along regularly, the proper width and depth as above; turning the earth ſpit and ſpit into the firſt open trench, laying it in a raiſed ridge lengthways thereof, without breaking it fine, ſo that it may lie ſomewhat rough and hollow, according as the nature of the ſoil may admit: proceeding thus with another trench in the ſame manner, and continuing the ſame with the whole, trench and trench, to the end of the plat of ground; filling up the laſt trench with the earth of the firſt opened, laying it now ridgeways, as in the preceding trenches.

But in the work of levelling down ridged ground, as wanted, it ſhould proceed regularly, ridge and ridge, longways, levelling the earth equally to the right and left, looſening any ſolid parts, and breaking all large rough lumps and clods moderately fine; forming the whole in an even regular ſurface, in order for ſowing and planting, as required.

And in general, it is not adviſable to lay down more than can be ſown the ſame or next day, while the ſurface is freſh ſtirred, eſpecially in broad-caſt ſowing and raking in the ſeed, as, moſt generally, all tolerably light mellow ſoils are more yielding to the rake while the ſurface is freſh moved; or before rendered wet by rain, &c.; or very dry and hardened in the top earth by the ſun, air, and winds, in dry weather, in the ſpring months, &c.; and likewiſe for ſowing ſeeds by bedding in and covering in with earth from the alleys, &c. or with earth raked off the beds for that purpoſe, it would generally be moſt ſucceſsful to perform it in a freſh ſtirred ſurface; though it is not ſo material in drill ſowing; and beſides, when ſeeds are committed to the earth, while it is in a freſh turned up ſurface, eſpecially in a dry ſeaſon, they are more forwarded in a free regular germination than in ground that has lain ſome time after digging or levelling down. Though ſome grounds, of a wet, or heavy, ſtiff nature, ſometimes require to lie a few days after digging or levelling down, in order for the rough cloddy ſurface to mellow in ſome degree, either by drying a little, or by having a moderate rain, or ſometimes both, to meliorate the lumpy clods, pliant to the rake, in the caſe of broad-caſt ſowing, and raking in the ſeed.

Ridging-*up*, in *Huſbandry*, a term uſed to ſignify the practice of laying up the mould or ſoil to the rows of particular ſorts of crops, as thoſe of the pea, potatoe, turnip, cabbage, and other ſimilar kinds. It alſo implies the laying up land or earth in ſuch a manner as that it may receive the moſt full and perfect benefit and influence of the atmoſphere, and in conſequence become in a mellow and pulverized ſtate. It is often very neceſſary in ſtiff lands.

RIDGLET, in *Agriculture*, a provincial word, uſed to ſignify a ſmall ridge, eſpecially when raiſed by baulking or ridging up with the plough.

RIDGLING, in *Rural Economy*, the male of any beaſt that

that has been partially castrated, or which is not properly formed in the cod.

RIDICULE, in *Ethics*, is commonly used in the same sense with irrision; and has for its objects the absurdities and misfortunes of mankind. The latter, however, are very improper objects of ridicule, whose province should extend only to the carelessness, inconstancy, humour, affectation, impertinence, and in short all the lesser follies and imperfections of mankind. Such are generally the subjects of Horace's Satires; and Dr. More observes, that irrision, which is the parent of ridicule, was the original of satire.

Dr. Campbell (Philos. of Rhet. vol. i.) observes, that ridicule is not only confined to questions of less moment, but is fitter for refuting error than for supporting truth, for restraining from wrong conduct, than for inciting to the practice of what is right. It is not properly levelled at the *false*, but at the *absurd* in tenets; and it is not the criminal part of misconduct which it attacks, but that we denominate silly or foolish. With regard to doctrine, it is not falsity or mistake, but palpable error or absurdity (a thing hardly confutable by mere argument) which is the object of contempt; and consequently those dogmas are beyond the reach of cool reasoning which are within the rightful confines of ridicule. This statement is obviously inconsistent with the mode of arguing adopted (very improperly, as we conceive) by those who make ridicule, or raillery, the test of truth. To this class we may refer a noble writer, who, in his "Characteristics" (vol. i.) after alleging that truth may bear *all* lights, observes, that *one* of those principal lights or natural mediums, by which things are to be viewed, in order to a thorough recognition, is *ridicule* itself, or that manner of proof by which we discern whatever is liable to just raillery in any subject. So much, at least, is allowed by all, who at any time appeal to this criterion. His advocates, however, have asserted, that unjust representations have often been given of the positions which he has maintained in his "Essay on the Freedom of Wit and Humour," and it has been said, particularly in the "General Dictionary," that he was very far from vindicating a vague, indecent, and boundless ridicule, or inclined to employ his wit and humour otherwise than under certain restrictions, and when particular occasions called for and justified it. Although it be allowed, that his lordship has been in some instances misunderstood and misrepresented, and he has written in a manner so inaccurate and unguarded, as to have subjected himself to just animadversion and censure, Dr. Brown, in his "Essays on the Characteristics," has animadverted on his lordship's reasoning; and with great ingenuity contended, that though ridicule is a species of eloquence, reason alone is the detector of falsehood, and the test of truth; that ridicule can never pretend to this character; that it is one of the most powerful engines by which error can be maintained and established; and that its proper object is folly of conduct, and chiefly affectation. Other writers have defended his lordship, among whom we may reckon the Rev. Mr. Charles Bulkley, an ingenious and learned dissenting minister. In a work ascribed to Mr. Ramsay, the painter, the author has attempted to shew, that ridicule is of two kinds, and that it may be applied to opinions as well as to manners. The usual objects of ridicule are, indeed, certain improprieties and peculiarities of character and conduct, and to assert, in general, that it is the test of truth, is advancing a false position. Reason is undoubtedly the genuine and proper test of truth. Nevertheless, ridicule may in some cases be justly applied to opinions. There are tenets so flagrantly absurd, that it is not easy to refrain from viewing them in the light of humour and raillery, and perhaps the best way of exposing them may be to display them in that light. Nevertheless, it must be acknowledged, that ridicule, when applied to grave and important subjects, is a very dangerous weapon; that it ought to be adopted with the utmost discretion, and that it has often been made use of in an improper manner.

With regard to conduct, says Dr. Campbell, we may discover to what kind ridicule is applicable, by directing our attention to the different departments of tragedy and of comedy. In the last it has a mighty influence: but into the first it never legally obtains admittance. Those things which principally come under its lash are aukwardness, rusticity, ignorance, cowardice, levity, foppery, pedantry, and affectation of every kind. But against murder, cruelty, parricide, ingratitude, or perfidy, to attempt to raise a laugh, would shew such an unnatural insensibility in the speaker, as would be excessively disgustful to any audience. To punish such enormities, the tragic poet must take a very different route. It should be carefully remembered, says our author, that where nothing reprehensible, or supposed to be reprehensible, either in conduct or sentiment, is struck at, there is properly no satire (or, as it is sometimes termed, pointed wit), and consequently no ridicule. We may here observe, that the words "banter" and "raillery" are used to signify ridicule of a certain form, applied, indeed, more commonly to practices than to opinions, and oftener to the little peculiarities of individuals, than to the distinguishing customs or usages of sects and parties. The only difference in meaning between the two terms is, that the first generally denotes a coarser, the second a finer sort of ridicule; the former prevails most among the lower classes of the people, the latter only among persons of breeding. Dr. Campbell, after remarking that an air of ridicule in disproving or dissuading, by rendering opinions or practices contemptible, hath occasionally been attempted with approbation by preachers of great name, suggests the absolute necessity, in the use of it, of the greatest care and delicacy, that it may not degenerate into a strain but ill adapted to so precious an occupation.

Our author cites the authority of Aristotle in favour of the general principles with regard to the subject of ridicule which he has endeavoured to establish. "The ridiculous," says the Stagyrite, "implies something deformed, and consists in those smaller faults, which are neither painful nor pernicious, but unbeseeming: thus a face excites laughter, in which there are deformity and distortion without pain." Aristotle here speaks of ridicule, not of laughter in general; and not of every sort of ridicule, but solely of the ridiculous in manners, of which he has, in few words, given a very apposite description. Laughter is not his theme, but comedy and laughter, only so far as comedy is concerned with it; and the concern of comedy reaches no farther than to that kind of ridicule which relates to manners. For an account of Hobbes's theory of laughter and Dr. Campbell's objection to it, see LAUGHTER.

On the subject of laughter, Dr. Hartley (Obs. on Man) remarks, that young children do not laugh aloud for some months. The first occasion of doing this seems to be a surprise, which brings on a momentary fear first, and then a momentary joy, in consequence of the removal of that fear, agreeably to what may be observed of the pleasures that follow the removal of pain. This may appear probable, inasmuch as laughter is a nascent cry, stopped of a sudden; and also because, if the same surprise, which makes young children laugh, be a very little increased, they will cry. As children learn the use of language, they learn to laugh at sentences or stories, by which certain alarming notions and expectations are raised in them, and again dissipated instantaneously.

taneouſly. Children, and young perſons, are diverted by every little jingle, pun, contraſt, or coincidence, which is level to their capacities, even though the harſhneſs and inconſiſtency, with which it firſt ſtrikes the fancy, be ſo minute, as ſcarcely to be perceived. And this is the origin of that laughter which is excited by wit, humour, buffoonery, &c. The moſt natural occaſions of mirth and laughter in adults ſeem to be the little miſtakes and follies of children, and the ſmaller inconſiſtencies and improprieties, which happen in converſation in the daily occurrences of life; inaſmuch as theſe pleaſures are, in great meaſure, occaſioned, or at leaſt ſupported, by the general pleaſurable ſtate, which our love and affection to our friends in general, and to children in particular, put the mouth and body into. For this kind of mirth is always checked where we have diſlike; alſo where the miſtake or inconſiſtency riſes beyond a certain limit; for then it produces concern, confuſion, and uneaſineſs. This account of the original of laughter, and alſo of its ſalutary effects which the author mentions, both with reſpect to the body and mind, is inconſiſtent with Hobbes's theory, to which we have above referred. The laughter of pride and contempt, and the ridicule connected with it, are very different, not only in their origin, but in their influence.

Ridicule, in a *Comedy*. See Comedy.

RIDICULI Ædicula, or the *Chapel of Laughter*, in *Roman Antiquity*, was a building erected at Rome, about two thouſand paces beyond the gate Capena, in memory of the flight of Hannibal from the ſiege of the city, on account of the ruin and tempeſt that befel him on that occaſion. The Romans, in ridicule of his flight, built and conſecrated this chapel.

RIDING, a corruption of *trithing*, a diviſion of Yorkſhire, of which there are three; *viz.* the Eaſt-riding, Weſt-riding, and North-riding.

In indictments, in that county, it is neceſſary that the town and riding be expreſſed. See Register.

Riding *Academy*. See Academy and Manege.

An academy for riding was founded in this country, by king William III. See Ride.

Riding *Armed*, with dangerous and unlawful weapons, is an offence at common law. (4 Inſt. 160.) By the ſtatute 2 Edw. III. cap. 3. none ſhall ride armed by night or day, to the terror of the people; or come with force and arms before the king's juſtices, &c. doing their office, upon pain to forfeit their armour, and ſuffer impriſonment at the king's pleaſure; and a fine may be ſet upon them by the juſtices, by 20 Ric. II. cap. 1. And no perſon can excuſe the riding armed, in public, by alleging that he wears armour for his defence againſt an aſſault; but men may wear common arms, according to their quality and the faſhion, and have attendants with them armed agreeable to their characters: alſo perſons may ride or go armed to take felons, ſuppreſs riots, execute the king's proceſs, &c. 3 Inſt. 162.

Riding *Caſt*, in *Huſbandry*, a term uſed by the farmers for a particular method of ſowing their grounds, by making two caſts upon the ground at the ſame time. This is not much uſed, but it is a quicker way than the double caſt, which is the method now moſt uſed. Plot's Oxfordſhire, p. 251.

Riding-*Clerk*, one of the ſix clerks in chancery, who in his turn, for one year, keeps the controlment-books of all grants that paſs the great ſeal that year. Blount.

Riding-*Bitts*, in *Ship Building*, are the largeſt bitts in a ſhip, and thoſe to which the cable is fitted when ſhe rides at anchor.

RIDL, in *Geography*, a town of Auſtria; 10 miles S.S.W. of Aigen.

RIDLEY, Nicholas, in *Biography*, an eminent Engliſh prelate, and martyr to the cauſe of the reformed religion, deſcended from an ancient family in Northumberland, was born early in the 16th century. As he exhibited early proofs of good natural abilities, he was placed in a grammar-ſchool at Newcaſtle-upon-Tyne, in which he made ſuch progreſs, that he was taken from thence and entered of Pembroke-hall, Cambridge. This was about the year 1518. In 1522 he was admitted to the degree of B.A.; and in 1524 he was elected a fellow of his college. In the following year he commenced M.A.; and having been ordained prieſt, he went, for farther improvement, to the Sorbonne at Paris; and from thence to Louvain; continuing on the continent till the year 1529. He had been brought up, and continued a zealous Papiſt; but on his return home, he applied with great diligence to the reading of the ſcriptures, as the ſafeſt guides in his theological ſtudies. In 1533 Mr. Ridley was choſen ſenior proctor of the univerſity; and while he continued in this office, the point of the pope's ſupremacy was brought before the univerſity, to be examined upon the authority of ſcripture. No one was better qualified to give an opinion on this ſubject than Mr. Ridley; and after much public diſputation, the univerſity came to the following reſolution: "That the biſhop of Rome had no more authority and juriſdiction derived to him from God, in this kingdom of England, than any other foreign biſhop;" and this was officially ſigned by Mr. Ridley, as well as by the vice-chancellor and the other proctor. In the year 1536, his well-known learning and talents procured him a powerful patron in archbiſhop Cranmer, who took him into his family, and made him his chaplain. He had, probably before this, abandoned the principles in which he had been educated; and being, in 1538, preſented by the archbiſhop to the vicarage of Herne, in Eaſt Kent, he preached certain doctrines attached to the reformation, but nevertheleſs ſtill adhered to the doctrine of tranſubſtantiation. Among other converts whom he made to his own opinions was lady Fiennes, who proved a diſtinguiſhed ornament to the cauſe which ſhe adopted. To excite or enliven the devotion of his pariſhioners, he had the "Te Deum" ſung in Engliſh, which was afterwards made the ſubject of an accuſation againſt him. In 1539, when the act of the ſix articles was paſſed, he bore his teſtimony againſt it, though he himſelf was not likely to be affected by the penalties of the ſtatute. In 1540 he went to Cambridge, and proceeded doctor in divinity; and ſoon after he was choſen to the maſterſhip of Pembroke-hall. About the ſame time he was, through the influence of the archbiſhop, nominated chaplain to the king; and this honour was ſpeedily followed by his collation to a prebendal ſtall in the cathedral church of Canterbury. In this city, when his duty called him to preach, he endeavoured with all his talents to expoſe to the people the abuſes of Popery; which gave ſo much offence, that charges were exhibited againſt him for preaching contrary to the ſtatute of the ſix articles. The attempt, however, of involving him in the penalties of the law, completely failed. Gardiner, biſhop of Wincheſter, next endeavoured to entrap him; and articles were exhibited againſt him before the juſtices of the peace in Kent, and afterwards before the king and council, which charged him with preaching againſt auricular confeſſion, and with directing the Te Deum to be ſung in Engliſh. The accuſation was fortunately referred to Cranmer, by the king, who immediately cruſhed it, much to the mortification of Dr. Ridley's enemies. About the year 1545 he

he began to examine the doctrine of transubstantiation, which he and his friend and patron, Cranmer, rejected as unscriptural. Towards the close of the year he was appointed prebend of St. Peter's, Westminster. It 1547 he was promoted to the bishopric of Rochester; and in the following year he was employed in reforming the liturgy, in conjunction with Cranmer, five other prelates, and some learned divines; and in 1549 he was appointed one of the commissioners empowered to search after all Anabaptists, heretics, and contemners of the book of common prayer. In this character he was involved in the foul reproach of having contributed to bring to the stake Joan Bocher, and others. (See CRANMER.) That he did this from conscientious motives, there can be no doubt; but he ought to have investigated the principles, before he proceeded to the horrid act of persecution; and having a mind open to conviction, he would soon have found that no tenets, inculcated by the mild and holy Jesus, would lead to the infliction of corporal punishment for the sake of curing mental error. He more than once opposed the unreasonable commands and wishes of those in power; and would no doubt, in the case of Bocher and others, have done so too, had he felt it his duty.

The bishop of Rochester was one of the commissioners appointed to sit in judgment on the cause of Bonner, bishop of London; and by him the sentence of deprivation was pronounced against the prelate. This was in the reign of Edward. In that of Mary, as we shall see, ample revenge was taken of him. Ridley succeeded to the bishopric of London in the year 1549-50, when the bishopric of Westminster was suppressed as a distinct see, and united to that of London. Ridley's conduct towards his predecessor Bonner, and his family, after taking possession of the episcopal palace, was honourable to his integrity and benevolence, of which the following facts are sufficient proofs. He took care to preserve from injury the goods, &c. belonging to Bonner, allowing him full liberty to remove them when he pleased. Such materials as Bonner had purchased for the repair of his house and church, the new bishop employed to the uses for which they were designed; but he repaid him the money which he had advanced for them. He took upon himself the discharge of the sums which were due to Bonner's servants for liveries and wages; and that the mother and sister of that prelate, who lived near the palace at Fulham, and had their board there, might not be losers in consequence of his promotion, he always sent for them to dinner and supper, constantly placing Mrs. Bonner at the head of the table, even when persons of high rank were his guests.

Soon after his translation to the see of London, bishop Ridley was nominated one of the commissioners for examining Gardiner, bishop of Winchester, and concurred in his deprivation. In 1550 bishop Ridley visited his diocese, and he directed that the altars should thenceforth be taken down in the churches, and tables substituted in their room, for the celebration of the Lord's supper; to take away the false persuasion which the people had, of sacrifices to be offered upon altars. In 1551 the sweating sickness prevailed in London, and in the space of a few days carried off eight or nine hundred persons; but in the midst of the alarm which this necessarily occasioned, Ridley administered in the duties of his office, trusting himself entirely to the good providence of God for safety, in the danger to which he was every moment exposed; and he endeavoured, with all the zeal of an exemplary spiritual pastor, to improve the public calamity to the reformation of the manners of the people. To promote more generally a reformation in the doctrine of the church, the council, this year, appointed Cranmer and Ridley to prepare a book of articles of faith. With this view they drew up forty-two articles, and sent copies of them to the other bishops and learned divines, for their corrections and amendments; after which the archbishop reviewed them a second time, and then presented them to the council, where they received the royal sanction, and were published by the king's authority, as an act of the supremacy. In the year 1552 he paid a visit to the princess Mary, and offered to preach before her; but she refused to hear him herself, or permit her servants to attend to his doctrine; telling him, that, in her father's days, he would not have dared to have avouched that for God's word that he then did. Mary never forgot nor forgave this interference on the part of the prelate, which, notwithstanding the remarks of most of Ridley's biographers, appears to us to have been uncalled for, if it were not even an act of rudeness not easily justified.

When the parliament assembled in 1553, the king, who was languishing under the decline which soon put an end to his life, ordered the two houses to attend him at Whitehall, where bishop Ridley preached before him, recommending with such energy the duties of beneficence and charity, that his majesty sent for him, to inquire how he could best put in practice the duties which he had so well and so strongly enforced; and the result of this sermon and conference was a determination in the king to found, or incorporate anew, and endow with ample revenues, those noble institutions, Christ's, Bartholomew's, Bridewell, and St. Thomas's hospitals.

Upon the death of Edward VI., Ridley was earnest in attempting to set lady Jane Grey on the throne; but when the design had miscarried, he went to Mary to do her homage, and submit himself to her clemency. His reception was such as he might have expected: he was immediately committed to the Tower, where, however, he was treated with much less rigour than Cranmer and Latimer, who were likewise prisoners in the same fortress. Ridley, it has been thought, might have recovered the queen's favour, if he would have brought the weight of his learning and authority to countenance her proceedings in religion. He was, however, too honest to act against his conviction; and he was, after eight months' imprisonment in the Tower, conveyed from thence to Oxford, where he was, on the 1st of October 1555, condemned to death for heresy. During the fortnight between his condemnation and execution, the priests tried all their means of persuasion to gain him over to their cause. He was deaf to their remonstrances, and was not to be shaken in the principles which he had adopted.

The 15th of October being the day appointed by the court for his execution, he met the trial with calmness and fortitude. He called it his marriage-day, and supped on the preceding evening with the utmost cheerfulness, having invited some friends on the occasion. When they rose to depart, one of them offered to sit up with him through the night, which he would not permit, saying, he meant to go to bed, and, by God's will, to sleep as quietly that night as he ever had done in his life. On the following morning, having dressed himself in his episcopal habit, he walked to the place of execution, between the mayor and one of the aldermen of Oxford; and seeing Latimer approach, from whom he had been separated since their condemnation, he ran to meet him, and with a cheerful countenance embraced him, and exclaimed, "Be of good heart, brother, for God will either assuage the fury of the flames, or else give us strength to endure them." Then walking to the stake, he kneeled

kneeled down, kiſſed it, and prayed with great fervour. A ſermon was now preached, at the concluſion of which he was aſked to recant; but he refuſed, and with a ſteadfaſt voice cried out, "May God's will be done." He was then ſtripped to his ſhirt, and faſtened by an iron chain to the ſame ſtake with biſhop Latimer. Every thing being ready, a kindled faggot was laid at Ridley's feet, who, when he ſaw the fire flaming up towards him, with a loud voice commended his ſoul to God. Latimer's ſufferings were ſoon at an end, but Ridley endured the agonies of dying a much longer time, till they were terminated by the exploſion of a bag of gunpowder, which had been ſuſpended from his neck: after this he diſcovered no ſigns of life. Such was the end of biſhop Ridley, who was unqueſtionably one of the moſt eminent inſtruments in promoting the cauſe of the reformation. In private life he was a pattern of all the virtues. His temper was excellent; his manners very affable and agreeable; and of the benevolence of his heart he gave abundant proofs, in his extraordinary liberality to the poor. He was unqueſtionably a man of great learning, and was author of a number of works. Many of his letters have been publiſhed by Fox, in his "Acts and Monuments;" and may likewiſe be ſeen in Gloſter's Life of Biſhop Ridley, to which, to Wood's Athen., and Neal's Hiſt. of the Puritans, our readers are referred.

Ridley, *Sir* Thomas, a learned civilian, of the ſame family as the preceding, was born at Ely, and educated firſt at Eton, and then at King's-college, Cambridge. He afterwards became a maſter in chancery, and vicar-general to the archbiſhop of Canterbury. He died in 1628, and was author of "A View of Civil and Eccleſiaſtical Law."

Ridley, Gloster, of the ſame family with the preceding, was born in 1702, on board the Glouceſter Eaſt Indiaman, whence he derived his name. He was educated in ſchool-learning at Wincheſter; from which place he was removed to New-college, Oxford, where he laid the foundation for thoſe acquirements, by which he was afterwards diſtinguiſhed as a poet, hiſtorian, and divine. He obtained ſome preferment in the church; and in 1740 and 1742 he preached eight ſermons at lady Moyer's lecture, which were publiſhed. In 1763 he publiſhed the "Life of Biſhop Ridley," to which we have referred; and ſhortly after, "A Review of Philips's Life of Cardinal Pole." In reward for his labours in this controverſy, and in another which Mr. Archdeacon Blackburn's Confeſſional produced, he was preſented by Secker to a golden prebend at Saliſbury. He died in 1774, leaving a widow and four daughters, one of whom, Mrs. Evans, publiſhed ſeveral novels. In the latter part of his life he loſt two ſons, young men of conſiderable talents. The elder, James, was author of "The Tales of the Genii;" a humorous paper, called "The Schemer," afterwards collected into a volume; "The Hiſtory of James Lovegrove," and ſeveral other literary pieces. Two poems by Dr. Ridley, one ſtyled "Jovi Eleutherio, or an Offering to Liberty;" and the other entitled "Pſyche," were printed in Dodſley's Collection. "Melampus," the ſequel of the latter, was printed by ſubſcription. His tranſcript of the Syriac Goſpels was publiſhed with a Latin tranſlation, by profeſſor White, in 2 vols. 4to. Gen. Biog.

Ridley, in *Geography*, a townſhip of America, in Delaware county, Pennſylvania, containing 991 inhabitants.

RIDOLLY, a town of Hindooſtan, in the ſubah of Agra; 35 miles S. of Agra.

RIDZIN. See Reussin.

RIE, in *Rural Economy*, a provincial term, applied to the operation of turning grain in a ſieve, ſo as to bring the *capes* into an eddy at the top. It is performed by a particular kind of circular motion.

RIEBACH, in *Geography*, a town of Germany, in the county of Hohenloe; 7 miles S.S.E. of Weichenſheim.

RIEBECK-CASTEEL, or the caſtle of Van Riebeck, one of the diviſions in the diſtrict of Stellenboſch and Drakenſtein, in the Cape diſtrict, Southern Africa, which may be conſidered as a prolongation of the *Paardeberg* (which ſee), terminating to the northward in a high rocky ſummit. It took its name from the founder of the colony having travelled to this diſtance from the Cape, which is about 60 miles, and which, in that early period of the ſettlement, was as far as it was conſidered ſafe to proceed, on account of the numerous natives, whoſe race has now almoſt diſappeared from the face of the earth. The produce is the ſame as that of Paardeberg, in both which there are as many corn-farms as freehold eſtates.

RIEBEN, a town of Brandenburg, in the Middle Mark; 3 miles S. of Belitz.

RIECHENAU, a town of the country of the Griſons; 9 miles S.S.W. of Coire.

RIED, a town of Bavaria; 18 miles S. of Paſſau.—Alſo, a town of Bavaria, in the principality of Aichſtatt; 4 miles S.E. of Harrieden.

RIEDEN, a town of Germany, belonging to Anſpach, inſulated in the principality of Culmbach; 22 miles N. of Anſpach.—Alſo, a town of Bavaria, in the Upper Palatinate; 9 miles S. of Amberg.

RIEDENBURG, a town of the biſhopric of Paſſau, on the Inn; 12 miles S.S.W. of Paſſau.—Alſo, a town of Bavaria, on the Altmuhl; 17 miles N.E. of Ingolſtadt.

RIEDLIN, Vitus, in *Biography*, a diſtinguiſhed German phyſician, was born at Ulm in March, 1656, where many of his anceſtors had practiſed the ſame profeſſion with conſiderable repute. He obtained his early education principally at his native city, and terminated his ſtudies by going to Tuningen in 1674, where he made great acquiſition, during a reſidence of two years, and afterwards into Italy; and he graduated at Padua, about the end of the year 1676. He wiſhed to have reſided longer at this diſtinguiſhed univerſity; but his father having died in his boyhood, he was unable to procure the neceſſary means, and therefore he returned to Ulm in the following year. In 1679 he was elected a member of the college of phyſicians at Augſburg, where he ſettled, and obtained a conſiderable ſhare of practice among the firſt people; but on the preſſing ſolicitations of his countrymen, he returned to Ulm in 1704, and remained there, in the enjoyment of extenſive reputation, till his death, which took place in 1724. His principal work is entitled "Lineæ Medicæ, continentes Obſervationes, Hiſtorias, Experimenta, Cauteles, &c. à Menſe Januario 1695 ad Menſem Junium 1700," in ten ſmall volumes. It is a ſort of journal, in which he not only recorded his own obſervations, but thoſe of others. It does not, however, commend itſelf by much originality or good method. Eloy Dict. Hiſt.

RIEDLINGEN, in *Geography*, a town of Wurtemberg; 27 miles S.W. of Ulm. N. lat. 48° 11′. E. long. 9° 30′.

RIEFF. See Riva.

RIEGEL, Henry Joseph, in *Biography*, a muſician born at Wertheim, in Franconia, in 1741. M. Laborde does him the honour to call him a French compoſer. He ſtudied muſic under Jomelli, at Stutgard, and was recommended by Richter to complete the muſical education of a young lady of rank in France; which having finiſhed, he eſtabliſhed himſelf at Paris in 1765. His paſſion for the harpſichord

harpſichord confined his ſtudies chiefly to that inſtrument for a conſiderable time; but after having acquired a diſtinguiſhed reputation for his execution, he attended ſcholars, and applied to compoſition. Beſides many quartets, concertos, ſonatas, duos, &c. he compoſed ſymphonies à grand orcheſtra, which had conſiderable ſucceſs at the concert of amateurs. He gained reputation by a French oratorio, "The Flight from Egypt," the firſt work of that kind that was executed at the Concert Spirituel, where it was well received for four ſucceſſive years. A ſecond oratorio, "The Taking of Jericho," had likewiſe merited applauſe.

His comic opera, "The Cobler and Financier," was at firſt repreſented at court, but afterwards well received in the capital, at the Italian theatre, though not performed by the beſt actors.

What characterizes his compoſitions is the great purity of his harmony. His effects are ingenious: in his capital pieces of ſymphonic compoſition, there is always a natural and regular melody. This compoſer, paſſionate for his art, enjoyed, free from envy, the talents of others. An enemy to cabal, he was excluſively attached to no kind of ſtyle; but enjoying whatever was good in all ſtyles, (French, Italian, German,) he was one of the few foreigners who did the moſt honour to the profeſſion in France. Laborde.

RIEHEN, in *Geography*, a town of Switzerland, in the biſhopric of Bâle, and principal place of a bailiwic; 3 miles E. of Bâle.

RIELVES, a town of Spain, in New Caſtile; 11 miles N.W. of Toledo.

RIEMLING, in *Ichthyology*, a name given by ſeveral to the ſmall freſh-water fiſh, called by the Latins *poxinus*, and vulgarly the *pink*.

RIENECK, in *Geography*, a town and citadel of Germany, and capital of a county of the ſame name, on the Sinn; 36 miles E. of Frankfort on the Maine. N. lat. 50° 11′. E. long. 9° 47′.

RIENS ARREAR, in *Law*, a kind of plea uſed to an action of debt upon arrearages of accounts; by which the defendant alleges, that there is nothing in arrear.

RIENS *paſſe par le fait, nothing paſſes by the deed*, is the form of an exception taken in ſome caſes to an action.

RIENS *par deſcent, nothing by deſcent*, is the plea of an heir, when ſued for his anceſtor's debt, though he had no lands from it by deſcent, nor has aſſets in hand.

RIENTZ, in *Geography*, a river of the county of Tyrol, which joins the Eyſach, at Brixen.

RIENZI, in *Biography*. See GABRINI.

RIER, or REER-COUNTY, *Retro-comitatus*, in *Law*, is uſed in the ſtatute of Weſtm. 2. c. 39. 2 Edw. III. cap. 5. and in our law-books, in oppoſition to *open county*.

This appears to be ſome public place, which the ſheriff appoints for the receipt of the king's money, after the end of the county-court. Fleta ſays it is *dies craſtinus poſt comitatum*.

RIERSDORFF, in *Geography*, a town of Auſtria; 3 miles W. of Mauttern.

RIESENBURG, a town of Pruſſia, in the province of Oberland; 18 miles S.W. of Konigſberg. N. lat. 53° 43′. E. long. 19° 24′.

RIESENKOPPE, or SCHNEE, a mountain of Sileſia, and one of the moſt elevated in Europe, in the principality of Jauer.

RIESSA, a town of Saxony, in the margraviate of Meiſſen, on the Elbe; 12 miles N.W. of Meiſſen. N. lat. 51° 18′. E. long. 13° 15′.

RIETBERG, a town of Germany, and capital of a county of the ſame name, on the Embs, which county is about 18 miles long and 6 broad; 12 miles W.N.W. of Paderborn. N. lat. 51° 55′. E. long. 18° 32′.

RIETI, a town of Italy, in the duchy of Spoleto, the ſee of a biſhop; containing, beſides the cathedral, three collegiate and ſix pariſh churches, and 12 convents. In the year 1785, it was much damaged by an earthquake; 25 miles E.S.E. of Spoleto. N. lat. 42° 44′. E. long. 12° 56′.

RIEV VOLODIMEROV, a town of Ruſſia, in the government of Tver; 64 miles S.W. of Tver. N. lat. 56° 5′. E. long. 34° 44′.

RIEUMS, a town of France, in the department of the Upper Garonne, and chief place of a canton, in the diſtrict of Murat; 9 miles S.W. of Murat. The place contains 1425, and the canton 6316 inhabitants, on a territory of 200 kiliometres, in 15 communes.

RIEUPEIROUX, a town of France, in the department of the Aveiron, and chief place of a canton, in the diſtrict of Villefranche; 15 miles W. of Rodes. The place contains 1752, and the canton 6299 inhabitants, on a territory of 182½ kiliometres, in 13 communes.

RIEUX, a town of France, and principal place of a diſtrict, in the department of the Upper Garonne; and before the revolution, the ſee of a biſhop; 24 miles S. of Toulouſe. N. lat. 43° 15′. E. long. 1° 17′.—Alſo, a town of France, in the department of the Morbihan; 10 miles S.E. of Rochefort.—Alſo, a town in the department of the Ille and Vilaine, on the Vilaine; 6 miles S. of Redon.—Alſo, a town in the department of the Aube; 10 miles E. of Carcaſſonne.

RIEZ, an old, populous town of France, formerly Civitas Reienſium, a biſhop's ſee, and the ſeat of a council in 439, ſituated on a plain between the Aſſe and Verdun, in the department of the Lower Alps, and chief place of a canton, in the diſtrict of Digne; 18 miles S. of Digne. The place contains 2784, and the canton 9963 inhabitants, on a territory of 330 kiliometres, in 14 communes. Its environs abound in wine and fruits.

RIEZE, a river of France, which runs into the Garonne, near Saverdun.

RIF, one of the largeſt provinces of the empire of Morocco, ſituate in that chain of mountains which forms a part of the Leſſer Atlas. This province, the ſoil of which is ſtony, is bounded by that of Garet to the eaſt, the Mediterranean to the north, on the coaſt of which is the ancient city of Gomera, and alſo Melilla and Veles de Pegnon, belonging to Spain; by the province of Garb to the weſt, and to the ſouth by thoſe of Shaus or Chaus, and Fez.

RIF. See BAHIRA.

RIF-DYKE, one of the ſmaller Orkney iſlands, eaſt of North Ronaldſha. N. lat. 59° 13′. W. long. 2° 17′.

RIFENBACH, a river of Germany, which runs into the Inn, 2 miles N. of Kuffſtain.

RIFFREDO, a town of Etruria; 20 miles N.N.E. of Florence.

RIFLE GUNS, in the *Military Art*, are thoſe whoſe barrels, inſtead of being ſmooth on the inſide, like our common pieces, are formed with a number of ſpiral channels, reſembling female ſcrews; except only that the threads or riſles are leſs deflected, making only one turn, or a little more, in the whole length of the piece. This conſtruction of the barrel is employed for correcting the irregularity in the flight of balls from ſmooth barrels, of which we have mentioned ſeveral inſtances under our articles GUNNERY and PROJECTILES. It has, for inſtance, been found, from the experiments of Mr. Robins, that notwithſtanding the piece was firmly fixed, and fired with the ſame weight of

powder, ſometimes the ball was deflected to the right, ſometimes to the left; ſometimes above, and at others below, the true line of direction. It has alſo been obſerved, that the degree of deflection increaſes in a much greater proportion than the diſtance of the object fired at: thus, at double the diſtance, the deflection of the ball from the line in which the piece is pointed is conſiderably more than double, and at treble the diſtance more than treble, what it was at firſt. Mr. Robins ſecured a muſket barrel upon a block of wood, and firing it with a ball at a board of a foot ſquare, at 60 yards diſtance, found that it miſſed the board only once in 16 ſucceſſive diſcharges; yet when fired with a ſmaller charge, at the diſtance of 760 yards, the ball was thrown ſometimes 100 yards to the right or left of the line in which it was pointed. The direction upwards and downwards was alſo found equally uncertain; the ball, in ſome diſcharges, having ſtruck the ground 200 yards nearer the piece than it did at others.

It is not difficult to account for theſe irregularities: they doubtleſs proceed from the impoſſibility of fitting a ball ſo accurately to any plain piece, but that it will rub more againſt one ſide of the barrel than another, in its paſſage through it. Whatever ſide, therefore, of the muzzle the ball is laſt in contact with, on quitting the piece, it will acquire a whirling motion towards that ſide, and will be found to bend the line of its flight in the ſame direction, whether it be upwards or downwards, to the right or left; or obliquely, partaking in ſome degree of both; and after quitting the barrel, this deflection, which, though in the firſt inſtance it is but trifling and inconſiderable, is ſtill farther increaſed by the reſiſtance of the air; this being greateſt on that ſide where the whirling motion conſpires with the progreſſive one, and leaſt on that ſide where it is oppoſed to it. Thus, if the ball, in its paſſage out, rubs againſt the left ſide of the barrel, it will whirl towards that ſide; and as the right ſide of the ball will, therefore, turn up againſt the air during its flight, the reſiſtance of the air will become greateſt on the right ſide, and the ball be forced away to the left, which was the direction it whirled in. If the axis, about which the rotatory motion of the ball is made, preſerved its poſition during the whole flight, the deflection would be in the ſame direction from one end of the track to the other; though it is obvious, that the quantity of this deflection would ſtill not be proportional to the diſtance: for if all reſiſtance of the ball were to ceaſe at any part of its flight, ſtill the ball would neceſſarily purſue the line in which it then moved, and the deflection be double at a double diſtance, treble at a treble diſtance, and ſo on. But as this reſiſtance does not ceaſe, but continue to act upon the ball throughout its whole flight, (though leſs in the latter part of it than at the commencement, in conſequence of the decreaſe of velocity,) it is obvious that the deflection of the ball will be accelerated at every inſtant, and conſequently increaſe in a greater proportion than the diſtance; as we have ſeen it has been found to do, from the experiments above alluded to. It happens, however, from various accidental circumſtances, that the axis of the ball's rotation frequently changes its poſition ſeveral times during the flight; ſo that the ball, inſtead of bending its courſe uniformly in the ſame direction, often deſcribes a track variouſly contorted. So great, however, is the tendency of the ball to deflect itſelf againſt the ſide it rubs againſt, that it has been ſaid, though we never ſaw the experiments authenticated, that a ball, when fired out of a barrel bent towards the left hand, (and which will, therefore, be thrown from the piece in the direction of the bend,) yet as the ball, in this caſe, will be forced to rub againſt the right ſide of the muzzle, and thus turn its left ſide up againſt the air, ſo it will be found to alter its courſe during the flight, and bend towards the right hand, ſo as to fall a conſiderable way to the right hand of the line in which the piece was pointed.

It will readily appear, therefore, from what has been ſtated, that theſe variations will be more frequent and conſiderable when the ball runs very looſe in the piece; or when, from any roughneſs on its ſurface, or on the middle of the barrel, a conſiderable degree of friction takes place between them. With a view to prevent friction, it has been propoſed to greaſe the ball; but this we ſhould imagine would be of very little ſervice. All that can be done in a plain barrel is to have the balls caſt very ſolid and true, and afterwards milled in the ſame manner as is now practiſed upon ſhot: the barrel alſo ſhould be very ſmooth on the inſide, and the ball fit it very accurately, ſo as to leave ſcarcely any windage: yet, with all theſe precautions, it is very difficult, we may ſay impoſſible, to prevent it entirely; for gravity will conſtantly act, and friction on the under ſide will naturally be occaſioned by the weight of the ball. In fact, when we conſider the cauſes of the aberration in the flight of balls, it will be pretty evident that the only means of correcting it is by preventing the ball from rubbing more againſt one ſide of the barrel than another in paſſing through it; and by giving to the bullet a motion which will counteract every accidental one, and preſerve its direction, by making the reſiſtance of the air upon the fore part continue the ſame during its whole flight; that is, by giving it a rotatory motion perpendicular to the line of direction. The contrivance for this purpoſe is called rifling, and conſiſts of forming upon the inſide of the barrels a number of threads and furrows, either in a ſtraight or ſpiral direction, into which the ball is moulded, whereby any rolling motion along the ſides of the barrel is effectually prevented.

The numbers of theſe threads in a gun are different, according to the fancy of the workman and the ſize of the barrel; and, in like manner, the depth to which theſe channels or rifles are cut down, is not regulated by any invariable rule; but differs according to the country where the work is performed, or the caprice of the artificer. There are alſo different methods of charging pieces of this kind, but the uſual one is as follows: after the powder is put in, a leaden bullet, ſomewhat larger than the bore of the gun, is taken, and having greaſed it well, it is laid on the mouth of the piece, and rammed down with an iron rammer, hollow at the end; the ſoftneſs of the lead giving way to the violence with which the bullet is impelled, that zone of the bullet which is contiguous to the piece, varies its circular form, and acquires the ſhape of the inſide of the barrel, ſo that it becomes the part of a male ſcrew, exactly fitting the indents of the rifle. And hence it happens that, when the piece is fired, the indented zone of the bullet follows the ſweep of the rifles, and thereby, beſides its progreſſive motion, acquires a circular one round the axis of the barrel, which motion will be continued to the bullet after its ſeparation from the piece; by which means a bullet diſcharged from a rifled barrel is conſtantly made to whirl round an axis, which is coincident with the line of its flight. And hence it follows, that the reſiſtance on the foremoſt ſurface of the bullet is equally diſtributed round the pole of its circular motion, and acts with an equal effort on every ſide of the line of direction, ſo that this reſiſtance can produce no deviation from that line: and if, by the caſual irregularity of the foremoſt ſurface of the bullet, or by any other accident, the reſiſtance ſhould be ſtronger on one ſide of

the pole of the circular motion than on the other; yet, as the place where this greater resistance acts must perpetually shift its position round the line, in which the bullet flies, the deflection, which this inequality would occasion, if it acted constantly with the same given tendency, is now continually rectified by the various and contrary tendencies of that disturbing force, during the course of one revolution; so that the ball will always go right forwards, and thus that deflection or deviation, already taken notice of under the article PROJECTILE, and in the preceding part of this article, will be prevented. This may be explained by the motion of an arrow; for if an arrow that is not feathered be shot from a bow, its motion will be very irregular; but when the feathers of the arrow are properly arranged in a spiral form, so as to make the arrow spin round its axis, it will always fly straight forward. Upon the same principle, every school-boy finds himself under the necessity of making his shuttle-cock spin, before he can depend upon the truth of its flight. Mr. Robins observes, that the actual motions of bullets discharged from rifled pieces correspond very well with these speculations. Although the use of pieces of this kind had long prevailed in Europe, particularly in Germany and Switzerland, the advantages resulting from them have been very imperfectly understood, and, as Mr. Robins observes, unaccountably misrepresented. The three following reasons have been constantly alleged in favour of this construction: either that the inflammation of the powder was greater by the resistance which the bullet thus forced into the barrel gave it, and that by it the bullet received a much greater impulsion than it would have done from the same quantity of powder in a common piece, or that the bullet, by the compounding of its circular and revolving motion, did, as it were, bore the air, and thereby flew to a much greater distance, than it would otherwise have done; or that, by the same boring motion, it made its way much easier through all solid substances, and penetrated much deeper into them, than if discharged in the common manner. But the ingenious writer just mentioned, satisfied himself by numerous experiments made with rifled barrels of various sizes, that none of these reasons hold true in the use of such pieces; but that the advantage of their construction results from its preventing the deflection of the ball, as we have above represented it. And that it produced this effect he found by observing, that the same hemisphere of the bullet which lies foremost in the piece, continued foremost during the whole course of its flight.

In Germany and Switzerland, an improvement is made in the method, already recited, of charging these pieces; especially those of the larger sort, which are used for shooting at great distances. This is done by cutting a piece of very thin leather, or of thin fustian, in a circular shape, somewhat larger than the bore of the barrel. This circular piece being greased on one side is laid upon the muzzle with its greasy parts downwards, and the bullet being placed upon it, is then forced down the barrel with it; by which means the leather or fustian incloses the lower half of the bullet, and by its interposition between the bullet and the rifles, prevents the lead from being cut by them. But in those barrels where this method is practised, the rifles are generally shallow, and the bullet ought not to be too large. The rifle-barrels, which have been made in England, where they are not very common, are contrived to be charged at the breech, the piece being, for this purpose, made larger there than in any other part. The powder and bullet are put in through the side of the barrel by an opening, which, when the piece is loaded, is filled up with a screw. By this means, when the piece is fired, the bullet is forced through the rifles, and acquires the same spiral motion as in the former kind of pieces; other barrels unscrew at the breech, for the convenience of charging them. With regard to the defects of these rifled pieces, Mr. Robins observes, that if either the angle of elevation, or the curvature of the bullet's track through the air be great, the inclination of the axis round which it whirls will cause irregularities, which will often produce considerable deflections. Accordingly he proposes to make use of bullets of an egg-like form, instead of spherical ones, and to fire them with their broad ends foremost, that thus their longer axes may be always carried, by their centres of gravity, into the lines of their flight. Upon the whole, he concludes, that whatever tends to diminish the friction of these pieces, tends, at the same time, to render them more complete; and consequently the less the rifles are indented, the better they are, provided that they are just sufficient to keep the bullet from turning round in the piece. Besides, the bullet ought to be no larger than to be just pressed by the rifles, for the easier the bullet moves in the piece, supposing it not to shift its position, the more violent and accurate its flight will be. And to render them in this respect still more complete, the sweep of the rifles should be in each part exactly parallel to each other: for then, after the bullet is once put in motion, it will slide out of the barrel without any shake, and with a much smaller degree of friction than if the threads of the rifles have not all of them the same degree of incurvation. The foreigners are so exact in this respect, that they try their pieces, with a view to this particular, in the following manner: they first pour melted lead into them, and letting it cool, they procure a leaden cylinder of perhaps two or three diameters in length, exactly fitted to one part of the inside of the piece; then if this leaden cylinder, being gently pushed by the rammer, will pass from one end of the barrel to the other, without any sensible strain or effort, they pronounce the piece perfect; but if it any where sticks or moves hard they esteem it defective.

We have stated that some rifle-pieces are charged at the breech; these, however, are necessarily much dearer than the others, and excepting the expedition in charging them, are really inferior to those in which the ball is introduced at the muzzle, on which account they are not much employed at present, at least not in this country. The want of expedition in the charging pieces of this kind is, however, a very serious defect, to remedy which, it has been proposed to have the balls cast with projections upon them, in the same manner as described in the following article on RIFLE *Ordnance*. This may be done with great ease and accuracy, by making corresponding hollows round the zone of the bullet-mould; by this means the balls may be fitted so accurately to the rifles, as to leave scarcely any windage; while the friction will be less than it is either when the ball is put in at the breech, or forced in at the muzzle.

In treating of the causes of aberration in the flight of balls, we have supposed the air to be perfectly at rest; but it is evident that the force of the wind will affect balls considerably, whether they are fired from a plain or a rifle barrel; this effect, however, will be much less in the latter than in the former; but in neither case is it possible either to avoid it entirely, or to estimate the quantity of aberration that it may, under different circumstances, occasion.

Pieces intended for shooting with ball, whether they be plain or rifled, ought to be of much more equal thickness

neſs from the breech to the muzzle, than thoſe that are intended for ſhot only. In every barrel there is an undulating vibration communicated to the metal by the exploſion. This is moſt remarkable in a thin barrel, and when the charge is great, and in an equal degree, whether the piece be rifle or plain, and therefore ought to be equally attended to by gunſmiths in both caſes. For more on the ſubject of rifle muſket barrels, ſee Robins' Tracts, vol. i. p. 328, &c.; ſee alſo Nicholſon's Philoſophical Journal, vol. i. p. 382; and for rifle ordnance, ſee the Memoir of the National Inſtitute mentioned in the following article.

Rifle *Ordnance*. After the important advantages attending rifled barrel muſkets were well underſtood, the idea naturally occurred of carrying the ſame improvements into cannons and field-pieces, and many experiments have been made with a view of conſtructing theſe on ſimilar principles to the muſket. The firſt attempt of this kind was made by Dr. Lind, and Capt. Alexander Blair, of the 69th regiment, in 1774. The pieces are of caſt iron, and are not bored like the common cannon, but have the rifles moulded on their core, after which they are cleaned out, and furniſhed with the proper inſtruments.

Guns of this deſcription, which are intended for the field, ought never to be made to carry a ball of above one or two pounds weight at moſt; a leaden bullet of that weight being ſufficient to deſtroy either man or horſe. A pound gun of this deſcription, of good metal, need not weigh above an hundred weight, and its carriage about another hundred, and may therefore be eaſily tranſported from place to place by a few men, and a couple of good horſes may tranſport ſix of theſe guns and their carriages, if put into a cart. But for other purpoſes, in which a greater momentum is neceſſary, there is nothing to prevent them being made of the uſual calibre.

The following are the dimenſions that have been recommended for theſe kinds of cannon. The length of the gun being divided into ſeven equal parts, the length of the firſt reinforce is two of theſe parts; the ſecond reinforce $1\frac{15}{16}$ of the diameter of the calibre; the chaſe $3\frac{1}{16}$ diameter of the calibre. The diſtance of the hind part of the baſe ring to the beginning of the bore is $1\frac{3}{16}$ calibre. The trunnions are each one calibre in length, and the ſame in breadth; their centres are placed $\frac{3}{7}$ths of the length of the gun from the hind part of the baſe ring, in ſuch a manner, that the axis of the trunnions paſs through the centre line of the bore, which prevents the gun from kicking, and breaking its carriage. The length of the caſcable is $1\frac{3}{16}$ of a calibre.

The calibre of the gun being divided into 16 equal parts; then

The thickneſs of metal from the baſe ring to the bore, is	18.5
At the end of the firſt reinforce	17
At the ſame place for the beginning of the ſecond reinforce	17
At the end of the ſecond reinforce	15
At the ſame place for the beginning of the chaſe	13.75
At the end of the chaſe, or muzzle, the mouldings excluded	9
At the ſwelling of the muzzle	12
At the muzzle fillet	9.5
At the extreme moulding	8
Baſe ring	5.5
Ogee next the baſe ring	5.5
The aſtragal, or half round	4.75
Its fillet	1
Total aſtragal and fillets at the vent-field	4
Firſt reinforce ring	4.5
Second reinforce ring	3.5
Its ogee	3
Its aſtragal	1.5
And its fillet	1
The muzzle, aſtragal and fillet	4
Breadth of the fillet at the baſe ring	1
Diſtance of the fillet at the button from the fillet at the baſe ring	5
Breadth of the fillet at the button	1
Diameter of the fillet at the button	18
Diſtance of the centre of the button from its fillet	12
Diameter of the button	18
Diameter of its neck	10.5

The vent ſhould be placed about half an inch from the bottom of the chamber or bore, that the cartridge may be pricked, leſt ſome of the bottom of the cartridges ſhould be left when the gun is ſponged, which might retard the firing till the ball be again drawn, which is very difficult in pieces of this kind.

The rifles in this gun make one ſpiral turn in the length of the bore, but go no nearer to the breech, in their full ſize, than two calibres, and terminate in a gentle ſlope in half a calibre more, ſo as not to prevent the cartridge, with the powder, from being eaſily ſent home to the bottom of the gun, which would otherwiſe conſtantly happen with the flannel cartridges, and even ſometimes with paper ones, if not made to enter very looſely. The ſhape of the rifles is ſemicircular, their breadth being equal to the diameter, which is $\frac{3}{16}$ths of the calibre, and their depth $\frac{6}{16}$ths of a calibre. The bullets are of lead, having ſix knobs caſt on them, to fit the rifles of the gun; and being thus made of ſoft metal, they do not injure the rifles.

Rifle ordnance, however, of any calibre, might be made to carry iron ſhot for battering, or for other purpoſes; provided holes, that are a little wider at their bottoms than at their upper parts, be caſt in a zone round the ball, for receiving afterwards leaden knobs to fit the rifles of the cannon; by which means the iron ſhot will have its intended line of direction preſerved, without injuring the rifles more than if the whole ball was of lead, the rotatory motion round its axis, or the line of its direction, which corrects the aberration, being communicated to it by the leaden knobs following the ſpiral turn of the rifles in their progreſs out of the gun. It is particularly to be obſerved, that the balls muſt be made to go eaſily down into the piece, ſo that the cartridge with the powder, and the bullet, may be both ſent home together with a ſingle puſh of the hand, without any wadding above either the powder or the ball, by which means the gun is quickly loaded, and the ball flies farther than when it is forcibly driven into the gun, as was found from many experiments. The only reaſon why, in common rifle muſkets, the bullets are forcibly rammed in, is, that the zone of the ball which is contiguous to the inſide of the bore, may have the figure of the rifles impreſſed upon it, in ſuch a manner, as to become part of a male ſcrew, exactly fitting the indents of the rifle, which is not at all neceſſary in the preſent caſe, the figure of the rifles being, in the firſt inſtance, caſt upon the ball. Theſe knobs retard the flight of the ball in ſome degree, but this ſmall diſadvantage is fully counterbalanced by the eaſe with which the gun is loaded, its ſervice being nearly as quick as that of a common field-piece, and the retardation and quantity of the whirling motion which is communicated to the bullet being conſtantly the ſame, it will not in the leaſt affect the experiments

ments made with them, in order to determine the resistance of the air.

The French, in the course of the late war, have made experiments on rifle ordnance of a different kind to that above explained; in which, in fact, the gun is of the usual form, the principal difference being in the nature and form of the ball, which M. Guyton (who has given an account of these experiments in vol. vii. of the National Institute of France) calls *bullets a bague de plomb*, which in form are cylindrico-spherical, the cylindric part being next the charge. A rim of lead is fixed round the centre of the ball, rather exceeding the bore of the gun, which is cut off by the edge of the muzzle, in introducing the ball into the piece, whereby all the advantages of the rifle are obtained, although the rotatory motion above described, and which is supposed to have so great an influence on the direction, has not place in the present instance. According to M. Guyton's report, the accuracy in the rectilinear motion of these balls exceeded any thing before known in artillery practice; besides, that although the weight of the bullet was nearly double that of a common shot of a piece of the same calibre, the range in very few instances fell short of the common range, and in some even considerably exceeded it. The difficulty and time requisite in loading a gun with a ball of this kind, however, are so great, as, in our opinion, to render it useless, although it seems to have been recommended for adoption, in a few particular situations, by a committee of French artillery officers. In the course of the memoir in which the above experiments are detailed, M. Guyton mentions another kind of rifle cannon, invented by an Italian officer, which was found remarkably correct in projecting the ball in a right line. The bore of this gun is slightly conical, being greatest at the breech, where the piece is loaded by unscrewing the breech, as in some rifle muskets and pistols: the ball is of lead, which must necessarily, from the construction of the gun, change its form in passing through the bore. But this, as well as the one above-mentioned, seem to require too much time in loading to be ever adopted as regular pieces of ordnance.

RIFTS, in *Farriery*, are small cracks, clefts, chaps, or any other similar fissures or openings in the hoofs of horses' feet. See those heads.

RIG. See Ridgling.

Rig, in *Rural Economy*, a male sheep, with none, or one testicle only in the scrotum.

RIGA, in *Geography*, a sea-port town of Russia, formerly the capital of Livonia, now of the government of its own name, is situated in the gulf of Riga, and the see of an archbishop. This town derives its consequence from its situation on the Duna, which, being navigable from the frontiers of the government of Polotsk, brings the productions of the north-eastern parts of Poland and the western provinces of Russia, and has depth enough to receive, close to its walls, ships of burden, which sail to and from the Baltic. Next to St. Petersburg, it is the most commercial town in the Russian empire. The trade is chiefly carried on by foreign merchants, who reside in the town. Those of the English factory possess the greatest share of the commerce, and live in an hospitable, splendid manner. The principal exports are corn, hemp, flax, iron, timber, masts, leather, tallow; and the imports are salt, cloth, silks, wine, grocery, potash, and salted herrings. The mast trade is peculiarly beneficial to the town; the burghers of Riga send persons, who are called mast-cutters, into the Russian provinces, to mark the trees, which are purchased standing. They grow mostly on the districts which border the Dnieper, are sent up that river to a landing-place, transported 30 versts to the Duna, are then formed into floats of from 50 to 200 pieces, and descend the stream to Riga. The tree which produces the largest masts is the Scotch fir. Those pieces which are from 18 to 25 inches in diameter, are called masts; under those dimensions, spars, or, in England, Norway masts; because Norway exports no trees more than 18 inches in diameter. The English merchants, who contract with government, buy the masts from the burghers of Riga, which are skilfully examined in order to ascertain their soundness, and are usually from 70 to 80 feet in length.

The hemp is brought from the Ukraine and Poland, and requires two years in its passage to Riga. The barks in which it is conveyed are from 250 to 300 tons burden, are covered with mats, sloping like a pent-house roof, and have a false bottom. They ascend the Dnieper and Duna; but on account of numerous shoals, can only pass the Duna in the spring, or about three weeks after the snow begins to melt, and if they miss that time, they are delayed till autumn. The hemp exported from Riga is generally more esteemed, and 30 *per cent.* dearer than that exported from Petersburg; the former comes from the Ukraine, the provinces of Mohile and Polotsk, and the neighbouring parts of Poland; the other from the governments of Tver and Novogorod. The Riga hemp is chiefly used for shrouds and stays of men of war, and procured by contract for the English admiralty and the East India company.

The inhabitants of Riga carry on also a considerable commerce in salt. They import it from Spain, and send it up the Duna, to supply the districts bordering on that river; and by land into Courland, and into the neighbouring provinces of Poland. This town, says Mr. Coxe, contains within the fortifications 9000 inhabitants, and in the suburbs 15,000, exclusive of a garrison of 1000 soldiers. According to Heym, the town and suburbs contain 14,280 males, and 13,516 females.

Over the Duna at Riga is a floating wooden bridge, 40 feet in breadth, and 2600 in length. A row of piles extends from one shore to the other; each pile is from 25 to 40 feet long, according to the depth of the river, and appears about four feet above the level of the water. To these piles the ponts of the bridge are loosely fastened, by means of iron chains fixed to the transverse beams. The bridge rises and falls with the river; and, under the wheels of heavy-laden carriages, plays as if actuated by a spring. This is the fashionable walk, and is an agreeable busy scene, when crowded with people, and lined on each side with ships taking in or unloading their cargoes. In the beginning of winter, when the frost sets in, the bridge is removed; the piles, remaining in the water, are forced up by the ice, and conveyed to land; and the whole is laid down again in the spring.

Riga was built in the year 1200, and soon after inclosed by a wall. At different periods it hath suffered much by fires and sieges. N. lat. 56° 55′. E. long. 23° 54′.

Riga, Ital., a line of the staff, in *Music*; and speaking of music in general, the whole five lines, or staff, are called *una riga*.

RIGADON, Rigodon, and *Rigaudon*, a gay and lively dance, written all these several ways. Some say it came from Provence; but Rousseau affirms, that he has been told by an old dancing-master, that it had its name from its inventor, Rigaud.

At the beginning of the last century, there were three dances which every eminent master taught, and every noble-

man's

man's and gentleman's child learned, in the courſe of their education: theſe were the minuet, rigaudon, and l'ouvre, all natives of France, during the reign of Louis XIV.

The air to the rigaudon is always in jig time of $\frac{6}{8}$, beginning with an odd quaver. See DANCE, MINUET, and L'OUVRE.

RIGAL, in *Muſic*. See RIGOLL.

RIGAUD, HYACINTH, in *Biography*, was born at Perpignan, in Languedoc, in 1663, and was the ſon of Matthias Rigaud, a painter of ſome note, from whom, of courſe, he received his initiation into the myſteries of his art. He had the misfortune to loſe his inſtructor, when he was only eight years of age; and for a while, he was at the mercy of incapable maſters. At length he became acquainted with a portrait-painter, of the name of Ranc, under whom he acquired conſiderable freedom of taſte; and, after a few years, was enabled to produce works which rivalled thoſe of his maſter, for truth, for livelineſs, and expreſſion.

He was impatiently deſirous of viſiting Italy, but was diſſuaded from it by Le Brun, who adviſed him to continue at Paris, and ſtudy portraiture; by which he might aſſure himſelf of fortune and reputation: and his ſubſequent ſucceſs proved the propriety and kindneſs of the advice. He ſoon diſtinguiſhed himſelf by a richneſs and boldneſs of ſtyle, that induced the king of France, Louis XIV., to ſit to him for his portrait; and in ſucceſſion, he painted the princes of the blood, and prime nobility of the kingdom. Many foreign princes, nobles, and generals, alſo had their portraits from his hand; and he treated them with a ſplendour in compoſition, of which he is the inventor, and which unfortunately governed the French ſchool of portrait-painters till the revolution. We ſay, unfortunately!—for though Rigaud managed it with great dexterity, yet not being founded in nature, it neceſſarily led to error. To produce ſuperior grace, the actions of the figures are twiſted, and too often diſtorted: they are engaged about trifles, with an air of immenſe importance; and the draperies arranged in flowing lines, which convey an idea of motion in ſubſtances which would require a guſt of wind to move them, while the wearers are tranquilly ſeated in ſplendid apartments, and under complete ſhelter. He died in 1743, at the advanced age of 80.

RIGAULT, NICHOLAS, was born at Paris in 1577, and was educated among the Jeſuits, who in vain attempted to induce him to enter into their ſociety. As a literary character, he made himſelf known by a ſatirical work, entitled "Funus Paraſiticum," publiſhed in 1596; with which the celebrated de Thou was ſo much delighted, that he entruſted him with the education of his ſon. When the learned Caſaubon, who had the care of the royal library, removed to England, Rigault ſucceeded him in that employment. His ſervices were ſo well approved, that he was created attorney-general of the ſovereign chamber of Nanci, counſellor to the parliament of Metz, and, finally, intendant of that province. He died at Toul in 1654, at the age of 77, with a character for generoſity, modeſty, and benevolence, that contributed as much to his reputation as his numerous writings. It was chiefly as an editor of Greek and Latin authors that he made himſelf known to the learned world. Of theſe were "Minutius Felix," 1643; "St. Cyprian," 1648; and "Tertullian," 1664; enriched with uſeful notes, corrections, and obſervations. He gave tranſlations of the Greek writers, "Onoſander," "Artemidorus," and others; and he edited, with notes, "Phædrus," "Martial," "Rei Agrariæ Scriptores," &c. He alſo wrote and edited ſome works on juridical ſubjects; and he was appointed, together with Peter Dupin, by the will of the preſident de Thou, to give a complete edition of his hiſtory, which appeared at Geneva in 1620.

RIGEL, in *Aſtronomy* See REGEL.

RIGEL, or RIEGEL, ANTHONY, in *Biography*, a harpſichord maſter and compoſer. In 1780 he was at Spire, Manheim, and Paris, where he publiſhed pieces for the harpſichord, with a violin accompaniment in duo, *a parte equali*; and afterwards capriccios for the harpſichord. His ſtyle is ſlight, with little invention, but not vulgar.

RIGG, in *Agriculture*, a provincial word, uſed to ſignify the ſame as ridge.

RIGGEN, in *Rural Economy*, the ridge of the roof of a building. See FARM-*Building*.

RIGGEN-*Tree*, the piece of timber laid along the ridge of a roof, to ſupport the heads of the ſpars or rafters, which, in modern buildings, is found unneceſſary.

RIGGIL. See RIG and RIDGIL.

RIGGING, a general name given to all the ropes employed to ſupport the maſts, and to extend or reduce the ſails, or arrange them to the diſpoſition of the wind.

The former, which are uſed to ſuſtain the maſts, remain uſually in a fixed poſition, and are called *ſtanding* rigging: ſuch are the ſhrouds, ſtays, and backſtays. (*Plate* III. *Rigging*, *fig.* 1.) The latter, whoſe office it is to manage the ſails, by communicating with various blocks, &c. ſituated in different parts of the maſts, yards, ſhrouds, &c. are comprehended in the general term of *running* rigging: ſuch are the braces, ſheets, haliards, clue-lines, brails, &c. *Plate* III. *fig.* 2.

The principal objects to be conſidered in rigging a ſhip appear to be ſtrength, convenience, and ſimplicity; or the properties of affording ſufficient ſecurity to the maſts, yards, and ſails; of arranging the whole in the moſt advantageous manner, to ſuccour the maſts, and facilitate the management of the ſails; avoiding perplexity, and rejecting whatever is ſuperfluous and unneceſſary. The perfection of this art, then, conſiſts in retaining all theſe qualities, and in preſerving a judicious medium between them.

Rigging is in part prepared on ſhore, in a rigging-houſe, which has the following conveniencies, &c.; *viz.* at the upper end is a windlaſs; and at certain diſtances down the middle are two rows of large ſtrong poſts, for ſtretching ropes, and laying on ſervice; and on each ſide of the houſe are births for the men to ſtrop blocks, and prepare ſmall rigging on.

There is much ſubordinate knowledge neceſſary, before a perſon can either prepare rigging in the houſe, or fit it on board the ſhip. This conſiſts of *knotting*; as the overhand knot (*Plate* I. *fig.* 1.); reef-knot, *fig.* 2; bowline-knot, *fig.* 3; wall-knot, *figs.* 4 and 5; double wall-knot crowned, *fig.* 6; buoy-rope-knot, *fig.* 7; ſtopper-knot, *fig.* 8; diamond-knot, ſingle, *fig.* 9; diamond-knot, double, *fig.* 10; ſhroud-knot, opened for knotting, *fig.* 11; as knotted, *fig.* 12; ends tapered and ſerved, which completes it, *fig.* 13; tack-knot, *fig.* 14; ſprit-ſail ſheet-knot, *fig.* 15.

Hitches.—Sheepſhank, *fig.* 16; half-hitches, *fig.* 17; clove-hitch, *fig.* 18; rolling-hitch, *fig.* 19; midſhipman's hitch, *fig.* 20; Blackwall-hitch, *fig.* 21; magnus-hitch, *fig.* 22; timber-hitch, *fig.* 23; racking-hitch, *fig.* 24.

Bends.—Sheet-bend, *fig.* 26; Carrick-bend, *fig.* 27; fiſherman's bend, *fig.* 30; hawſer-bend, *fig.* 31; temporary bend, *fig.* 32.

Gaſket, *fig.* 25; outſide-clinch, *fig.* 28; cat's-paw, *fig.* 29.

Splices.

Splices.—Eye-ſplice, ends opened, *fig.* 33; finiſhed, *fig.* 34; ſhort-ſplice, ends opened and laid together, *fig.* 35; finiſhed, *fig.* 36; long-ſplice, ends opened and laid for ſplicing, *fig.* 37; finiſhed, *fig.* 38; cunt-ſplice, ends opened and laid for ſplicing, *fig.* 39; finiſhed and ſerved over the ſplice, *fig.* 40; cable-ſplice for drawing, ends opened, tapered, and pointed, *fig.* 41; tapered ſhort-ſplice, *fig.* 42. This ſplice is ſerved all over the ſplice.

Hawſer, the ends opened, *fig.* 43; tapered and pointed, *fig.* 44; ditto with a becket, *fig.* 45.

Worming, *fig.* 46; parſling, *fig.* 47; ſerving, *fig.* 48; platting, *fig.* 49.

The ropes, &c. for the ſeveral parts of rigging are, in circumference and in length, according to the eſtabliſhed dimenſions for ſhips of every claſs, particularly in the navy.

There is no one undeviating mode which is purſued in the progreſſive rigging of ſhips. It is an operation which muſt at all times depend upon the time allotted for its performance, and the neceſſity of immediate fitting. The nature of it, however, is ſuch, that all parts may be advancing at the ſame time, the lower maſts and bowſprit being fixed.

Fore, main, and *mizen maſts*, have girtline-blocks laſhed round the maſt-head, above the ſtop of the cap, one to hang on each ſide. The girtlines that reeve through them lead down upon deck, for hoiſting the rigging, tops, &c. and the men employed to place the rigging over the maſt-head.

Pendants of tackles are wormed, parcelled, and ſerved with ſpun-yarn, in the way of the ſplice (which is to the ſize of the maſt-head); they have large iron thimbles ſpliced into their lower ends; are then wormed, &c. as above, the whole length in the houſe; and are the firſt thing put over the maſt-head, reſting on the bolſters, they being firſt clothed with worn canvas ſeveral times doubled and tarred. Thoſe over the mizen-maſt are called burton-pendants, as , 2, 3, *Plate* III. *fig.* 1.

Shrouds.—The cablet is warped round two iron fids fixed in the floor, diſtant from each other the length of the firſt warp; that is, from the top of the bolſter to the foremoſt dead-eye; one end of the cablet is made faſt to the lower fid, and the remainder paſſed round the upper fid; and ſo on alternately, one turn cloſe to the back of another. The additional length, gained by the turns lying round each other, is ſufficient for the lengthening of each pair of ſhrouds, as they rake aft. When the whole gang of ſhrouds is warped out, the bights at the lower end are cut through, in a ſtraight direction, with the fids.

Brigs have four pair of ſhrouds forward, and the foremoſt ſhroud and pendant are in one. The upper bights are deſigned for the eyes, and the outer turns are called *ſwifters*, and are left from four to five feet at each end longer than the ſhrouds, and have an eye ſpliced in them to the ſize of the maſt-head.

The ſhrouds, when cut to their length, are ſtretched for worming by the windlaſs and tackle, and then wormed with double ſpun-yarn one-fourth the length from the centre of the eye on each ſide: but the fore leg of the foremoſt pair is wormed all the whole length. Each length, after being wormed, is hove out, till each pair has acquired, by ſtretching, one and a half the length of the eye; and ſhould remain on that ſtretch twenty-four hours, before the ſervice is laid on.

The eyes of all ſhrouds are parcelled with worn canvas, well tarred, about one fathom and a half on each ſide of the middle for large ſhips, and proportionably for ſmaller; and then ſerved with ſpun-yarn one-fourth of their length; each turn of the ſerving is laid very cloſe, and ſtrained tight round, to prevent the water penetrating. The fore leg of the foremoſt pair of ſhrouds is ſerved the whole length.

Swifters, when ſtretched, have the length of the ſplice ſet off on each ſide of the middle, and likewiſe the length of the eye, or circumference of the maſt-head. The latter is parcelled and ſerved as above. They are then cut aſunder in the middle, and ſpliced to the circumference of the maſt-head; then got on the ſtretch, and ſerved over the ſplice one-fourth of the length.

The bights of ſhrouds are ſeized together to the circumference of the maſt-heads, 1, 2, (*Plate* II. *figs.* 14 and 15.); the ſeizing of the firſt ſhroud is put on below the bolſter or treſtle-trees, with ſeven under and ſix riding turns, and a double croſs over all. The ſeizing of each ſhroud is to be laid its breadth below the next, and clear of each other, to prevent chafing.

Thus far the ſhrouds are prepared in the houſe: they are next hoiſted over the maſt-head. The firſt pair leads down on the ſtarboard ſide forward; the next pair forward on the larboard ſide; then the ſecond pair on the ſtarboard, and the ſecond on the larboard, and ſo on, till all are fixed. By this method, the yards are braced to a greater degree of obliquity, when cloſe hauled; which could not be were the foremoſt ſhrouds laſt fitted on the maſt-head.

Swifters (which are the after ſhrouds) are ſwayed next over the maſt-head above the ſhrouds, and are fixed on the ſtarboard and larboard ſides of the ſhip, to ſupport the maſts, and enable them to bear the ſtrain of a heavy preſs of ſail; as 4, 5, 6, *Plate* III. *fig.* 1.

Stays have an eye ſpliced in one end, 1, (*Plate* II. *fig.* 16.) ſufficiently to receive itſelf through. Each ſtay is got on the ſtretch, and hove well out, as the ſhrouds were; then wormed with ſpun-yarn one-third the length; and then hove out, till the middle ſtrand or heart is made to break in ſeveral places. The mouſe, 2, (*Plate* II. *fig.* 16.) made with ſpun-yarn, &c. in the ſhape of a pear, is then raiſed on the ſtay, at one-third of its length, or by ſome at two ſides of the maſt-head, added to twice the length of the treſtle-trees from the eye to the mouſe. The warp of the mouſe to be marline, and the pointing continued the circumference of the ſtay for the length of the tail. The collar, 3, the eye, 1, and one fathom below the mouſe, 2, to be parcelled with worn canvas, well tarred, and ſerved over with ſpun-yarn. (*Plate* II. *fig.* 16.) The ſtay is hoiſted over the maſt-head, and ſupports the maſt, by extending from its upper end towards the fore part of the ſhip, and counteracts the ſtrain of the ſhrouds which lead aft; and thus is the maſt kept in a firm poſition fore, aft, and ſideways.

Preventer-ſtay is next hoiſted over the maſt-head, the ſame as the former.

Collars.—Fore-ſtay-collars are fitted to the circumference of the bowſprit, and ſpliced together at the ends; wormed, parcelled, and ſerved the whole length; then doubled, and a heart ſeized in the bight. The ſplice is to lie on the back of the heart with *quarter-ſeizings*, a ſcore being cut on each ſide of the heart, large enough to admit from nine to twelve turns of ſeizing; the ſeizing to be ſnaked on the back, to lie cloſely.

Main-ſtay-collar, 4, (*Plate* II. *fig.* 16.) is made by the rope-maker with an eye in one end: in the houſe it is wormed, parcelled, and ſerved round the eye and the whole length.

The fore-ſtay, 7, (*Plate* III. *fig.* 1.) and main-ſtay, have a heart turned into the lower end with a throat-ſeizing, 5,

(*Plate* II. *fig.* 16.) and two round-ſeizings, 6 and 7, above, and the end of the ſtay capped with canvas, whipped and tarred, 8; then ſet up with its laniard, 9, (*Plate* II. *fig.* 16.) which is alternately reeved through the heart in the ſtay and the heart in the fore-ſtay-collar on the bowſprit. The laniard is ſet up with a luff-tackle, or luff upon luff, and the four firſt turns are ſtopt, and ſo on, till the laniard is expended: the end is then well ſtopt.

The fore-preventer-ſtay, 8, (*Plate* III. *fig.* 1.) ſets up as the fore-ſtay.

The main-ſtay, 9, (*Plate* III. *fig.* 1.) ſets up as the fore-ſtay. Its collar reeves from the ſtarboard ſide, through a hole in the upper part of the knee next the ſtem, (or large triangular eye-bolt drawn through the ſtem, in ſome merchant ſhips,) then paſſed through the eye, 10, in the other end, and is brought down to its ſtanding-part, and ſecurely ſeized and croſſed in two or three places, 11, 12, 13, (*Plate* II. *fig.* 16.) and the end capped; the heart is then ſeized in the bight above the bowſprit-chock.

The main-preventer-ſtay, 10, (*Plate* III. *fig.* 1.) ſets up as the fore-ſtay, to a heart ſeized in the bight of its collar, which laſhes round the fore-maſt; on the fore-ſide through the eyes in the ends, or through bolts in the knight-heads or ſtem.

The mizen-ſtay, 11, (*Plate* III. *fig.* 1.) ſets up through a thimble ſeized in the collar, which is laſhed round the main-maſt, about twelve feet up from the deck. A thimble is turned into the end of the ſtay, after it is reeved through the collar, and is ſet up with a laniard through an eye-bolt in the deck, abaft the main-maſt.

The ſhrouds have a dead-eye turned into the lower ends, as 3, (*Plate* II. *fig.* 15.) left-handed, (being cable-laid rope,) with a throat-ſeizing, 4, clapt on cloſe to the dead-eye; and above that a round-ſeizing croſſed, 5, and the end of the ſhroud whipt with ſpun-yarn, and capped with canvas, 6, well tarred. The laniards, 7, are then reeved through the dead-eyes thus: the end of the laniard is thruſt through the after-hole of the dead-eye in the ſhroud, and ſtopt with a walnut-knot; the other end is paſſed through the after-hole of its reſpective dead-eye in the chains, 8, then returns upwards, and reeves alternately through the holes in each, and is ſet taught with a tackle. It is cuſtomary to ſet up the ſhrouds the firſt time with temporary laniards of worn rope and ſpun-yarn ſeizings; and the proper laniards and ſeizings, when ſet up the laſt time for ſea.

The tops, 12, 13, 14, (*Plate* III. *fig.* 1.) are gotten over their reſpective maſt-heads by the girtlines.

The futtock-ſtaves are wormed, parcelled, and ſerved with ſpun-yarn the whole length, in the houſe; and then cut to their lengths, as wanted, on board; and are ſeized along the lower ſhrouds horizontally, as much below the upper ſide of the treſtle-trees as the cap is above. The ſhrouds are then *ſwiftered* together, thus: a ſpar is laſhed to the outſide of the ſhrouds, about a fathom below the futtock-ſtave; a ſingle block is then laſhed round each ſhroud and ſpar, except the foremoſt and aftermoſt ſhroud, ſo that all come in together; the ſwiftering-line is then reeved through each block from ſide to ſide, beginning in the middle, one end leading aft, the other forward; it then croſſes, and reeves through two leading blocks, one on each ſide the deck, and is bowſed tight, till the ſhrouds come in to the length of the catharpin-legs.

Catharpin-legs are four in number. The foremoſt is the ſhorteſt, and they increaſe an inch in length as they go aft. The length of the foremoſt one is from four feet in ſmall, to eight feet in large ſhips. They have an eye ſpliced in each end, and then wormed, parcelled, and ſerved with ſpun-yarn the whole length, in the houſe. They are ſeized through the eye at each end, round the futtock-ſtave and ſhroud.

Ratlings, 23, 24, 25, (*Plate* III. *fig.* 1.) are faſtened horizontally to the ſhrouds the firſt thirteen inches below the futtock-ſtave, and all the others the ſame diſtance aſunder; they are faſtened round each ſhroud with a clove-hitch, except at the ends, which have an eye, and ſeized round the ſhroud. The foremoſt and aftermoſt ſhrouds are left out for the firſt ſix ratlings down from the futtock-ſtave, and likewiſe the ſix lower ratlings next the dead-eyes. Small ſpars, or boats' oars, are ſeized to the ſhrouds, about five feet aſunder, for the men to ſtand on to rattle down the ſhrouds. The ſwifters on the ſhrouds are next removed half way down between the dead-eyes, and bowſed tight, and ſo remain as long as convenient.

The cap is next ſwayed up into the top by the girtlines.

Bowſprit.—*Horſes*, 15, (*Plate* III. *fig.* 1.) The outer ends are ſpliced round a thimble in the upper eye-bolt, on each ſide the bowſprit-cap. The inner ends have a thimble ſeized in, and ſet up to an eye-bolt in the knight-heads on each ſide the ſtem with a laniard; the turns are *frapped* together, and the end hitched.

Gammoning, 16, 17 (*Plate* III. *fig.* 1.) The end of the rope is firſt whipt, then paſſed through the hole in the knee, (but where there is no knee, through a large triangular ring-bolt driven through the ſtem,) and over the bowſprit with a round turn, and clinched cloſe againſt the cleats; the other end is paſſed through the fore part of the hole and over the bowſprit, croſſing every turn, keeping each turn forward on the bowſprit and aft in the hole, from nine to eleven turns, and every turn is hove tight and *nippered*. The outer end of the bowſprit is ſwayed down by a chain-boat, or the ſhip's long-boat, loaded with caſks of water, to make it ſit cloſe on the bed. When all the turns are hove tight, they are frapped together in the middle by as many croſs-turns as are paſſed over the bowſprit, which are alſo hove very tight: the end of the gammoning-rope is then whipt, and ſeized to one of the turns.

Bobſtays are wormed, parcelled, and ſerved with ſpun-yarn three-fourths of their length; and their collars are fitted to the circumference of the bowſprit, with an eye ſpliced in each end; they are then wormed, parcelled, and ſerved from eye to eye; and have a heart ſeized in the bight, with a long and ſhort leg, with ſeven under and ſix riding turns, well ſtrained and croſſed with two turns; the end whipt, and ſecured with a walnut-knot, in the houſe. The bobſtay-collar is laſhed upon the upper ſide of the bowſprit at two-thirds out, or within the ſaddle for the ſpritſail-ſlings, with from eight to ten turns through the eyes, and hove tight by a *heaver*. Ships in the navy generally have two pairs of bobſtays, 18, 19, (*Plate* III. *fig.* 1.), merchant-ſhips commonly but one pair; one end is paſſed through a hole in the front of the knee, or large triangular eye-bolt in the ſtem; the ends are then ſpliced together. A heart, or dead-eye, is ſeized in the bight, the ſplice to come on the heart; it is then ſet up with a laniard, paſſing through the heart in the ſtay, and its collar by a luff-tackle.

Shrouds, 20, (*Plate* III. *fig.* 1.) are cable-laid rope; they have an iron hook and thimble ſpliced in the inner ends, and are ſerved over the ſplice. They hook to an eye-bolt on each ſide the bow; the fore-ends have a heart, or dead-eye, ſeized in, and they are ſet up the ſame as the bobſtays.

The uſe of the bobſtays and ſhrouds is to draw down, and keep ſteady, the bowſprit; to counteract the force of the ſtays of the fore-maſt, which draw it upwards.

Topmaſts.—The girtlines may now be taken down from the

the lower maſt-heads, and one of the top-blocks ſecurely laſhed round the maſt-head below the cap. The end of a hawſer is then led up from aft, outſide the treſtle-trees, and reeves through the top-block at the maſt-head, then leads down inſide the fore part of the treſtle-trees, and reeves through the ſheave-hole in the heel of the topmaſt, and is racked to the topmaſt in two or three places between the heel and the hounds; it is there well ſtopt with three-quarter laſhing, and enough of the end left to make faſt round the maſt-head. The other end of the hawſer is led to the capſtan. When the topmaſt is hove high enough to enter the treſtle-trees, the end of the hawſer is made faſt round the maſt-head: the lower cap, 32, 33, 34, (*Plate* III. *fig.* 1.) is then lifted over the head of the topmaſt, and ſecurely ſtopt with laſhing a little below the hounds. The topmaſt is now hove high enough for the cap to enter over the lower maſt-head, and then lowered, that the cap may be beaten down firmly on the maſt-head with malls; then the laſhings may be caſt off, and as the topmaſt is raiſed the rackings are cut looſe.

Top-rope-pendants have a large thimble ſpliced in the lower end, and are marled over the ſplice in the houſe, and pointed when on board. The top-rope-pendant is then reeved through the top-block, which is hooked to an eye-bolt on one ſide the lower cap, next through the ſheave-hole in the heel of the topmaſt, then led upwards, and made faſt to an eye-bolt in the cap oppoſite to the top-block. Through the thimble, at the lower end of the pendant, is hooked the block of the top-tackle; its lower block is hooked to an eye-bolt in the deck, and the fall brought to the capſtan. The girtline-blocks are now laſhed to the topmaſt-head, and the topmaſt-croſs-trees and cap are ſwayed up into the top, and the croſs-trees, 35, 36, 37, (*Plate* III. *fig.* 1.) fixed on the maſt-head.

Burton-pendants for the mizen-maſt, 3, and topmaſts, fore and main, 21, 22, (*Plate* III. *fig.* 1.), have a ſplice in the middle to the circumference of their reſpective maſt-heads; thimbles ſpliced in their lower ends; and ſerved with ſpun-yarn over the ſplices in the houſe. The burton-pendants are hoiſted by the girtlines, and placed over the topmaſt-head, that the thimbles may hang on each ſide, to which are hooked the burton-tackles.

Shrouds are warped out on the floor, as the lower ſhrouds are, and fitted to the circumference of the topmaſt-head. In the foremoſt ſhroud, on each ſide, is ſeized a ſiſter-block, 2, (*Plate* II. *fig.* 14.), below the futtock-ſtave, in the houſe. They are ſwayed up and placed over the topmaſt-head, 41, 42, 43, (*Plate* III. *fig.* 1.); the firſt pair to lead down on the ſtarboard ſide forward, the next pair on the larboard ſide forward, and ſo on with the other two pair. The dead-eyes are turned in to their ends the ſame as the lower eyes are, and are ſet up with laniards to the dead-eyes in the futtock-plates by the burton-tackles.

Futtock-ſhrouds, 26, 27, 28, (*Plate* III. *fig.* 1.) The whole-lengths are divided into four, and cut in the bights. Each length has a hook and thimble ſpliced in each end, and the ends of the ſplices ſtopt with ſpun-yarn; then doubled, and a ſpun-yarn tied in the middle for the cutting-mark. The hooks are then hooked in each other, and got upon the ſtretch. They muſt be well hove out, in order to try the hooks and ſplices, as the topmaſt, &c. depends very much thereon. If a hook ſhould break, or a ſplice draw, the former muſt be ſhifted, and the latter hauled tighter through. After they are ſufficiently ſtretched, the ends of the ſplices are tapered, marled down, and ſerved with ſpun-yarn within two feet of the cutting-mark; then cut aſunder, and the ends whipt. On board, their upper ends hook to a hole in the lower end of the futtock-plates, and the lower ends of the futtock-ſhrouds are made faſt to the lower ſhrouds, with a round turn round the futtock-ſtave and ſhrouds, and ſeized up on the ſtanding-part of the ſhroud with two ſeizings croſſed.

Stays are ſwayed up and placed over the topmaſt-head next the ſhrouds, in their order thus: the breaſt-backſtay firſt, and the ſtanding-backſtay next; then the topmaſt-ſtay; and, laſtly, the topmaſt-preventer-ſtay.

Topmaſt-caps, 38, 39, 40, (*Plate* III. *fig.* 1.) may now be lifted on the topmaſt-head, and beat down firm; the girt-lines unlaſhed and taken down, and the topmaſt hove up and fidded. Then ſet up the ſhrouds, 41, 42, 43, (*Plate* I. *fig.* 1.), and rattle them down, as before directed. Set up the breaſt-backſtay, &c. thus: the *breaſt-backſtay*, 44, 45, (*Plate* III. *fig.* 1.) has a ſingle block turned into the lower end, with a throat and round-ſeizing, through which reeve the runner, one end of which is made faſt to the chain-plates, abreaſt the maſt, with a half-hitch, and the end ſeized down. In the other end is ſpliced a double block, connected by its fall to a double block that is ſtrapped with an eye, through which a *ſpan* is reeved, that has an eye ſpliced in each end, by which it is laſhed to the chain-plates.

Standing-backſtays, 46, 47, 48, (*Plate* III. *fig.* 1.) are ſet up, the ſame as a ſhroud, to a ſmall dead-eye in the after-end of the channel.

Shifting-backſtays, 49, 50, 51, (*Plate* III. *fig.* 1.) are clinched round the topmaſt-head and a thimble ſpliced in the lower end, to which is hooked a tackle, the lower block of which is hooked to an eye-bolt over the ſide, and frequently ſhifted, ſo as to render the topmaſt under a preſs of ſail of the greateſt aſſiſtance.

Fore-topmaſt-ſtay, 52, and *fore-topmaſt-preventer-ſtay*, 53, (*Plate* III. *fig.* 1.) are ſet up by paſſing the end through a ſheave under the *bees* of the bowſprit; then a long tackle-block is turned into the ends, which is connected by its fall to a ſingle block hooked to an eye-bolt in the bow on each ſide, and ſet up with a luff-tackle, cat's-pawed to its fall. When the ſtay is ſet up, the parts of the tackle are ſtopt together with a rope-yarn, and the fall of the long-tackle is paſſed through the eye-bolt and arſe of the block alternately till it is expended; the end is then made faſt round all the parts with two half-hitches.

Main-topmaſt-ſtay, 54, (*Plate* III. *fig.* 1.) reeves through a ſingle block, ſtrapped with a long and ſhort leg; the ſhort leg has an eye ſpliced in it, the long leg goes round the fore-maſt-head above the rigging, and through the eye of the ſhort leg, and is turned back and ſeized. The ſtay, having a thimble turned in the lower end, leads down between the cat-harpins and the maſt, and ſets up with a laniard to an eye-bolt in the deck, cloſe abaft the maſt.

The *preventer-ſtay*, 55, (*Plate* III. *fig.* 1.) reeves through a thimble ſeized in the bight of a collar, that is laſhed cloſe up to the *bibs* of the fore-maſt, and then ſet up to an eye-bolt, as the topmaſt-ſtay.

Mizen-topmaſt-ſtay, 56, (*Plate* III. *fig.* 1.) reeves through a thimble ſeized in the bight of the collar, that is laſhed cloſe up to the *bibs* of the main-maſt; a thimble is then ſpliced into the end of the ſtay, which is ſet up by its laniard to a thimble in another collar, that is laſhed round the maſt, a little below the cat-harpins.

When the *ſtays* are ſet up very tight, the ſhrouds and backſtays muſt be caſt off, and the maſt-head gotten ſo far forward as nearly to touch the fore part of the partners by the runners and tackles, 29, 30, (*Plate* III. *fig.* 1.) or burtons of the mizen-maſt, 31, (*Plate* III. *fig.* 1.) The pendants are frapped together abaft their reſpective maſts, and the runners made faſt as far as convenient before the maſt, and the falls led to the capſtan or windlaſs.

Lower Yards.—The lower yards muſt firſt be gotten on board thus: the hawſer that hove up the topmaſt is made faſt round the yard with a round turn and two half-hitches, ſecurely ſtopt with ſpun-yarn along the yard in ſeveral places, and well ſtopt at the upper arm. As the yard is hove on board, the ſtops are cut, and the runner-tackle of the oppoſite ſide is brought on to the quarter of the yard, to aſſiſt it in lowering as the yard advances on board beyond the ſlings. They are laid athwartſhips before their reſpective maſts, but the fore-yard muſt be kept above the main-ſtay by the runners, which are made faſt round each quarter of the yard. They are then rigged as follows.

Horſes, 1, 2, 3, (*Plate* III. *fig.* 2.) have an eye ſpliced in one end to the circumference of the yard-arm, and ſerved with ſpun-yarn over the ſplice. The eye goes over the yard-arm, 1, and ſtops againſt the cleats, and the other end reeves through the thimble in the lower end of the ſtirrups, 2, which are from three to four in number; the inner end of the horſes then have a thimble turned in, with a throat and round ſeizing, through which they are laſhed to the yard, juſt beyond the ſling-cleats on the oppoſite ſide. The ſtirrups, 3, (*Plate* II. *fig.* 17.) have their upper ends opened and plaited, and are faſtened to the yard at equal diſtances with three round turns, and nailed, ſo as that the horſes may hang ſuſpended about three feet below the yard.

Yard-tackle-pendants, 4, 5, 6, 7, (*Plate* III. *fig.* 2.) have an eye ſpliced in one end the ſize of the yard-arm, 4, and a double block in the other end, 5, and the ſplices ſerved over with ſpun-yarn in the houſe. The eye is put over the yard-arm next the horſes, and the double block is connected by its fall to a ſingle block ſtrapped with a hook and thimble, 6, *Plate* II. *fig.* 17.

Brace-pendants, 8, 9, 10, 11, 12, 13, (*Plate* III. *fig.* 2.) have an eye ſpliced in one end, as in the former, and a ſingle block in the lower end, and the ſplices ſerved over with ſpun-yarn in the houſe. They, like the former, are next put over the yard-arm, 7, and the brace reeved through the ſingle block, 8, (*Plate* II. *fig.* 17.) Sometimes in the navy, but moſtly in merchant-ſhips, the block is laſhed cloſe up to the yard, without a pendant. *Fore-braces* have their ſtanding-part made faſt round the collar of the main-ſtay, on each ſide, with a hitch, and the end ſeized. The leading-part reeves through a ſingle block, laſhed on each ſide the main-ſtay-collar, cloſe up to the rigging, and leads down and paſſes through a ſheave in the brace-bitts, at the fore part of the quarter-deck. The *main-braces* have their ſtanding part made faſt with a clinch round an eye-bolt in the upper part of the quarter-piece: the leading-part reeves through a fixed block cloſe aft upon the plank-ſheer, or a block laſhed to an iron ſtay projecting on the ſide, and leads in and belays round a cleat on the inſide. The ſtanding and leading-parts of the main-brace are led aft through a thimble ſpliced in the end of a *ſpan* with two legs, which is made faſt with a half-hitch round the mizen-ſhrouds on each ſide.

Preventer-braces to the fore-yard, in war, reeve through a block laſhed round the yard-arm, 9, (*Plate* II. *fig.* 17.) and through a block in a ſpan, hitched round the bowſprit-cap; they lead in upon the forecaſtle, and the ſtanding-part makes faſt round the cap. Thoſe to the main-yard reeve through the block on the yard-arm, then through a block laſhed to the fore-ſhrouds, cloſe below the cat-harpins, lead down upon the forecaſtle, and the ſtanding-part makes faſt to the ſhrouds above the block with a hitch, and the end is ſeized.

Topſail-ſheet-blocks are next put over the yard-arms, 8, 9, 10, 11, (*Plate* III. *fig.* 2.), ſtrapt with an eye to the ſize of the yard-arm, 10, *Plate* II. *fig.* 17.

Lift-blocks are then ſpliced into the ſtraps of the topſail-ſheet-blocks, 11, (*Plate* II. *fig.* 17.); the lifts, 12, 13, 14, 15, 16, 17, (*Plate* III. *fig.* 2.) reeve through a block in a ſpan, hitched round the maſt-head, between that and the topmaſt, then lead down abreaſt the ſhrouds, and reeve through a block faſtened to the ſide, and there belay.

Quarter-blocks, 18, 19, (*Plate* III. *fig.* 2.) are ſtrapt with a long and ſhort leg, with a laſhing-eye ſpliced in each end, through which they laſh round the middle of the yard, within the cleats, the block hanging downwards, 11, *Plate* II. *fig.* 17.

The quarter-block is a double block, with a thick and thin ſheave running on the ſame pin, through which reeve the topſail-ſheets, and the thin ſheave is intended for the clue-lines; but a ſingle block, in lieu of them, is recommended, as they would lead fairer and work eaſier. Large merchant-ſhips have a ſingle block laſhed on each ſide of the middle of the yard, and the ſheets reeve on their reſpective ſides, and lead down by the ſides of the maſt. Smaller ſhips have a double block laſhed in the middle of the yard, as the quarter-block, through which the ſheets reeve, and lead down on oppoſite ſides.

Clue-garnet-blocks, 12, (*Plate* II. *fig.* 17.) laſh through the eyes upon the yard, the blocks to hang downwards, four feet without the ſling-cleats, on each ſide.

Leech-line-blocks, 13, (*Plate* II. *fig.* 17.) are laſhed through the eye and round the yard, ten feet within the cleats at each yard-arm. The blocks to hang on the fore-ſide of the yard.

Bunt-line-blocks, 14, (*Plate* II. *fig.* 17.) are laſhed, like the former, midway between them and the ſlings.

Slab-line-blocks, 15, (*Plate* II. *fig.* 17.) are ſtrapt with a ſhort laſhing-eye, and are ſeized to the ſpan of the quarter-blocks underneath the yard.

Tricing-blocks, 16, (*Plate* II. *fig.* 17.) for the yard tackles are ſtrapt as the above, and are ſeized round the yard about one-third the length within the arm-cleats. The blocks to hang under the yard.

The *inner tricing-line*, 20, (*Plate* III. *fig.* 2.) reeves through a block laſhed to the futtock-ſtave, has a long-eye ſpliced in the outer end, the bight is put over the hook of the ſingle block with a couple of turns, 17, (*Plate* II. *fig.* 17.), and the leading-part belays to the ſhrouds. At ſea it is hooked to a becket, or ſtrap, round the futtock-ſtaff. The *outer tricing-line*, 21, (*Plate* III. *fig.* 2.) is ſpliced round the ſtrap of the yard-tackle-block, 18, (*Plate* II. *fig.* 17.), and reeved through a block on the yard, it then reeves through a block laſhed in the ſhrouds near the futtock-ſtaff, and leads down upon deck.

Jeers, in large ſhips, are two large tackles, 22, 23, (*Plate* III. *fig.* 2.) The blocks at the maſt head are hove up cloſe on each ſide by the top-burton tackles, and ſo laſhed, that every turn of the laſhing is alternately paſſed through the ſtrap of the block (*Plate* II. *fig.* 11.), and over a broad elm-cleat, nailed on the oppoſite ſide of the maſt-head, and the ends of the laſhing are well ſtopt. The other two blocks are ſtrapt with a double ſtrap to the ſize of the yard, with a long and ſhort leg (*Plate* II. *fig.* 10.) (See *Strapping of Blocks*, below.) They laſh on each ſide the middle, or ſlings, within the cleats, 19, 20, (*Plate* II. *fig.* 17.) The long leg of the ſtrap is paſſed down the aftſide of the yard, and meets the bight of the ſhort leg on the foreſide, and laſhes, every turn paſſing alternately through each bight, roſe-faſhion. The falls reeve through the blocks at the maſt-head and on the yard, and lead down upon deck. Jeers, in merchant-ſhips, and ſmall ſhips in the navy, have two ſingle blocks laſhed on each ſide the maſt-head, as above, and another, the ſame ſize, in the middle of the yard. The *tye* then reeves through one of the blocks at the maſt head, then through the block on the yard, and then through the block

on

on the oppofite fide of the maft-head. In the lower ends of the tye is fpliced a double block, with its fall, which reeves through another double block, that hooks to an eye-bolt in the deck. The fall of the jeers leads through the bitts to the capftan, by which the yards are hoifted up in their place.

Trufs-pendants are doubled, and cut in the bight; they have a thimble fpliced into one end, and are ferved with fpun-yarn one-third the length, in the houfe. The ends that have the thimbles are paffed round the yards within the fling-cleats, and are well feized. One end paffes over the yard, the other under, and both ends round the maft. The ftarboard end reeves through the larboard thimble, and the larboard end through the ftarboard thimble. The lower end has a double block turned in, with a throat and round-feizing, and its fall reeves through a double block that hooks to an eye-bolt in the deck, on each fide the maft, by which the trufs-pendant is ftraightened or flackened, confequently the yard is clofe confined, or removes from the maft.

The *nave-line* reeves through a fingle block lafhed under the aftfide of the top, and through a block or thimble feized to the trufs-pendants; one end leads upwards, and makes faft round the treftle-trees. The leading-part goes down upon deck.

Slings and Straps.—The ftrap has an eye fpliced in each end, with a long and fhort leg, to the circumference of the yard, and ferved with fpun-yarn from eye to eye, with a thimble feized in the bight. The flings have an eye fpliced in one end, then wormed, parcelled, and ferved almoft the whole length, in the houfe.

The long leg of the ftrap paffes down the aftfide of the yard, exactly in the middle, comes up the forefide, meets the fhort leg, and lafhes through the eyes, the thimble to be upwards. The flings have a large thimble feized to the bight with a long and fhort leg. The long leg paffes round the after-part of the maft, and reeves through the eye in the fhort leg; it is then returned back, and fecurely feized to its own part in feveral places. By thefe the yards are flung at the maft-head by a laniard, that fplices in the thimble in the flings at the fore-part of the maft, and then reeves through the thimble in the ftrap upon the yard, and alternately till the laniard is expended; the end then fraps round the turns, and makes faft with two half-hitches. In time of action, the yards are flung with chains.

Strapping of Blocks in the Houfe.

A Table of the Dimenfions of Straps for Lafhing and Seizing Blocks.

Size of the Blocks.	Size of the Straps.	Length of the Straps.	
Inches.	Inches.	Feet.	Inches.
17	5	7	6
16	$4\frac{1}{2}$	6	9
15	4	6	0
14	$3\frac{1}{2}$	5	6
13	$3\frac{1}{2}$	5	0
12	$3\frac{1}{2}$	4	6
11	3	4	3
10	3	3	9
9	$2\frac{1}{2}$	3	6
8	$2\frac{1}{2}$	3	0
7	$2\frac{1}{2}$	2	9
6	2	2	6
5	$1\frac{1}{2}$	1	9
4	$\frac{3}{4}$	1	6

The whole length of all the different fizes of block-ftrapping is gotten upon the ftretch, and hove out tight for worming and ferving; after that is performed, it is cut into lengths agreeable to the above table, according to the fize of the blocks. The fcores of all blocks, if required, are to be opened, or eafed, fo as to receive the ftrap, and then to be well tarred, and the pin and fheave examined, before the ftrap is put on (*Plate* II. *fig.* 1.) The block is then fet well into the ftraps with wedges, thus: the ftrapping is frapped together with rope-yarn under the block, with a chock between, and the wedges are fet between the breaft of the block and the chock. The ftrap is next nippered, with a heaver, round the block; the wedge, chock, and frappings are then removed, and the block hung up, that the ftrap may be well feized together, clofe under the block, with nine under and eight riding turns; every turn ftrained tight round with a heaver, and crofled each way with two turns.

Jeer-blocks (*Plate* II. *figs.* 10, 11.) are double fcored, confequently ftrapped with a double ftrap, thus: it is fpliced together at the ends, and when doubled, fhould be the fize of the block and the circumference of the yard. It is then doubled, and the block feized in the bight, with a long and fhort leg, the fplice lying in the arfe of the block. Jeer-blocks for the maft-heads are ftrapped with long-eyes, to receive many turns of the lafhing.

Blocks ftrapped with a thimble, or hook and thimble, (*Plate* II. *fig.* 3.) have the ends of the ftraps fpliced together. The block is fixed in one bight, for the fplice to lay, as above, and the thimble in the other bight; the feizing is clapt on, between the block and the thimble, with eight under and fix riding turns, according to the fize of the block; each turn ftrained by a heaver, turns double-crofled, and the end ftopt with a wall-knot crowned.

Blocks ftrapped with eyes (*Plate* II. *figs.* 4, 5, 6.), or thimbles fpliced in the ends, are feized tight into the bight, and the legs left long enough to lafh through the eyes, round their refpective maft, yard, &c. as the topfail, clue-lines, clue-garnets, &c.

Blocks ftrapped with double tails are feized in the bight as the former; but thofe with a fingle tail are fpliced in, and ferved with fpun-yarn over the fplice.

The ftrapping of jeer-blocks is wormed, parcelled, and ferved. Strapping of four inches diameter, and above, is wormed and ferved; and all under four inches is only ferved with fpun-yarn; except the fpritfail-brace, buntline, and leech-line blocks, that are lafhed under the tops, which are only ferved with fpun-yarn over the fplice, and the tail left half a fathom in length.

Rigging the Topfail Yards.

The topfail-yards are firft hove on board by the top-rope, which is faftened to the flings of the yard, and ftopt from thence with fpun-yarn to the yard-arm, and placed athwart their refpective mafts.

Horfes, 1, rig the fame as the lower yards, with the addition of *Flemifh horfes*, 2, (*Plate* II. *fig.* 18.) which have an eye fpliced in each end; one eye is put over the eye-bolt in the yard-arm, and the other is feized round the yard within the arm-cleats, 24, 25, 26, *Plate* III. *fig.* 2.

Brace-pendants, 3, (*Plate* II. *fig.* 18.) are next put over the yards, as on the lower ones. The fore-topfail-braces reeve through the block in the pendant, and then through a block lafhed on each fide to the main-ftay-collar, a little below the fore-braces; the ftanding-part makes faft to the ftay with a hitch, and is feized below the block. The leading-part leads from the block on the collar, through a block lafhed on the

ſtay, over the fore hatchway, and through a block ſtrapped with a thimble into an eye-bolt in the aft-part of the forecaſtle, and belays to a pin in the ſkid-beams, 27, 28, *Pl.* III. *fig.* 2.

The main-topſail-braces reeve through the block in the pendant, and the ſtanding-part makes faſt to the mizen-ſtay collar. The leading-part reeves through a block in the ſpan round the mizen-maſt-head below the hounds, and through a ſheave-hole in the mizen-topſail-ſheet-bitts, abaft the mizen-maſt, and belays there; 29, 30, *Plate* III. *fig.* 2.

The mizen-topſail-braces reeve through the block in the pendant. The ſtanding-part makes faſt round the peek-end, and the leading-part reeves through ſingle blocks at the peek, and comes down and belays to the fore-ſide of the taffarel to a cleat; 31, 32, *Plate* III. *fig.* 2.

Reef-tackle-pendants, 4, (*Plate* II. *fig.* 18.) reeve through the upper ſheave in the *ſiſter-block* in the topmaſt-ſhrouds, thence through a ſheave-hole in the yard-arm, and are ſtopt with an over-hand knot, till the ſail is bent. A double block is turned in to the lower ends of the pendants, and its fall reeves through another double block, that is ſeized to the after-part of the lower treſtle-trees, and the falls lead down upon deck; 33, 34, 35, 36, *Plate* III. *fig.* 2.

Lift-blocks, 5, (*Plate* II. *fig.* 18.) are ſtrapt with an eye to the ſize of the yard-arm. The lift reeves through the lower ſheave in the ſiſter-block in the topmaſt-ſhrouds, and through the block on the yard-arm. The ſtanding-part hooks to a becket round the top-maſt-cap, and the leading-part leads down the ſide of the maſt, and belays to the dead-eyes in the lower ſhrouds; 37, 38, 39, 40, 41, 42, *Plate* III. *fig.* 2.

Tye-blocks, thoſe at the topmaſt-heads, laſh cloſe up to the rigging, under the collar of the ſtay; and the blocks on the yard, 6, (*Plate* II. *fig.* 18.) laſh under the fore-part of the yard, as the lower ones. The ſtanding-part of the double-tyes in large ſhips clinch round the maſt-head, then reeve through the double block upon the yard, return upwards, and reeve through the block on each ſide the maſt-head; 43, 44, 45, (*Plate* III. *fig.* 2.) The fly-blocks are then ſpliced in their lower ends, and connected by their haliards to a ſingle block, that is ſtrapt with a long ſtrap, with a hook and thimble, that hooks to a ſwivel-eye-bolt in the channel on each ſide: the leading-part comes in-board through a block laſhed on each ſide; the foremoſt ones abaft the forecaſtle, and the after-ones on the quarter-deck. A ſingle tye rigs like the lower yards in ſmall ſhips.

Buntline-blocks are ſpliced round the ſtraps of the top-ſail-tye-block upon the yard, 7, *Plate* II. *fig.* 18.

Clue-line-blocks are ſtrapt with two laſhing-eyes, and laſh upon the yard, three feet without the ſlings, the blocks hanging under the yard, through which the clue-lines reeve and lead down upon the deck, 8, *Plate* II. *fig.* 18.

Top-gallant-ſheet-blocks, 9, (*Plate* II. *fig.* 18.) are ſtrapt with two laſhing-eyes, and laſh upon the yard, cloſe within the clue-line blocks on each ſide.

Parral. (*Plate* II. *fig.* 20.) The parral-ropes in the houſe have an eye ſpliced in each end, are wormed and ſerved with ſpun-yarn from eye to eye, then doubled, and cut aſunder in the bight. The end of one rope is thruſt through the upper hole in the ribs, and a truck, alternately. The end of the other rope is paſſed through the lower hole in the ribs and a truck the reverſe way. The parral is fitted to the aft-ſide of the topmaſt, and the eye in one end paſſed under the yard, and the other over, till both eyes meet and are ſeized together on the fore-ſide with ſpun-yarn. The other ends of the parral-rope are paſſed round the yard and aftſide of the parral alternately, till the latter is well ſecured to the former; and the whole of the turns are marled together with quarter-ſeizings, to confine them cloſe in the cavity on the aftſide of the ribs. Thus the yard is confined to the maſt, but eaſily hoiſted or lowered when the maſt is kept clean and greaſed.

Jib-boom to be rigged.—The jib-boom is hoiſted on board and laid on the bowſprit, and its fore end pointed through its hole in the bowſprit-cap. The heel-rope or top-rope may be reeved through the ſheave-hole at the heel, and one end made faſt to the eye-bolt on one ſide of the bowſprit-cap, the other reeved through a ſingle block made faſt to an eye-bolt on the oppoſite ſide, and lead in upon the forecaſtle, 46, *Plate* III. *fig.* 2.

The *traveller* is firſt put over the outer end of the jib-boom, and the hook kept inwards; 47, *Plate* III. *fig.* 2.

Horſes are doubled, and ſerved with ſpun-yarn one fathom in length in the bight, and knotted with an over-hand knot, at the diſtance of every yard, in the houſe. On board, the bight is taken over the outer end of the jib-boom, with a jambing-knot, cloſe againſt the ſtop, which prevents them coming in. The inner ends are brought aft and made faſt, with a round turn round the jib-boom, within the cap. The ends are ſtopt back with two or three ſeizings of ſpun-yarn, to prevent their being caſt off by miſtake; 57, *Plate* III. *fig.* 1.

Guy-pendants are put over the jib-boom, the ſame as the horſes, and the inner ends reeve through a thimble, on the quarters of the ſpritſail-yard, and turn in to the ſtrap of a double block, with a throat and round-ſeizing, and its fall reeves to a ſingle block, that hooks to an eye-bolt near the cat-head, and leads in upon the forecaſtle; 49, 50, *Plate* III. *fig.* 2.

A *ſtrap* is put over the end of the jib-boom, with three thimbles ſeized in it; the middle thimble is the largeſt, and reeves the fore-top-gallant-ſtay, and the ſmaller thimbles on each ſide the fore-top-gallant-bowlines.

The *ſpritſail-yard* is hove on board, and laid fore and aft the forecaſtle for rigging with its *horſes*, 51, 52, (*Plate* III. *fig.* 2.) The eye in the outer end is put over the yard-arm on each ſide, and ſtops againſt the cleats. The eye in the other end is well ſeized to the yard, at three feet beyond the ſlings, with *ſtirrups* and *Flemiſh horſes*, the ſame as the topſail-yards, 53, *Plate* III. *fig.* 2.

Braces and Pendants.—The eye in one end of each pendant goes over the yard-arm cloſe againſt the horſes, and the brace reeves through a ſingle block ſpliced in the other end; the ſtanding-part makes faſt to the ſtay-collar, and the leading-part reeves through a double block, made faſt under the fore-top, and then leads through another, made faſt to the aft-part of the top, and down to the aft-part of the forecaſtle; 54, 55, *Plate* III. *fig.* 2.

Lifts.—The blocks are ſtrapped with an eye to the ſize of the yard-arm, and driven thereon cloſe to the braces. The lift reeves through a ſingle block in the end of a *ſpan*, which is paſſed with a hitch round the cap under the jib-boom, and through the block on the yard-arm, and the ſtanding-part returns upwards, and is made faſt to an eye-bolt in the ſide of the cap; the leading-part comes in upon the forecaſtle. They are occaſionally uſed for ſpritſail-topſail-ſheets.

The *ſtanding-lift* has an eye ſpliced in one end, and laſhes to the yard one-fourth from the ſlings: the other end has a thimble ſpliced in, and is ſet up with a laniard to a thimble ſpliced in a ſtrap that is hitched round the bowſprit within the *bees*; 56, 57, *Plate* III. *fig.* 2.

Clue-line-blocks are ſtrapped with two eyes, and are laſhed

lashed-through those eyes round the yard three feet without the slings, the lashing to be upon the yard.

The *strap* has a thimble seized in the bight, and is spliced or seized round the yard in the middle, between the cleats. Also on each quarter of the yard is seized a strap, with a thimble, through which are led the jib-guys. The yard may now be hove out towards its place, and the long-tackle block of the haliards hooked into an eye-bolt in the after-part of the bottom of the bowsprit-cap; the hook to be moused with spun-yarn, to prevent its slipping loose. The single block is hooked to the thimble in the strap at the slings, and the fall then leading in upon the forecastle, the yard is hove to its place.

The *slings* have an eye spliced in each end, one of which goes round the yard close within the cleats near the middle, and seizes with a quarter-seizing close to the yard; the other end goes over the bowsprit before the saddle, and under the yard, then over the bowsprit again, till the eyes in the ends, meeting close together, are well lashed.

Preventer-slings are used when the haliards are taken in. The outer end has a hook and thimble spliced in and served down over the splice, that hooks to the eye-bolt in the bottom of the cap. The inner end reeves through the thimble in the strap at the slings, and is hitched with two half-hitches, or spliced.

The *spritsail-topsail-yard* is hove on board, &c. as the former, and the

Horses, having an eye in their outer ends, are put over the yard-arm on each side, and stop against the cleats; the inner end has an eye, which is seized to the yard, three feet without the slings, 58, *Plate* III. *fig.* 2.

The *braces* have an eye spliced in one end, that goes over the yard-arm on each side; the inner ends lead through a block made fast to the under side of the fore-top, from thence through another at the aftside under the top, and lead down to the aft-part of the forecastle, and there belay; 59, *Plate* III. *fig.* 2.

The *lifts* have an eye spliced in their outer ends, and are driven over the yard-arm close to the braces; the inner end reeves through a thimble, seized on each side a strap hitched over the end of the jib-boom, and leads in upon the forecastle through a saddle on the bowsprit, and belays to the rack over the bowsprit, 60, *Plate* III. *fig.* 2.

The *clue-line-blocks* are strapped with two eyes, and are lashed through those eyes round the yard, about two feet without the slings.

Haliard.—The standing-part is made fast with a bend through the becket of its block, lashed under the outer end of the jib-boom; then reeves through a single block, lashed round the middle of the yard between the cleats; then forward, and reeves through the block at the outer end of the jib-boom, and leads in upon the forecastle, and belays to a rack over the bowsprit, 61, *Plate* III. *fig.* 2.

Top-gallant Masts.—The *top-rope* reeves for the top-gallant-mast as it does for the topmast, observing to stop it to the top-gallant-mast-head with spun-yarn, to keep it steady till it has entered the topmast-cap; the stop is then cut, and the end of the top-rope made fast to the eye-bolt in the topmast-cap.

A grommet of rope, spliced to the size of the mast, is first put over the head, and beat down close to the stop of the hounds.

Shrouds, *backstays*, and *stays*, are fitted in the house, and hoisted over the top-gallant-mast-head, the same as the topmasts, and the top-gallant-mast is then swayed up and fidded.

The *shrouds* are then thrust through a hole in the end of the topmast cross-trees, and between the topmast shrouds, over the futtock-staff. A thimble is seized in the ends that set up with the laniard through a thimble seized in the bight of a strap, made fast round the futtock-plates, close under the dead-eyes, with a turn through the bight, 58, 59, 60, *Plate* III. *fig.* 1.

Backstays set up, the same as the topmast-backstays, to a small dead-eye in the aft-part of the channel, or in a stool abaft the channel, 61, 62, 63, *Plate* III. *fig.* 1.

Fore-top-gallant-stay, 64, (*Plate* III. *fig.* 1.) reeves through a single block in large ships, or a thimble in the strap at the outer end of the jib-boom of frigates and smaller vessels. The former sets up by its tackle to an eye-bolt in the head; the latter with a jigger-tackle occasionally, and is secured by a laniard to the gammoning or eye-bolt in the head.

Main-top-gallant-stay, 65, (*Plate* III. *fig.* 1.) is cable-laid in large ships, and fitted with a collar and moused, as the lower stays. Smaller ships are hawser-laid, have an eye spliced in the upper end to the circumference of the mast-head, and served with spun-yarn over the splice, in the house. It reeves through a single block at the fore-top-mast-head, has a thimble turned into the end of the stay, and sets up to a thimble in a span, made fast to the trestle-trees of the foremast by its laniard.

Staysail-stay, 1, (*Plate* IV. *fig.* 1.) is spliced into the top-gallant-stay, one fathom below the top of the mast, it then reeves through a block or thimble lashed to the fore-top-mast-head, takes a turn round the trestle-trees, and belays there.

Mizen-top-gallant-stay, 66, (*Plate* III. *fig.* 1.) sets up to the main-topmast-head, as the main-top-gallant-stay sets up to the fore-topmast-head.

Flag-staff-stays go round their respective top-gallant or royal mast-heads with a running-eye, and are kept close up under the truck, by a small cleat nailed on each side. The fore one reeves through a thimble at the jib-boom end, and belays round the fore-stay-collar. The main one reeves through a thimble above the fore-top-gallant rigging, and belays in the top. The mizen one the same above the main-top-gallant rigging.

Royal masts are rigged as top-gallant-masts, and often abaft the mast.

The *top-gallant-yards* are hove on board, and rig with horses, braces, and lifts, over the yard-arm, the same as the topsail-yards.

Braces, 1, (*Plate* II. *fig.* 19.) The fore-top-gallant-braces, 56, (*Plate* III. *fig.* 2.) reeve through the block in the pendant of large ships, or the block in the yard-arm of small. The standing-part makes fast with a hitch, and the end seized back round the collar of the main-topmast-stay on each side; and the leading-part reeves through a block lashed round the collar a little below the standing-part; then leads through a block at the aft-part of the fore-top, and belays to a pin at the aftside of the forecastle.

The *main-top-gallant-braces*, 57, (*Plate* III. *fig.* 2.) reeve as the former. The standing-part makes fast with a hitch, and the end seized back round the collar of the mizen-topmast-stay, and the leading-part through a block seized just below the standing-part, and leads down into the mizen-shrouds.

The *mizen-top-gallant-braces*, 58, (*Plate* III. *fig.* 2.) are single, and go with a splice over the yard-arm. They lead through a thimble at the mizen-peek, come down, and belay to a cleat on the fore-side of the taffrail.

The *lifts*, 59, 60, 61, (*Plate* III. *fig.* 2.) are single, and go over the yard-arm with an eye; the other end reeves through

through a thimble in the top-gallant ſhrouds, leads down into the top, and belays round the dead-eyes.

Clue-line-blocks, 2, (*Plate* II. *fig.* 19.) are ſtrapped with two laſhing-eyes, and laſh upon the yard three feet without the ſlings. The clue-line reeves through the block which hangs under the yard, which is ſtopt with a knot till the ſail is bent. The leading-part comes down the maſt, and belays to the ſhroud-rack.

The *tye*, 3, (*Plate* II. *fig.* 19.) reeves through the ſheave-hole in the top-gallant-maſt hounds, and clinches round the yard at the ſlings; in the lower end is turned a double or ſingle block, according to the ſize of the ſhip, through which reeves the haliard, and through a ſingle block laſhed to the after-part of the lower treſtle-trees, under the top, and belays round the croſs-piece of the bitts abaft the maſt.

Parral, the ſame as the topſail-yard, after the yard is ſwayed up.

Rigging of Royal-Yards.

When they have royal maſts, they rig as the top-gallant-yards above; but if there are no royal maſts, they ſet flying; that is, the *haliard* reeves through a ſheave-hole cloſe up under the truck; the ſtanding-part clinches to the middle of the yard, and the leading-part comes down and belays in the top.

Rigging of the Mizen-Yards.

Mizen-yards are now ſeldom uſed, and that only in line of battle ſhips in the navy, and large Eaſt India ſhips.

They are hove on board as the lower yards, and the *Derrick-block* is ſtrapt with two eyes, that go round the yard and laſh underneath, between the ſlings and outer yard-arm or peek. The *Derrick-fall* reeves through the double block that is croſs-ſeized in the ſtrap, has an eye ſpliced in each end, and laſhes to the mizen-cap; then through the ſingle block upon the yard. The ſtanding-part is again taken up and reeved through the block at the mizen-cap; an eye is then ſpliced in the end to the ſize of the yard-arm, that jambs over the peek-end. The leading-part comes from the double block at the cap, leads down through the treſtle-trees to a block in the larboard, mizen channel, and through the ſide upon deck.

Brail-blocks are ſtrapt together in one ſtrap, and lie over the yard, and ſeized together underneath; the throat-blocks next the cleats near the maſt; the middle-blocks in the middle between the throat-blocks and the peeks; the peek-blocks about three or four feet within the cleats at the peek.

Vangs.—The pendants are doubled, and ſerved with ſpun-yarn two fathoms long in the bight, and a double block ſpliced in each end, and ſerved with ſpun-yarn over the ſplice in the houſe. The bight is put over the peek-end with a hitch. The falls reeve through the double block in their ends, and a ſingle block is hooked to an eye-bolt in the quarter-piece on each ſide. The ſtanding-part makes faſt to the becket of the ſingle block, and the leading-part from the double block, belays to a cleat on the taffrail.

Signal haliard-block is laſhed to an eye-bolt in the peek of the yard.

Jeers.—The fall reeves through a treble or double block laſhed at the maſt-head, and likewiſe a double or ſingle block laſhed between the ſling-cleats, and the leading-part comes into the mizen-chains on the ſtarboard ſide as the derrick did on the larboard ſide. The yard is then ſwayed up, and the fall made faſt with a hitch, and ſeized.

Slings go round the maſt-head, and round the yard between the ſling-cleats, which are kept abaft the maſt.

Bowlines reeve through a ſingle block ſtrapt with a thimble into an eye bolt, in the lower end of the yard, and through a block hooked to an eye-bolt in the ſide abreaſt the lower end of the yard, or laſhed to the mizen-ſhrouds.

Horſe for the mizen-ſheets clinches to an eye-bolt on each ſide the fore part of the taffrail with a thimble, to which is ſtrapped the ſheet-block.

Gaff.—If the mizen-yard is not uſed, there muſt be a *gaff*, 20, (*Plate* IV. *fig.* 1.) as in ſmaller veſſels, which is rigged ſimilarly to the mizen-yard, excepting only that it has a throat-haliard inſtead of jeers, which hooks to an eye-bolt over the jaws: and a ſpan inſtead of a derrick, 21, *Plate* IV. *fig.* 1.

The *driver* or *ſpanker-boom* rigs with a *topping-lift*, 25, (*Plate* IV. *fig.* 1.) which goes over the outer end of the boom with a clove-hitch, and ſtops againſt the ſhoulder; the ends are reeved through a ſingle block laſhed on each ſide of the mizen-maſt-head; then have a double block ſpliced in each lower end, which reeves with its fall to a ſingle block, hooked to an eye-bolt in each mizen-channel. The ſtanding-part makes faſt to the becket of the ſingle block, and the leading-part belays to a cleat on each ſide of the mizen-maſt.

Guy-pendants, 26, (*Plate* IV. *fig.* 1.) have a hook and thimble ſpliced in one end, that hook to a thimble on each ſide of a ſtrap ſpliced round the boom, over the horſe at the fore-ſide of the taffrail; a thimble is ſpliced in the inner ends of the pendants, to which is hooked the tackle on each ſide, that are uſed where moſt ſupport can be given to the boom.

Rigging and Bending the Sails.

Rigging and bending the fore-courſe, 5, (*Plate* IV. *fig.* 2.) This ſail is hoiſted on board by the yard-tackles, and laid athwart the main-ſtay, ready for bending, thus; the *ſheet-block* is ſtrapped with an eye, and put over the clue on each ſide. The tack is next thruſt through the clue for the knot to come on the aftſide.

Clue-garnet Block.—The eyes of the ſtrap are put through the clue, brought up on each ſide, and ſeized on the top.

Tacks are cable-laid, and tapered in the making. The biggeſt end is opened out long enough to heave the knot cloſe together; the knot is double-walled and crowned; the ends are thruſt through the walling, then ſcraped down, ſerved over with ſpun-yarn, and are wormed, parcelled, and ſerved with ſpun-yarn one-fourth of the whole length, in the houſe. (*Plate* I. *fig.* 14.) *Single tacks*, as the above, reeve through the block laſhed round the outer end of the boomkin, on each ſide; then lead in upon the fore-caſtle or upper deck, and belay round a large cleat upon the cat-tail, or the bitts near the maſt. In *double tacks*, the ſtanding-part makes faſt round the outer end of the boomkin, and the leading-part reeves through a ſingle block laſhed to the clue of the ſail, then through the block at the outer end of the boomkin, and leads in as the above, 21, *Plate* IV. *fig.* 2.

Sheets, 23, (*Plate* IV. *fig.* 2.) are reeved through the ſheet-block at the clues, and the ſtanding-part ſeizes or ſplices with a thimble to an eye-bolt in the ſide a little before the gangway. The leading-part reeves through a ſheave in the ſide above the eye-bolt, leads forwards, and belays round a large cleat in the ſide.

Yard-ropes are temporary, and are only uſed to get up the ſail; they reeve through tail-blocks, that are made faſt round the boom-iron at each yard-arm, and one end comes down

down and makes fast to the upper reef-earing cringle. The leading-part comes in upon deck, through a leading-block lashed to a timber-head or eye-bolt. The sail is then run up to the yard, where the men go and pass the

Earings: one end of the earing splices to the head-cringle with a long-eye; the other end passes over the yard-arm, without the rigging, and through the cringle alternately, two or three times, and likewise passes round the yard, within the rigging, and through the cringle, till the earing is expended, making fast the end with two half-hitches. The outer turns are to stretch the head of the sail tight along the yard, and the inner turns to draw it close up.

Reef-earings, when used, the same.

Rope-bands, which fasten the head of the sail along the yard, are braided cordage, with an eye in one end, and one leg longer than the other. The eye of the long leg is put over the short leg, and the eye of the short leg is thrust through the eye-let hole at the aftside of the sail, and passes through the eye of the short leg; and so of the rest. The rope-bands, being previously reeved through the head of the sail, fasten to the yard as follows. The long leg comes over the yard from the foreside, with a round turn between the head of the sail; the short leg comes up the aftside, and makes fast with a reef-knot upon the yard. The sail is then let fall to see it is clearly bent.

Points are usually put in the sail at the sail-loft. See SAIL-*Making*.

Gaskets are braided cordage, which go round the yard with a running-eye, two on each quarter, and one at each yard-arm: the bunt-gasket in the middle has two legs, and lashes to the yard on each side of the quarter-blocks. These are used when the sail is *furled*, to bind it firmly up to the yard, by passing the gasket six or seven times round the yard and sail, each turn a certain distance apart, or spirally, making fast the end with two half-hitches.

Clue-garnets, 24, (*Plate* IV. *fig.* 2.) reeve through their block upon the yard on each side, then through the block at the clue of the sail. The standing-part is carried up, and made fast round the yard by its block with a timber-hitch, and the end stopped. The leading-part comes down upon deck, and reeves through its sheave-hole in the topsail-sheet-bitts, and there belays.

Bowlines, 25, (*Plate* IV. *fig.* 2.) reeve through a single block lashed round the collar of the fore-stay, or the fore-preventer-stay on the bowsprit, and the outer part reeves on the bowline-bridle, with a thimble spliced in the end, and the bridle clinches to the cringle on the leech of the sail. The leading-part comes in upon the forecastle, and belays to the fore-topsail-sheet-bitts.

Leech-lines, 26, (*Plate* IV. *fig.* 2.) reeve through the spritsail-brace-block, under the top, then through the block upon the yard, and the standing-part makes fast with a clinch to the upper bowline-bridle; the leading-part then reeves through a double block, at the aft-part of the top, and comes down upon the forecastle.

Bunt-lines, 27, (*Plate* IV. *fig.* 2.) reeve through the leg and fall-block, and through a double block at the aft-part of the top, and through the blocks upon the yard, and lead down the fore-side of the sail, and clinch to the cringles in the foot. The fall reeves through the leg-block; the standing-part makes fast to an eye-bolt near the mast, and the leading-part through a live-block under the cross-piece of the breast-bitts.

Slab-lines, 28, (*Plate* IV. *fig.* 2.) reeve through a small block lashed to the strap of the quarter-block, and the standing-part clinches with two legs to the middle bunt-line cringles. The leading-part leads to the topsail-sheet-bitts, and belays to the cross-piece.

Spilling-lines, 29, (*Plate* IV. *fig.* 2.) reeve through blocks lashed on each side of the quarter-blocks of the lower yards, then lead down before the sail, return upwards under the foot of the sail, and make fast round the yard with a timber-hitch.

Life-lines are sometimes used for the preservation of the seamen. They are generally of worn hawser-laid rope, and are made fast with the two half-hitches round the strap of the lift-block, and jeer or tye-block, in the middle of the yard.

Rigging and Bending the Main-Course, 1, *Plate* IV. *fig.* 2.

This sail is hoisted on board, and laid athwart, ready for bending, as the fore-course. Sheet-blocks, tacks, and clue-garnet-blocks, are fitted in the clues as the fore-course.

Tacks, single, 31, (*Plate* IV. *fig.* 2.) reeve through the sheave-hole in the chestree, on each side, and lead on board through a sheave-hole in the side, and belay round a range-cleat in the waist.

Tacks, double, 32, (*Plate* IV. *fig.* 2.) The standing-part clinches to an eye-bolt before the chestree, and the leading-part reeves through a single block lashed to the clue of the sail; then leads in upon deck, through the chestree and sheave-hole in the side, and belays as the above.

Sheets, 33, (*Plate* IV. *fig.* 2.) reeve through the sheet-block at the clues. The standing-part is seized to an eye-bolt with a thimble on the quarters; the leading-part comes on board through a sheave-hole in the side, and belays to a range-cleat in the waist. The present custom is for the leading-part of the sheets to reeve through a block lashed to the eye of an iron stay, projecting from the side, called a *spider*, and comes in upon deck through a port that has a roller fitted vertically at its aftside.

Yard-ropes and *bending*, as the fore-course.

Earings, *rope-bands*, *points*, *gaskets*, and *clue-garnets*, as the fore-course.

Bow-lines, 34, (*Plate* IV. *fig.* 2.) reeve through a double block, lashed round the fore-mast five feet above the fore-castle, and the outer part reeves upon the long leg with a thimble. The lower bridle is the longest, and clinches to the lower cringle on the sail. In the other end is spliced a thimble, through which reeves the upper leg, that clinches to the upper cringle. The starboard bow-line belays on the larboard, and the larboard bow-line leads over and belays on the starboard side. Four feet from the bridle on each bow-line is spliced a thimble, and pointed over, called a *lizard*, to which is hooked a bow-line tackle that makes fast to the bitts, and is bowsed upon until the bow-line can be made fast to the bitts.

Leech-lines, 35, (*Plate* IV. *fig.* 2.) reeve through the block upon the yard, and the outer end makes fast with a clinch to the upper bow-line bridle. The leading-part reeves through a double block at the fore part of the top, and another at the aft part of the top. A single block is turned into the lower end, and a whip-fall reeved through it. The standing-part makes fast to an eye-bolt in the deck; and the leading-part reeves through a block under the cross-piece of the bitts, near the mast.

Bunt-lines, 36, reeve as the fore-course, and lead forward upon the forecastle.

Slab-lines, 37, *spilling-lines*, 38, and *life-lines*, 39, (*Plate* IV. *fig.* 2.) as the fore-course.

Rigging and Bending the Mizen-Courſe, 9, *Plate* IV. *fig.* 2.

Earing reeves, with an eye in one end, through the cringle in the peek of the ſail, and makes faſt round the peek as the earings above.

The nock-earings the ſame as the peek.

Lacing is ſpliced to the peek-earing-cringle, and laces round the yard or gaff, through the eye-let holes in the head of the ſail, and makes faſt to the nock-earing-cringle. Lacing round the maſt is ſpliced to the nock-cringle, and round the fore-ſide of the maſt, backwards and forwards, and through each cringle on the fore-leech of the ſail, making faſt to the tack at the lower end.

Tack ſets up with a laniard reeved through the tack-cringle in the foot of the ſail, and through an eye-bolt in the deck.

Sheet reeves through a block on the horſe, at the fore part of the taffrail; then through the block that hooks to the thimble, in the clue of the ſail; again through the block on the horſe, and belays to a cleat on the ſide.

Brails, 41, (*Plate* IV. *fig.* 2.) throat, middle, and peek, reeve through their reſpective blocks on the yard or gaff, and make faſt to cringles on the after-leech of the ſail on each ſide. The throat-brails lead down by the maſt, and the middle brails lead down to the after-mizen-ſhroud on each ſide, and the peek-brails to a cleat on each quarter.

Fancy-line, 42, (*Plate* IV. *fig.* 2.) has two ſpans, with a thimble ſeized in the bight, and a thimble ſeized in each end; one thimble reeves upon the throat-brail, the other on the middle brail, on each ſide the ſail. The fancy-line reeves through blocks laſhed at the peek end, and each end bends to the thimble in the bight of the ſpan on each ſide. When the mizen is ſet, the brails are hauled up by the fancy-line, that they may be ſlack, and not girt the lee-ſide of the ſail.

Rigging and Bending the Topſails.

The *fore-topſail*, 6, (*Plate* IV. *fig.* 2.) is ſwayed up into the top by the topſail-haliards, that make faſt to ſlings round the middle of the ſail, and then laid in the fore part of the top fair for bending.

Sheets, 44, (*Plate* IV. *fig.* 2.) are paſſed through the fore part of the clue of the ſail, and ſtopt with an overhand-knot. They reeve through the ſhoulder-block at the lower yard, then through the quarter-block, and come down before the maſt; reeve through the ſheave-holes in the bitts, and there belay.

Clue-lines, 45, (*Plate* IV. *fig.* 2.) The ſtraps of the blocks are paſſed through the clues of the ſail, and brought round the clue to the fore part, and ſecurely ſeized. The clue-lines are paſſed the ſame as the clue-garnets of the courſes, and ſometimes have no block, but bend to the clue of the ſail.

Bow-lines, 46, (*Plate* IV. *fig.* 2.) reeve through the blocks at the bowſprit-cap. The outer part reeves on the lower bow-line bridle with a thimble, as the main-courſe. The leading-part comes in upon the forecaſtle, and belays to the topſail-ſheet-bitts.

Bunt-lines, 47, (*Plate* IV. *fig.* 2.) reeve through the block upon the yard, lead down on the fore-ſide of the ſail, and clinch to the cringles in the foot-rope. The leading-part reeves through a ſingle block, laſhed cloſe under the topmaſt croſs-trees, leads down through the ſquare hole in the top, and belays to the ſhrouds.

Reef-tackle-pendants, 48, (*Plate* IV. *fig.* 2.) reeve through the upper ſheave in the ſiſter-block in the topmaſt-ſhrouds, then through the ſheave-hole in the yard-arm, and clinch to the reef-cringle in the leech-rope of the ſail.

Reef-earings reeve through their bights in each reef-cringle, and are ſtopt to the next cringles and the head of the ſail, till uſed.

Spilling-lines have two legs, which are each made faſt with a timber-hitch round the quarters of the topſail-yard, then lead down on the aftſide, return upwards under the foot of the ſail, and reeve through a block on the fore-ſide, laſhed to the tye-block on the yard, then lead down upon deck abaft the maſt.

Life-lines, *earings*, *rope-bands*, and *points*, as the fore-courſe.

Gaſkets.—The yard-arm gaſket reeves with an eye round the yard-arm, within the cleats. Quarter-gaſkets reeve as the above, between the yard-arm and ſlings. Bunt-gaſkets have two legs, and laſh to the yard with an eye on each ſide the tye-block, and faſten thereto, when the ſail is hauled up in the bunt.

The MAIN-TOPSAIL, 2, (*Plate* IV. *fig.* 2.) is ſwayed up into the top, as the fore-topſail.

Sheets, 51, *clue-lines*, 52, *bunt-lines*, 53, *reef-tackle pendants*, 54, *earings*, *rope-bands*, *points*, and *gaſkets*, as the fore-topſail.

Bow-lines reeve through blocks laſhed round the fore-maſt-head, cloſe under the cap; the outer part reeves on the lower bowline-bridle with a thimble, as the fore-topſail. The leading-part comes down through the ſquare hole of the cap, reeves through a ſheave-hole in the bitts upon the forecaſtle, and there belays.

The MIZEN-TOPSAIL, 10, (*Plate* IV. *fig.* 2.) in large ſhips, is ſwayed as the foregoing.

Sheets, 56, *clue-lines*, 57, *bunt-lines*, 58, *reef-tackle pendants*, 59, *earings*, *rope-bands*, *points*, and *gaſkets*, as the fore-topſail.

Bow-lines, 60, (*Plate* IV. *fig.* 2.) bend to the ſail as the fore-topſail, and reeve through a ſingle block, ſeized to the main-ſhrouds on the oppoſite ſide near the futtock-ſtaff; then lead down through a ſeizing-truck to the quarter-deck, and belay to the rack at the ſhrouds.

Rigging and Bending the Top-gallant Sails.

The FORE-TOP-GALLANT-SAIL, 7, (*Plate* IV. *fig.* 2.) is either ſwayed up to the topmaſt croſs-trees by the clue-lines, or bent to the yard upon deck. It is hauled out to the yard-arm by earings, and bends or laces to the yard, as before obſerved.

Sheets, 62, and *clue-lines*, 63, are bent to the clues of the ſail, and lead down upon deck, as the fore-topſail.

Bunt-lines, 64, reeve through a ſmall block, ſeized to the top-gallant-maſt-head; then through a thimble ſeized to the tye, cloſe down upon the yard, and bend, with legs, to cringles in the foot of the ſail. The leading-part comes down into the top.

Bow-lines, 65, (*Plate* IV. *fig.* 2.) reeve through the thimbles at the jib-boom-end, and faſten to the ſail as the topſail, only with a toggle, to caſt off the bow-line readily for ſending the yard down. The leading-part comes down the forecaſtle, and belays to a pin in the hook over the bowſprit.

The jack-block is ſtrapped with a ſeizing-eye, through which reeves a ſhort piece of rope, with an eye ſpliced in one end, and a double walnut-knot made at the end, called a button and loop, which encircles the maſt, by thruſting the knot through the eye, and is triced up and down the maſt by the top-gallant-tye, which bends through the eye

of

of the ſtrap. It is uſed for ſending the top-gallant-yards up or down. When the yard is ſwayed up, the top-rope reeves through the jack-block, and makes faſt with a hitch round the yard in the ſlings, then ſtopt at the outer quarter to the eye-bolt in the yard-arm. When lowered, the ſame, except the ſtop at the eye-bolt. The rigging is taken off or put on by the men at the maſt-head, when the yards are ſwayed up or lowered down.

The MAIN-TOP-GALLANT-SAIL, 3, (*Plate* IV. *fig.* 2.) rigs and bends as the former. Bow-lines, 67, reeve through the ſheave-holes in the after-ends of the fore-topmaſt croſs-trees, and lead down upon deck. *Sheets*, 68, *clue-lines*, 69, *bunt-lines*, 70, *Plate* II. *fig.* 2.

The MIZEN-TOP-GALLANT-SAIL, 11, rigs and bends as the former. Bow-lines, 72, reeve through the ſheave-holes in the after-end of the main-topmaſt croſs-trees.

Rigging and Bending the Royals.

Royals, fore, 8, main, 4, and mizen, 12, (*Plate* IV. *fig.* 2.) are ſet flying; the clues laſhed to the top-gallant yard-arms.

When royal maſts are uſed, the royals rig ſimilar to top-gallant ſails.

Rigging and Bending the Jib and Stayſails.

Jib, 7, (*Plate* IV. *fig.* 1.) bends to its ſtay with hank and ſeizings.

Stay, 57, reeves through the upper ſheave of the cheek-block at the fore-topmaſt-head, from aft on the ſtarboard ſide, then through the hanks, and clinches to the traveller on the boom; a double block is then turned in the lower end, and its fall reeves through it; and a ſingle block, laſhed to the after-end of the fore-maſt treſtle-trees, leads down upon deck, and belays to the bitts abaft the fore-maſt.

Haliards, 58, reeve through the lower ſheave of the cheek-block at the fore-topmaſt-head, from aft on the ſtarboard ſide, and bend to the head of the ſail. The leading-part leads abaft the top to the aft part of the forecaſtle. Large ſhips have a ſingle block turned into the lower end of the haliards, and a whip-fall; the ſtanding-part makes faſt into the ſide.

Sheets, 59.—The bight is bent to the clue of the ſail, and a ſingle block turned in each inner end, that reeves a whip-fall. The ſtanding-part makes into the ſide, and the leading-part leads in upon the forecaſtle, and belays to a timber-head, or a cleat before the ſhrouds on each ſide.

Downhauler, 60, reeves through a ſmall block laſhed to the traveller, then leads upwards through the hanks, and bends to the head of the jib. The leading-part leads in upon the forecaſtle.

Outhauler reeves through a ſheave-hole at the outer end of the jib-boom, and clinches to the ſpan-ſhackle of the traveller. The inner end has a double block turned in, which reeves with its fall to a ſingle block, hooked to an eye-bolt in the fore part of the bowſprit-cap, and the fall leads in on the forecaſtle.

Inhauler reeves through a ſmall block laſhed on the traveller. The ſtanding-part makes faſt to an eye-bolt in the ſide of the bowſprit-cap, and the leading-part comes in upon the forecaſtle.

The FORE-TOPMAST-STAYSAIL, 6, (*Plate* IV. *fig.* 2.) bends to its ſtay with hanks and ſeizings. *Stay*, 62, reeves through the hanks, then makes faſt with a running-eye round the bowſprit, between the collars and the ſpritſail-yard; then reeves through the upper ſheave of the cheek-block, at the fore-topmaſt-head, on the larboard ſide; the lower end has a double block turned in, and reeves with its fall to a ſingle block laſhed at the after-end of the fore-maſt treſtle-trees, leads upon deck, and belays to the bitts abaft the fore-maſt.

Haliards, 63, reeve through the lower ſheave of the cheek-block at the fore-topmaſt-head, on the larboard ſide, and bend to the head of the ſail. The leading-part leads down abaft the top to the after-part of the forecaſtle, and belays to a cleat in the ſide.

Sheets, 64.—The bight is bent to the clue of the ſail, and leads through a ſingle block, laſhed to an eye-bolt on each ſide of the forecaſtle.

Downhauler, 65, reeves through a ſmall block that laſhes at the tack of the ſail, then leads up through the hanks, and bends to the head of the ſail; and the leading-part comes in upon the forecaſtle.

Outhauler reeves through a block laſhed at the outer end of the bowſprit; the ſtanding-part makes faſt to the tack of the ſail, and the leading-part comes in upon the forecaſtle.

FORE-STAYSAIL, 5, (*Plate* IV. *fig.* 1.) bends to the preventer-ſtay with hanks and ſeizings.

Haliards, 67, reeve through a ſingle block bent to the head of the ſail. The ſtanding-part makes faſt round the head of the fore-maſt; and the leading-part reeves through a block laſhed to the rigging under the top, and leads down abaft the maſt.

Sheets, 68, are doubled, and the bight put through the clue of the ſail; and a ſingle block ſpliced in each end. The ſtanding-part of the fall is made faſt round a timber-head on the forecaſtle or eye-bolt, and the leading-part comes in through a block made faſt to the ſaid eye-bolt.

Tack, 69, bends to the tack of the ſail, and laſhes the tack of the ſail to the ſtay near the heart.

Downhauler, 70, reeves up through the hanks, bends to the head of the ſail, and leads in upon the forecaſtle through a ſingle block laſhed near the tack.

MAIN-STAYSAIL, 1, (*Plate* IV. *fig.* 1.) is ſeldom bent in ſhips but at ſea, though commonly in brigs. It bends to the main-ſtayſail ſtay with hanks and ſeizings.

Stay, 72, has its upper end clinched round the main-maſt-head above the rigging, and the lower end ſet up with a luff-tackle round the foremaſt.

Haliards, 73, reeve through a ſingle block laſhed to the head of the ſail. The ſtanding-part makes faſt at the main-maſt-head, and the leading-part reeves through a block laſhed to the rigging under the top, and leads down abaft the maſt: a double block is turned in to the end, and connected, by its fall, to a ſingle block, hooked to an eye-bolt in the ſide abaft the maſt.

Sheets, 74, are doubled, the bight is put through the clue of the ſail, and the ends through the bight. A block is ſpliced into each end, and the ſtanding-part of each fall makes faſt on its reſpective ſide at the fore part of the quarter-deck, and the leading-part through a ſnatch-block. Sometimes a luff-tackle is clapt on to bowſe the ſheets aft.

Tacks, 75, bend to the tack of the ſail, and laſh the tack of the ſail to the foremaſt, or the bitts abaft it.

Downhauler, 76, reeves up through the hanks, bends to the head of the ſail, and belays to the main-top bow-line bitts.

MAIN-TOPMAST-STAYSAIL, 2, (*Plate* IV. *fig.* 1.) bends to the main-topmaſt preventer-ſtay with hanks and ſeizings.

Haliards, 78, reeve from the aftſide through the cheek-block at the main-topmaſt-head on the larboard ſide, come

 down

down and bend to the head of the ſail. The leading-part reeves through a block in the ſide.

Sheets, 79, are doubled, the bight is put through the clue of the ſail, and the ends through the bight. A block is ſpliced in each end, and the ſtanding-part of each fall makes faſt on its reſpective ſide to the boat-ſkid beam next before the quarter-deck, and the leading-parts reeve through a block on the gunwale abaft the gangway, and belays to a pin in the boat-ſkid beam.

Tacks, 80, are doubled, the bight is put through the tack of the ſail, and the ends reeve through the bight, and lead through a thimble ſeized to the lower ſhrouds on each ſide; they lead down and belay to a ſhroud-cleat.

Brails, 81, reeve through blocks laſhed to the ſtrap of the main-bowline-block, and through blocks ſeized to the topmaſt preventer-ſtay, at the cat-harpins on each ſide, and then make faſt on each ſide the ſail to a cringle on the after-leech.

Sheets, 82, are doubled, the bight is put through the clue of the ſail, and the ends through the bight. A block is ſpliced in each end, and the ſtanding-part of each fall is made faſt on its reſpective ſide to the boat-ſkid beam next the quarter-deck, and the leading-part reeves through a block on the gunwale on each ſide abaft the gangway.

Tacks, 83, are doubled, the bight is put through the tack of the ſail, and the ends through the bight, and lead through a thimble ſeized on the lower ſhrouds on each ſide; they then lead down and belay to one of the ſhroud-cleats.

MIDDLE-STAYSAIL, 3, (*Plate* IV. *fig.* 1.) bends to the middle-ſtayſail-ſtay with hanks and ſeizings.

Stay, 85. The ſtanding-part reeves through the hanks, and makes faſt to a thimble ſeized in a ſtrap or grommet made faſt round the fore-topmaſt-head, below the parral. The leading-part reeves through the upper ſheave-hole at the main-topmaſt-head: a double block is then turned into the end, and connects by its fall with a ſingle block, that laſhes to the main-treſtle-trees, and the fall by which it is ſet up leads upon deck abaft the maſt.

Haliards, 86, reeve through the lower ſheave of the cheek-block at the main-topmaſt-head, and bend to the head of the ſail; the other end leads upon deck abaft the maſt.

Sheets, 87, are doubled, the bight is put through the clue of the ſail, and the ends through the bight, and lead down through a block on each ſide near the gangway.

Tacks, 88, are doubled, the bight is put through the tack of the ſail, and the ends through the bight, and each end through a thimble ſeized in the fore-topmaſt-ſhrouds, and belays in the top.

Downhauler, 89, reeves through a ſingle block ſeized to the ſtay at the nock of the ſail, then leads up through the hanks, and bends to the head of the ſail, and the lower end comes down upon deck abaft the maſt.

Tricing-line clinches to the grommet round the fore-topmaſt, and reeves through a block under the fore-topmaſt-croſs-trees, and leads down into the top.

MAIN-TOP-GALLANT-STAYSAIL, 4, (*Plate* IV. *fig.* 1.) bends to the ſtay, or main-top-gallant-ſtay, in ſmall ſhips, with hanks and ſeizings.

Stay, 91. The upper end ſplices into the top-gallant-ſtay below the rigging, and the lower end reeves through a thimble ſeized to the fore-topmaſt-croſs-trees, leading down into the top.

Haliards, 92, reeve through a ſheave-hole above the hounds of the main-top-gallant-maſt, and bend to the head of the ſail; the leading-part comes down upon deck, and belays to the bitts abaft the main-maſt.

Sheets, 92, and *tacks*, 93, as the middle ſtayſail.

Downhauler, 94, reeves up through the hanks, and bends to the head of the ſail; and the leading-part comes upon deck abaft the fore-maſt.

MIZEN-STAYSAIL, 8, (*Plate* IV. *fig.* 1.) bends to the mizen-ſtayſail ſtay with hanks and ſeizings.

Stay, 96, hitches round the head of the mizen-maſt, then reeves through a thimble ſeized in a collar laſhed round the main-maſt, and ſets up with a laniard through a thimble turned in to the ſtay, and an eye-bolt in the deck abaft the maſt.

Haliards, 97, reeve through a block at the head of the ſail, the ſtanding-part makes faſt round the mizen-maſt-head, and the leading-part reeves through a block laſhed to the treſtle-trees, and through a block in the ſide at the deck.

Sheets, 98, bend to the clue of the ſail with a long and ſhort leg, having a thimble ſpliced in the latter. The long leg reeves through a block in the ſide, and through the thimble in the ſhort leg, and belays to the rack at the ſide.

Tack, 99, ſplices to the tack of the ſail, and laſhes it to an eye-bolt in the deck abaft the mizen-maſt.

Downhauler, 100, reeves through a block made faſt to the collar of the ſtay, then upwards through the hanks, and bends to the head of the ſail, and belays to the fore-brace bitts.

Brails, 101, reeve through blocks laſhed on each ſide the collar, then through thimbles in a ſtrap put through the ſail, and make faſt to a cringle on the after-leech. The leading-part belays a-breaſt of the quarter-deck.

MIZEN-TOPMAST-STAYSAIL, 9, (*Plate* IV. *fig.* 1.) bends to the mizen-topmaſt-ſtay with hanks and ſeizings.

Haliards, 103, reeve through the ſheave-hole in the topmaſt above the rigging, or through a block laſhed round the maſt-head; one end bends to the head of the ſail, the lower end leads down upon deck abaft the maſt.

Sheets, 104, are doubled, the bight put through the clue of the ſail, and the ends through the bight; then through a thimble ſeized in the mizen-ſhrouds on each ſide, and lead down and belay to a pin in the ſhroud-rack.

Tacks, 105, are doubled, the bight put through the tack of the ſail, and the ends through the bight, then through a thimble ſeized to the main-topmaſt-ſhrouds on each ſide, and lead down and belay in the top.

Downhauler, 106, reeves up through the hanks, and bends to the head of the ſail; the lower end leads down upon deck, and belays at the fore part of the quarter-deck.

MIZEN-TOP-GALLANT-STAYSAIL, 10, (*Plate* IV. *fig.* 1.) bends to the mizen-top-gallant-ſtay with hanks and ſeizings.

Haliard, 108, reeves through the ſheave-hole above its top-gallant-maſt hounds; one end bends to the head of the ſail, the lower end leads down upon deck abaft the maſt.

Sheets, 109, are doubled, the bight put through the clue of the ſail, and the ends through the bight, and lead down upon deck through a thimble ſeized in the mizen-ſhrouds, on each ſide near the cat-harpins, and belay to a pin in the ſhroud-rack.

Tacks, 110, bend to the tack of the ſail as the ſheets, and lead down into the top through a thimble ſeized in the main-topmaſt-ſhrouds on each ſide.

Downhauler, 111, reeves up through the hanks, and bends to the head of the ſail, the lower end comes into the main-top, and belays to the top-rail.

Rigging

Rigging and Bending the Studding-Sails.

Studding-ſails bend their yards at the head with rope-bands, the ſame as other ſquare ſails.

Lower ſtudding-ſails, main, 15, (*Plate* IV. *fig.* 2.) *Outer haliards*, 61, reeve through a ſpan-block hitched round the lower cap, and through a block at the lower yard-arm or boom-iron, and bend between the cleats of the ſtudding-ſail-yard; the other end leads down upon deck.

Inner haliards, 62, bend to the upper inner cringle on the head of the ſail, then reeve through a tail-block made faſt round the quarter of the lower yard, then through another block made faſt round the yard near the maſt, and lead down upon deck.

Sheets, 63, are doubled, the bight is put over, and the ends through the inner clue on the foot of the ſail; one leads forward, and the other aft.

Fore-ſtudding-ſail, 18, (*Plate* IV. *fig.* 2.) ſets flying, or with a boom at the foot. If flying, the foot of the ſail ſpreads on a yard, that rigs with a ſpan clinched round each yard-arm. A guy is bent to an eye that is croſſed in the middle of the ſpan, and leads aft through a block laſhed to the main-chains, leads in through a port, and belays round a cleat in the waiſt. The ſail thus rigged has no tacks. Booms rig as follow: the hook in the inner end hooks to an eye-bolt between the fore-chains and cat-head, and the hook of the main-ſtudding-ſail-boom in an eye of an iron ſtrap on the fore part of the main channel; the end is confined down with a laſhing to the chain-plates; the inner end of the fore-boom is confined down with a tackle, made faſt round the inner end of the boom, and the lower block is hooked to an eye-bolt in the wale; the guy clinches round the middle of the boom, reeves through a block laſhed round the ſpritſail-yard, and leads in upon the forecaſtle.

TOPMAST-STUDDING-SAILS, *Main*, 16, *Fore*, 19, (*Pl.* IV. *fig.* 2.) *Haliards*, 90, 91, reeve through a block in the ſpan round the topmaſt-head, under the cap, and through the jewel-block, at the outer end of the top-ſail-yard-arm, and bend to the topmaſt-ſtudding-ſail-yard; the other end leads down upon deck, and belays to the bitts next the maſt.

Sheets are doubled, the bight is put through the inner clue, and the ends through the bight. The after-ſheet, 92, of the fore-topmaſt-ſtudding-ſail leads in abaft the fore-ſhrouds, and the fore-ſheet, 93, leads in upon the forecaſtle. The after-ſheet, 94, of the main-topmaſt-ſtudding-ſail leads down to the quarter-deck, and the fore-ſheet, 95, upon the gangway.

Tacks, 73, bend to the outer clue of the ſail, reeve through a block laſhed to the outer end of the boom, and lead aft through a block at the gangway. Tack, 74, of the main-topmaſt-ſtudding-ſail leads in upon the after-part of the quarter-deck through a block laſhed upon the quarter.

Downhauler, 75, reeves through a block laſhed to the outer clue of the ſail, and through a thimble on the outer leech: it is then made faſt to the topmaſt-ſtudding-ſail-yard, juſt within the earing, and leads into the waiſt.

The Booms, 76, 77, are run out by the tackles. The ſtrap of the double-block makes faſt through a hole in the heel of the boom, and the outer block to the boom-iron, and the fall leads along the yard. On the middle of the boom is faſtened a ſelvagee, or a ſtrap with a thimble, to which is hooked the top-burton-tackle, to ſupport the boom in the middle.

TOP-GALLANT-STUDDING-SAILS; fore, 20, main, 17, (*Plate* IV. *fig.* 2.) *Haliard* reeves through a block ſeized round the head of the top-gallant-maſt, above the hounds or rigging, then through the jewel-block, ſtrapt with a thimble through an eye-bolt at the ends of the top-gallant-yards, and bends to the top-gallant-ſtudding-ſail-yard; the other end leads down the maſt into the top.

Sheets, 80, are doubled, the bight is put through the lower inner clue of the ſail, and the ends through the bight; one end leads forward, and makes faſt to the quarter of the topſail-yard, and the other end leads into the top, and belays to the topmaſt-ſhrouds.

Tacks, 81, bend to the outer clue of the ſail, and reeve through a thimble in a ſtrap round the outer end of the top-maſt-ſtudding-ſail-boom; and in merchant ſhips that have no boom, through a thimble in a ſtrap round the outer yard-arm of the topmaſt-ſtudding-ſail. The fore-top-gallant-ſtudding-ſail-tack leads aft to the main-chains, and the main leads to the quarter-piece.

Downhauler, 82, makes faſt to the outer yard-arm within the earing, and leads down into the top.

Rigging and Bending the Spritſail-Courſe.

The ſpritſail-courſe, 13, (*Plate* IV. *fig.* 2.) bends to its yard as the fore-courſe.

Sheets, double, 84, reeve through a block ſeized to the clue of the ſail; the ſtanding-part clinches to an eye-bolt in the bow, and the leading-part comes in on the forecaſtle.

Sheets, ſingle, bend to the clue of the ſail, and lead in-board.

Clue-lines, 85, reeve through the blocks upon the yard, and bend or reeve through a block at the clue of the ſail, and lead in upon the forecaſtle.

Bunt-lines, double, 86, reeve through the block on the yard, and clinch to the cringles at the foot of the ſail, and lead in upon the forecaſtle.

Bunt-lines, ſingle, reeve through a block in the ſlings of the yard, and clinch with legs to the cringles in the foot of the ſail, and lead in upon the forecaſtle.

Rigging and Bending the Spritſail-Topſail.

The ſpritſail-topſail, 14, (*Plate* IV. *fig.* 2.) bends to the yard with lacing and earings.

Sheets, 88, reeve through the ſheet-block at the ſpritſail-yard-arm, and hook to the clue of the ſail, and lead in upon the forecaſtle, through a block laſhed on each ſide of the bowſprit.

Clue-lines, 89, the ſame as the ſpritſail.

Rigging and Bending the Driver or Spanker-ſail, 11, *Plate* IV. *fig.* 1.

This ſail is only uſed occaſionally, and is bent or hoiſted in a temporary manner, thus; it is made faſt at the peek, 113, and nock, 114, with an earing, as the mizen, and makes faſt to the yard and gaff with four or five pairs of haliards, that reeve through blocks made faſt with tails round the yard and gaff, one end of the haliard being bent to the head of the ſail. The throat-haliards, 115, reeve with a double and ſingle block: the former is made faſt round the maſt-head, and the latter hooks to the nock-cringle on the ſail.

Sheet, 116, reeves through a block or ſheave-hole at the outer end of the boom, and bends to the clue of the ſail; a luff-tackle is cat's-pawed to the other end of the ſheet; the inner block hooks to the taffarel, and the fall leads in upon the quarter-deck. When this ſail is bent to the maſt, yard, or gaff, inſtead of the mizen, it bends exactly the ſame, only the foot of the ſail is extended on the boom, as above.

Tack,

Tack, 117, is set tight with a luff-tackle, that hooks to the cringle in the tack of the sail, and to an eye-bolt in the throat of the boom.

Downhauler, 118, reeves through a block made fast to the middle of the driver-yard, and leads down to the taffarel.

Rigging of Snows, Brigs, &c.

A *Snow* has her sails and rigging on the fore and main-mast, similar to those on the same mast in a ship. The braces of the yards on the main-mast lead forward. The trysail abaft the main-mast bends to the trysail-mast, similar to the mizen of a ship.

Vessels in the navy resembling snows have a rope-horse, that sets up abaft the main-mast, with dead-eyes and a laniard, to an eye-bolt in the deck, to which the trysail is bent by hanks and seizings, similar to the trysail of a snow.

Brigs.—The rigging of a brig differs little from the fore and main-mast of a ship; the braces of yards on the main-mast lead forward. The after-main-shroud is served from the mast-head to the dead-eye, to prevent its being chafed by the main-boom and gaff. The after-backstay is fitted with a tackle, that it may be slackened when the main-sail jibes, or is bowsed forward by the boom-pendant and tackle.

Boom-topping-lift is taken up on the starboard side, and reeved through an iron-bound block, hooked to the upper eye-bolt on the aftside of the main-mast-head, then leads down and reeves through a block at the after-end of the boom. The standing-part clinches round the mast-head, or hooks to an eye-bolt near the block; the leading-part comes down and has a double block spliced or turned in, that connects by its fall to a single block that hooks to an eye-bolt in the after-part of the channel. Sometimes it has the addition of a runner.

Main-sheet reeves through a double block, strapped round the boom within the taffarel, and through another double block, strapped round the horse inside the taffarel, and belays to a large cleat, or the pin in the sheet-block of small vessels. Large vessels sometimes have a treble block on the horse.

Tack-tackle has the double block fastened to the tack of the sail, and connects with its fall to a single block hooked to an eye-bolt in the deck.

Guy-pendants have a hook and thimble, that hook in a thimble of a strap on the boom, just without the main-sheet-block. In the inner end of the pendant, is a thimble or long-eye spliced, to which is hooked a luff-tackle, which is hooked to an eye-bolt in the side before the mast, and the fall leads in-board.

Gaff-topping-lift rigs similar to the boom above, only it has a span upon the gaff, and the block at the mast-head hooks to the eye-bolt, next below the boom-topping-lift; and the

Haliard connects it to an eye-bolt in the deck or side, the same as the boom.

Inner tye is similar to the above, and hooks to an eye-bolt in the jaws of the gaff, then reeves through an iron-bound block, that hooks to an eye-bolt in the mast-head below the above. It has a double block spliced or turned in to the lower end, and sets up by the haliards, the lower block hooking to an eye-bolt on the opposite side to the tye above.

Peek-downhauler reeves through a small block, strapped with a thimble to the eye-bolt at the outer end of the gaff, and belays round a cleat under the boom.

Throat-downhauler reeves through a block at the nock of the sail, and leads down the aftside of the mast.

Main-sail bends at the head to the gaff with lacing and earings, and is seized to the hoops round the mast, through the holes in the fore-leech.

Throat-downhauler.—The double block hooks to an eye-bolt under the throat of the gaff, that connects by its fall to a single block hooked to the thimble, seized in the bight of a strap round the mast under the boom saddle.

Sheet-rope splices in the clue of the sail, and reeves through a sheave-hole in the boom; and a thimble is turned in to the inner end, to which hooks the sheet or luff-tackle, and the inner block to a strap round the boom near the jaws. When the sail is hove out, it is lashed with an earing through the clue, and an eye-bolt in the boom-end.

Tricing-line reeves through a small block made fast to an eye-bolt in the throat of the gaff; one end splices to the tack of the sail, the other end leads down upon deck, and belays to a cleat on the mast.

Rigging of Cutters or Vessels with one Mast.

The different articles before the mast rig similar to ships, and the shrouds, boom, &c. as the brigs.

Gaff-topsail laces to a small gaff at the head.

Haliards reeve through a sheave-hole at the top-gallant-mast-head, and bend to the inner quarter of the gaff; the leading-part comes down upon deck.

Topping-lift reeves through a sheave-hole, or small block, seized to the top-gallant-head, then through a thimble or small block seized at the outer end of the gaff; the standing-part clinches round the top-gallant-mast-head above the sheave-hole, and the leading-part comes down upon deck.

Sheet reeves through a thimble seized at the peek of the main-sail, and bends to the clue of the sail, and leads down upon deck.

Tack makes fast to the tack of the sail, a little above the rigging.

Saveall-topsail.—The clues lash near the lift-block of the cross-jack-yard.

Haliards bend to the earings of the sail, and reeve through a block on each quarter of the topsail-yard, and lead down upon deck.

Ringtail-sail bends to a small yard on the head, and is hoisted by the peek-downhauler, abaft the main-sail. The foot is expanded on a small boom, or spar, lashed to the outer end of the main-boom.

Water-sail bends on the head to a small yard.

Haliards reeve through a small block lashed under the outer end of the main-boom, and make fast to the middle of the yard, and the leading-part belays round a cleat on the taffarel.

Sheets make fast to the clues of the sail, and lead in over the quarters.

Mizen is set on a small mast over the stern. If a square-sail, it bends to a yard at the head, and is hoisted by a *haliard* reeved through a sheave-hole at its mast-head, and is spread by *sheets* at the foot. If a spritsail, its fore-leech bends to the mast with grommets, and is spread or peeked with a sprit, and the foot hauls aft by the sheet to a small boom.

Rigging, *Serving the.* See Rigging.

RIGHT, Rectum, in *Logic* and *Ethics.*

In this sense the word stands opposed to *wrong*, *erroneous*, *false*, &c.

Right, in *Geometry*, something that lies evenly, without inclining or bending one way or another.

Thus, a *right line* is that whose several points all tend the same way, or which lies evenly between its extremes.

In this ſenſe, *right* ſignifies as much as *ſtraight*, and ſtands oppoſed to *curved* or *crooked*.

Right *Angle*. See Angle.

In this ſenſe, the word *right* ſtands oppoſed to *oblique*.

Right-*Angled* is underſtood of a figure, when its ſides are at right angles, or ſtand perpendicularly one upon another.

This ſometimes holds in all the angles of the figure, as in ſquares and rectangles; ſometimes only in part, as in right-angled triangles.

Right *Cone*. See Cone.

Right-*Lined Angle*. See Angle.

Right *Sine*. See Sine. The word here ſtands contradiſtinguiſhed to *verſed*.

Right *Aſcenſion*, in *Aſtronomy*. See Ascension.

Right *Aſcenſion, Angle of*. See Angle.

Right *Aſcenſion, Parallax of*. See Parallax.

Right *Deſcenſion*. See Descension.

Right *Deſcenſion, Parallax of*. See Parallax.

Right *Sphere* is that where the equator cuts the horizon at right angles: or, that in which the poles are in the horizon, and the equator is in the zenith.

Such is the poſition of the ſphere with regard to thoſe who live directly under the equator. The conſequences of which poſition are, that they have no latitude, nor elevation of the pole. They can ſee nearly both poles of the world; all the ſtars riſe, culminate, and ſet, with them; and the ſun always riſes and deſcends at right angles to their horizon, and makes their days and nights equal.

In a right ſphere the horizon is a meridian; and, if the ſphere be ſuppoſed to revolve, all the meridians ſucceſſively become horizons, one after another.

Right *Circle*, in the *Stereographical Projection of the Sphere*, is a circle at right angles to the plane of projection, or that which paſſes through the eye. See Projection.

Right *Sailing* is when a voyage is performed on ſome one of the four cardinal points.

If a ſhip ſail under the meridian, that is, on the north or ſouth points, ſhe varies not in longitude at all, but only changes the latitude, and that juſt ſo much as the number of degrees ſhe has run.

If a ſhip ſail under the equinoctial upon the very eaſt or weſt points, ſhe alters not her latitude at all, but only changes the longitude, and that juſt ſo much as the number of degrees ſhe hath run.

If ſhe ſail directly eaſt or weſt, under any parallel, ſhe there alſo altereth not her latitude, but only the longitude; yet that not according to the number of degrees of the great circle ſhe hath ſailed in, as under the equinoctial, but more according as the parallel is remoter from the equinoctial towards the pole. For the leſs any parallel is, the greater is the difference of longitude.

Right, *Jus*, in *Law*, ſignifies not only a property, for which a writ of right lies, but alſo any title or claim, either by virtue of a condition, mortgage, or the like, for which no action is given by law, but only an entry.

Such are *jus proprietatis*, a right of property; *jus poſſeſſionis*, a right of poſſeſſion; and *jus proprietatis et poſſeſſionis*, a right both of property and poſſeſſion.

This laſt was formerly called *jus duplicatum*. As if a man be diſſeiſed of an acre of land, the diſſeiſee has *jus proprietatis*; the diſſeiſor hath *jus poſſeſſionis*; and, if the diſſeiſee releaſe to the diſſeiſor, he hath *jus proprietatis et poſſeſſionis*. See Jus.

Right, *Hereditary*. See Hereditary.

Right, *Petition of*. See Petition.

Right, *Pretenſed*. See Pretensed.

Right *of Reformation*. See Reformation.

Right, *Writ of*. See Writ and Recto.

Right *in Court*. See Rectus *in Curia*.

Right *Diſtillation*. See Distillation.

RIGHTING, in *Sea Language*, denotes the act of reſtoring a ſhip to her upright poſition, after ſhe has been laid on a careen. This is generally the natural effect of caſting looſe the careening pullies, by which ſhe had been drawn down. But it is ſometimes neceſſary to apply mechanical powers to right the ſhip in ſuch a ſituation; and the principal of theſe are the relieving tackles.

A ſhip is ſaid alſo to right at ſea, when ſhe riſes with her maſts erected, after having been preſt down on one ſide by the effort of her ſails, or a heavy ſquall of wind. Falconer.

Righting, when expreſſed of the *helm*, implies the replacing it amidſhips, after it has been put over to the ſide in tacking or otherwiſe.

RIGHTS, *Bill of*, in *Law*, is a declaration, delivered by the lords and commons to the prince and princeſs of Orange, February, 13 1688; and afterwards enacted in parliament, when they became king and queen. This declaration ſets forth, that king James II. did, by the aſſiſtance of divers evil counſellors, endeavour to ſubvert the laws and liberties of this kingdom, by exerciſing a power of diſpenſing with and ſuſpending of laws; by levying money for the uſe of the crown, by pretence of prerogative, without conſent of parliament; by proſecuting thoſe who petitioned the king, and diſcouraging petitions; by raiſing and keeping a ſtanding army, in time of peace; by violating the freedom of election of members to ſerve in parliament; by violent proſecutions in the court of king's bench; and cauſing partial and corrupt jurors to be returned on trials, exceſſive bail to be taken, exceſſive fines to be impoſed, and cruel puniſhments inflicted; all which were declared to be illegal. And the declaration concludes in theſe remarkable words, "And they do claim, demand, and inſiſt upon, all and ſingular the premiſes, as their undoubted rights and liberties." And the act of parliament itſelf (1 W. & M. ſtat. 2. cap. 2.) recognizes "all and ſingular the rights and liberties aſſerted and claimed in the ſaid declaration to be the true, ancient, and indubitable rights of the people of this kingdom."

RIGIACUM, in *Ancient Geography*, a town of Belgic Gaul, and capital of the Attrebatii. Ptolemy.

RIGID Marble. See Marble.

RIGIDITY, among *Philoſophers*, a brittle hardneſs; or that kind of hardneſs ſuppoſed to ariſe from the mutual indentation of the component particles within one another.

Rigidity is oppoſed to ductility, malleability, &c.

RIGLAND, in *Geography*, a town of Germany, in the margraviate of Anſpach; 7 miles N. of Anſpach.

RIGLET. See Reglet.

RIGNAC, in *Geography*, a town of France, in the department of the Aveyron, and chief place of a canton, in the diſtrict of Rodes; 12 miles W.N.W. of Rodes. The place contains 851, and the canton 7182 inhabitants, on a territory of 202½ kiliometres, in 16 communes.

RIGNEY, a town of France, in the department of the Doubs; 10 miles N.E. of Beſançon.

Rigney *le Seron*, a town of France, in the department of the Aube; 6 miles N.W. of Ervy. N. lat. 48° 12′. E. long. 3° 43′.

RIGNY, a town of France, in the department of the Indre and Loire; 6 miles N.N.E. of Chinon.

RIGO, a ſmall iſland in the Weſt Indies, near the N.W. coaſt of Porto Rico.

RIGODUNUM, in *Ancient Geography*, a town of Britain,

tain, in the country of the Brigantes, placed by Camden and Baxter at Ribchester in Lancashire; but Horsley prefers Manchester or Warrington. See RIBCHESTER.

RIGOLL, or REGALS, a kind of musical instrument, consisting of several sticks bound together, only separated by beads. It makes a tolerable harmony, being well struck with a ball at the end of a stick.

Such is the account which Grassineau gives of this instrument.

Skinner, upon the authority of an old English dictionary, represents it as a clavichord, or clarichord; possibly founding his opinion on the nature of the office of the tuner of the regals, who still subsists in the establishment of the king's chapel at St. James's, and whose business is to keep the organ of the chapel royal in tune; and not knowing that such wind instruments as the organ need frequent tuning, as well as the clavichord and other stringed instruments.

Sir Henry Spelman derives the word *rigol* from the Italian *rigabello*, a musical instrument, anciently used in churches instead of the organ.

Walther, in his description of the regal, makes it to be a reed-work in an organ, with metal and also wooden pipes, and bellows, adapted to it. And he adds, that the name of it is supposed to be owing to its having been presented by the inventor to some king.

From an account of the regal, used in Germany, and other parts of Europe, it appears to consist of pipes and keys on one side, and the bellows and wind-chest on the other.

We may add, that lord Bacon (Nat. Hist. cent. ii. § 102.) distinguishes between the regal and organ, in a manner which shews them to be instruments of the same class. Upon the whole there is reason to conclude, that the *regal*, or *rigol*, was a pneumatic, and not a stringed instrument.

Mersennus relates that the Flemings invented an instrument, *les regales de bois*, consisting of seventeen cylindrical pieces of wood, decreasing gradually in length, so as to produce a succession of tones and semitones in the diatonic series, which had keys, and was played on as a spinnet; the hint of which, he says, was taken from an instrument in use among the Turks, consisting of twelve wooden cylinders, of different lengths, strung together, which, being suspended, and struck with a stick, having a ball at the end, produced music. Hawkins's Hist. Mus. vol. ii. p. 449. See REGAL.

RIGOMAGUS, in *Geography*, a town of Italy, in Liguria, at a small distance N. of Asta.

RIGOR, in *Medicine*, a *shivering*, or the slight convulsive *tremors*, attended by a sensation of cold, which occur either from actual exposure to cold, or from that condition of the body which usually precedes a paroxysm of fever, or which, it should rather be said, constitutes one of the first symptoms of a febrile paroxysm. (See FEVER.) There is often no absolute diminution of the heat in the body, when this sensation of cold, and even actual shivering, with a disposition to sit near a fire, or to be loaded with blankets, occur. It arises, therefore, from some peculiar affection of the brain and nervous system, and not from actual deficiency of heat. This is farther proved by the circumstance, that a similar tremor, or *rigor*, is capable of being temporarily excited by certain impressions upon the sensorium; as by certain sights, or even thoughts, that excite horror: whence, indeed, the word *horror* is applied by medical writers in nearly the same sense with *rigor*.

Rigor, or chillinefs, precedes or commences the attack of almost all febrile and inflammatory diseases; whence the vulgar, mistaking the first symptom for the cause, ascribe all these diseases to the agency of *cold*, the operation of which they conceive to have been accomplished at the time when the *rigor* occurred. It takes place at the beginning of quinsey, pleurisy, peripneumony, and all the organic inflammations; at the commencement of almost all fevers; and at each such successive paroxysm or even exacerbation of intermittent, remittent, and hectic fevers: it constitutes the most striking feature, indeed, of the intermittent fever, which is hence called the *ague* by the common people, in contradistinction from the *fever*, or hot fit, which ensues. The tremor and clattering of the teeth are often so great, indeed, in the cold fit of an ague, as to shake the bed and its furniture about the patient. It made even Cæsar tremble.

> "He had a fever when he was in Spain,
> And, when the fit was on him, I did mark
> How he did shake: 'tis true, this god did shake."
> Shakspeare.

The rigor is a symptom still more notorious in pathology, as having been the foundation of Dr. Cullen's whole theory of fever. That physician maintained, that the rigor, or *cold fit*, having been produced by the sedative influence of the common causes of fever on the brain, became itself the cause of the succeeding *hot* and *sweating* stages, by rousing the heart and arteries to greater actions, in order to throw back the load of blood into the extreme vessels, which had been driven to the centre by the constriction of the latter, while the *rigor* lasted. The reader will find this doctrine stated, and refuted, under the article FEVER, and the head *Cullenian Theory*. It is not difficult to shew, respecting this, as well as the vulgar opinion, that the *rigor*, like the heat, and the sweating, is one in the chain of *effects*, and not a *cause* of the phenomena which ensue. But it would be equally difficult to explain the immediate cause of any of them.

RIGOSA, in *Geography*, a town of Italy, in the department of the Serio; 3 miles N.N.W. of Bergamo.

RIGOURISTS, in *Ecclesiastical History*. See JANSENISM.

RIGUSA, in *Ancient Geography*, a town of Spain, in the Tarragonensis, belonging to the Carpetani. Ptolemy.

RIK, in *Geography*, a town of Persia, in the province of Irak; 12 miles N. of Ispahan.

RIKEBACH, a town of Germany, in the county of Bregentz; 7 miles S.S.E. of Bregentz.

RIKIKES, a town of Thibet; 35 miles S. of Deuprag.

RIL, a town of Africa, in Darfur; 60 miles S.S.E. of Cobbé.

RILANDA, a town of Sweden, in the province of Upland; 28 miles N.E. of Stockholm.

RILEY, JOHN, in *Biography*, a portrait painter, and the best which England had produced prior to sir Joshua Reynolds. He was born in London in 1646. After the death of Lely he obtained very considerable esteem and employment. He painted the portraits of king Charles II., James II. and his queen, and was appointed by James state-painter. His style is composed from Vandyke and Lely, and his execution is free and masterly, and bears an air of originality. He died in 1691, at the age of 45.

RILL, or RIVULET. See RIVER.

RILL, in *Agriculture*, a small runlet of water, mostly rising on the sides of small hills or declivities. In many situations they may be converted to useful purposes in husbandry, such as the irrigation of pasture or meadow lands that lie below their levels; the supplying of grass grounds with water, for the purposes of live-stock; and the afford-

ing it to towns and villages, in dry or other ſituations where it is ſcarce. See IRRIGATION, WATERING *of Land*, and the following article.

RILLS, *Artificial*, ſuch as have been formed or made by means of art. It has been remarked, that the practice of conſtructing rivulets of this ſort for ſupplying water is peculiar to a few diſtricts of this country, as Yorkſhire and weſt Devonſhire, in the latter of which they have been made uſe of time immemorial in bringing what, in the ſimple language of the diſtrict, is termed "pot-water" to the farm-houſes, and the hamlets of cottages in upland ſituations; an excellent expedient, which is ſuppoſed applicable in many other parts of the iſland, but which, except in the caſe of Yorkſhire, has hitherto been confined to that extreme part of the country.

And in forming theſe ſorts of rills in their original diſtrict, it is obſerved by Mr. Marſhall, that one which ſupplies the houſe with water, alſo a drinking-pool near the yard, and in the natural courſe of it conveying it through a ſtraw yard, a trough is placed acroſs it for the uſe of the yard cattle; and which has, likewiſe, been for a vaſt length of time led over ſome graſs land, which lies below the yards, on the principle of the float and drain. But that although this rill is ſeldom, if ever, dried up, leading it along the ſides of the valley, through upland incloſures, which are deſtitute of water for ſtock, and their value of courſe thereby much depreciated, does not appear to have been thought of. In the courſe of the ſummer of 1792, being deſirous to know if this rill could be carried through an intended ſuite of yards on the ſide of the valley, he took the level, and found not only that object to be attainable, but alſo that it might be led with eaſe into two waterleſs fields which lie above theſe yards; and, through them, into four or five more (equally in want of water for ſtock) ſituated beyond them. It is added that, in aſcertaining theſe facts, he made uſe of a maſon's long level inverted, a plummet-hole being previouſly cut in the head of the ſtandard; the crown of which being ſet upon the ground, the arms of the level were ſteadied by rods in the horizontal poſition; and a carpenter's rule held acroſs another rod, ſet up, at as great a diſtance as a clear ſight would admit of, and at a height upon the ſtaff equal to the height of the level. Finding this a moſt ſimple and perfect inſtrument, but difficult to adjuſt, by reaſon of its inſtability, he has ſince had a *frame-level* made on the ſame principle; namely, with a ſtraight edge, or top rail, anſwering to the baſe-board of the long level, with a broad piece falling down from the middle of it, anſwering to the ſtandard; and with two end-pieces or legs, to ſuperſede the uſe of the rods, together with a bottom rail, eight or nine inches from the ground, and with diagonal braces to keep the whole firm, and prevent the middle or plumb-line from getting out of the ſquare with the ſtraight edge of the top rail; which is ſeven or eight feet long, and the height about four feet. He thinks that half a rod long, and a quarter of a rod high, are eligible dimenſions when great accuracy is required. But a ſhorter length, as one-third of a rod, is more handy. And, as an improvement of the rule and rod, he has contrived a *croſs-ſtaff*; namely, a ſlip of thin deal, about five feet and a half long, with a croſs-piece about two feet long and three inches wide, fixed in the edge of it, at the exact height of the level; the top of the ſtaff riſing twelve or eighteen inches above the upper edge of the croſs-piece, that the hand of the perſon who holds it up may not interfere with the view. This croſs-piece ſhould be of white wood, as deal, or be painted white, that it may be more diſtinctly ſeen at a diſtance. With this implement the flowing level may be well aſcertained.

And it is obſerved that, in order to aſcertain the proper fall of a rill of this intention, he previouſly took the running level of the ancient floating *leat* of the meadow, and finding its fall irregular, he took it in two places where the variations were greateſt. In the firſt, the fall was twenty-ſeven inches in one hundred and ten feet; which is nearly one inch, or one foot of fall to fifty inches, or fifty feet, in length. In this part the current is in a degree rapid; the fall much too great for the general intention. The fall in one hundred and ten feet of the other part is barely ſix inches; which is only one meaſure of perpendicular height to two hundred and twenty of horizontal length. But in this part the motion is too ſluggiſh; the ſurface of the water is nearly ſmooth; barely dimpling; no ripple or agitation appears. The fall is evidently too little for a water courſe, in which there is not a conſtant ſtream. He has therefore fixed upon one meaſure in a hundred, as the proper fall of a water-courſe, into which water is occaſionally thrown for the purpoſes of watering lands, filling drinking-pools, ciſterns, and other ſimilar purpoſes. And in order to adjuſt the level to this deſcent, he meaſured one hundred feet in length, and having nicely aſcertained the *dead level*, he depreſſed the range of the top bar one foot below the upper edge of the croſs-piece of the ſtaff, and, while in that poſition, he marked the ſituation of the plumb-line on the face of the level, the plummet-hole being made wide for this purpoſe; thus fixing the flowing level. And with this deſcent, he has traced a line from an intended reſervoir, and from point to point, through the fields of one ſide of the farm, and finds that it reaches, even with this deſcent, within every field; and that three-fourths, or a larger proportion, of the ſurface are capable of being floated from this intended pool. With the view of ſeeing the actual motion of water falling one in a hundred, he has had fifty yards of the upper end of the line opened, and finds the current fully ſufficient; a lively rippling ſtream, more active, perhaps, than is neceſſary. But the leakage being the leſs the quicker the water moves, it may, he thinks, be ſafely concluded that one foot of fall in a hundred feet length is nearly the proper degree that is required.

And in the ſame caſe he has, by the ſame means, alſo found that, from a ſimilar reſervoir formed near the ſource of the rill, water might be conveyed to every field, and almoſt every acre of the oppoſite ſide of the farm, which is a matter of great conſequence. It is ſuggeſted, that the uſes of theſe reſervoirs will be thoſe of having in readineſs, during the ſummer months, when the rill is weak, a body of water to throw into drinking-pools, ciſterns, &c.; a weak current turned into a dry trench is abſorbed by its perforations and fiſſures, for ſome time, at leaſt, after it is turned in; whereas a body of water, ruſhing quickly along it, not only in part eſcapes abſorption, but tends to fill up the leaks; and, in winter, theſe reſervoirs will be uſeful in ſcouring the trenches, and in hoarding up bodies of water for the purpoſe of irrigation, or other ſimilar uſes. In the ſetting out of theſe rills, he has laid the head or upper end of each, from two to three feet below the intended ſurfaces of their reſpective reſervoirs, when full. Hence, by the means of a portcullis flood-gate, a body of water two or three feet deep, and the whole extent of the ſurfaces of the baſons, may be poured into the rills, faſter or ſlower, as may be requiſite. And in a ſubſequent minute it is ſtated, that difficulties were met with in conducting a rill through an open grove of trees, but which were overcome in the following manner; having, by means of the frame level and croſs, aſcertained the general deſcent, or flowing level, through the whole extent of the grove; and having, in this

operation,

operation, gained a general idea of the requiſite direction of the rill, by means of ſtakes placed at the ſeveral ſtations of the croſs-ſtaff, wherever clear views could be caught through the openings between the trees, the intermediate ſpaces between the ſtakes were traced by the eye, ſo as to endeavour to follow the natural level of the ground, without forming abrupt bends in the channel: parrying between the two. And that the ſuppoſed line being thus ſet out, the ſurface of the ground was cleared two or three feet wide on either ſide of it, from leaves and other incumbrances, and the top ſoil removed for manure; thus making a hollow pathway through the grove, four or five feet wide. The next operation was to level this pathway, which was likewiſe done by the eye, from ſtake to ſtake; paring off the protuberances, and caſting or wheeling them into the hollows to fill them up. Then in order to come at the true line, and to render the flowing level perfectly uniform, a narrow pathlet, the width of the ſpade, was formed on the upper ſide of the broad pathway. This pathlet was formed with the frame level in hand, ſinking trenches in the ſtill protuberating parts, and raiſing banklets in the hollows; thus fixing the exact flowing level at each level's length, and, at the ſame time, forming the face or lower ſide of it, in ſuch manner as to eaſe the bends, and give a ſmooth flowing line to the rill or runlet of the water. And further, in order to bring the buſineſs of forming the bed of the rill to a certainty, and thereby to render any further ſuperintendance unneceſſary, yet to prevent error in the execution, he formed a *gauge* for the labourers to work by; which conſiſted of a board, forming the ſegment of a circle; the chord or greateſt length being three feet, the greateſt depth twelve inches. This gives the dimenſions of the bed of the rill. To keep the bottom of it exactly true to the flowing level, ſo that the current ſtream may be perfectly uniform, it is fixed under a maſon's ſhort level; the end of one of the arms projecting three or four inches beyond one end of the gauge. And the trench being ſunk to nearly its proper depth, by the eye kept on the adjuſted margin, the projecting end of the level is placed on the ſame marginal guide, and the plummet-line being brought to the perpendicular, (and the baſe of the level of courſe rendered horizontal,) the bottom of the trench is finiſhed with certainty.

Upon having the water turned into the upper part of the trench thus formed, by two common labourers, who never before, perhaps, took a level in their hands, the current was found not only deſirable as to deſcent, but perfectly uniform, without alteration. And hence the practicability and certainty of this method of forming the channels of rills, as well as the eligibility of one meaſure in a hundred, for the deſcent or fall, are fully aſcertained. It is obſerved that the above dimenſions are the moſt proper for the part paſſing under trees, as being liable to fill up, by leaves and ſmall twigs; but in open land, liable to be trodden by cattle, four feet in width, and eight inches deep is better, the lower ſide being made broad and flatly convex to prevent treading in, being turfed over with the ſods removed.

But in reſpect to the Yorkſhire rills, the ſame writer remarks that the heights of the northern margin have neither ſprings nor rivulets (ſome very few inſtances excepted), nor any other natural waters than the brooks which wind at the bottom of the deep vallies that divide them, and the rivulets which generally run at the feet of the precipices that terminate them. That formerly theſe brooks and rivulets were the only reſources which the villages that are ſcattered on theſe heights had for water, both for the uſe of cattle and for domeſtic purpoſes. But that in proceſs of time wells were ſunk, but they are of ſuch a depth as to make the labour of raiſing the water little leſs than that of fetching it from a moderate diſtance. Of courſe that this kind of natural neceſſity has led to an expedient which, though not new in principle, is perhaps entirely ſo in ſimplicity of execution, and might be practiſed with great advantage in many ſimilar ſituations. For as the moorland mountains riſe with generally an eaſy aſcent, from the beds of the rivulets laſt-mentioned, to a height much exceeding that of the hills to be watered, frequently abounding with ſprings almoſt to their higheſt ſwells, theſe ſprings are collected and conducted by a narrow channel down the ſlope of the mountain ſides, and along the face of the precipice, until the ſummit be gained; the waters being thence conveyed to the place or places deſired. It is ſtated that, in planning an artificial rill, a level, and ſome little knowledge of the country, are, as has been ſeen, the requiſite guides. The ſurveyor begins at the place to which the water is required to be brought, and aſcertains the loweſt part of the brink of the precipice from which water can be conducted. The face of the precipice is traced in like manner; and, if neceſſary, the aſcent of the moorland hills, until ſprings, or their natural rills, can be commanded. And that if his level bring him to the bottom of the ſteep ſoon enough to catch the rivulet which runs at its foot, the work is readily completed. If not, he goes above its higheſt bend, generally to the head or higheſt part of the valley (between the heights and the moorlands), and winds along the ſide of the oppoſite ſwell to ſome more elevated ſource. And if, when he arrives on the moorland hills (or, by an obſervation from the top of the precipice,) he finds that nature does not furniſh the requiſite quantity of water high enough to give the neceſſary fall, the work is, of courſe, impracticable.

But in regard to the manner of executing an artificial rill in this part, an opening ſhallow channel, of a width proportioned to the quantity of water to be conducted, is the main operation. In making ſtagnant pools, it has been found that much art is neceſſary to make them retentive, but in forming the bed of a rill no ſuch art is requiſite. It is the nature of running waters to render the ſurface on which they run firm and retentive. Sand is, he believes, the chief material uſed in forming the channels of theſe rills; and this only in places where an open rock or other porous ſtratum is croſſed. But much depends on the quantity of fall and the quantity of water. If the fall be but little, and the quantity of water at the ſource be ſuch as not to admit of much waſte, great care is requiſite in forming the bed of the rill. The fall is therefore regulated in a great degree by the quality of the ground. On good ground the channel is nearly level. Over faulty ground the water runs with a current for the double purpoſe of getting quickly over it, and rendering its channel more retentive. The circumſtances from which injuries are produced in theſe rills are leaves in autumn and ſnows in winter. To remove the obſtructions which theſe not unfrequently cauſe, and to repair ſuch breaches as time will always make in the work of art, a ſuperintendant is neceſſary to every artificial rill.

And it is obſerved that the rill of Kirby moorſide is, he believes, the largeſt, and was the firſt which was brought upon theſe heights. This rill was brought to the villages of Gillimore and Fadmore near forty years ago; and has been extended to Kirby about thirty years, by Joſeph Ford, a ſelf-taught engineer of great ingenuity and ſome judgment; a man to whom the country owes much. Since the introduction of this, ſeveral others have been raiſed; and ſome few unſucceſsful attempts have been made; the channel was, in one inſtance, (that of Newton,) extended a conſiderable way before the impracticability of completing it

was

was discovered; a piece of misconduct which nothing but a want of accuracy in the use of the level can lead to. The miscarriage, in this case, was not owing to a want of elevation in the source, but to a depression of the channel at the foot of the steep; the head of the valley (if such it may be called) being lower than the top of the precipice at the given point. This shews the necessity of tracing the entire channel with sufficient accuracy before any other expence is incurred. The mode of doing which has been shewn above.

It is likewise further stated, that in the case of Kirby the channel is raised somewhat by a bridge-like mound of earth thrown across the crown of the valley. And that the same mound serves the purpose of conducting another rill across the same difficult pass; from whence the Kirby rill takes an eastward, the rill of Welburn (applied principally to the watering of pasture grounds) a westward direction.

Also in regard to the expence, it is stated that the first cost of the Kirby rill was not altogether one hundred pounds. The distance about ten miles, watering (besides the town of Kirby) two villages and a line of cultivated waterless upland country about four miles in length. Besides the first cost, which was raised by subscription, a superintendant had ten pounds a-year for keeping it in repair and free from obstructions; which yearly salary is paid by the contributions of the persons benefited; each being rated agreeably to the estimated benefit received.

It may be noticed, that from the vast advantages that have been derived from the construction of these sorts of rivulets, in these few cases of upland dry situations, the attention of the land proprietor and farmer in other districts where there is a prevalent scarcity of water, either for domestic purposes, or the use of cattle stock, should be directed to the execution of them, on such cheap and beneficial plans as may be the most convenient in the particular situations. See Pond.

These kinds of rills should, in all cases where they are capable of it, be turned to the purpose of watering land, as well as the uses noticed above.

RILLE, in *Geography*, a town of France, in the department of the Maine and Loire; 9 miles E. of Baugé. —Also, a river of France, which runs into the Seine, six miles below Quilbœuf.

RILLY, a town of France, in the department of the Marne; 6 miles S. of Reims.

RILSK, a town of Russia, in the government of Kursk, on the Sem; 52 miles W.S.W. of Kursk. N. lat. 51° 30′. E. long. 34° 54′.

RIM, in a watch or clock, the circumference or circular part of a wheel.

Rims, in *Ship Building*, compass-pieces of timber, which form the quarter-galleries between the stools.

Rims, a skirting of elm-board round the upper side of ships' tops.

Rim, a cast-iron frame, in which the dropping-palls of the capstan traverses, and palls, or counteracts the efforts of the capstan.

RIMA literally denotes a fissure or chink. See Fissure, and Rhagades.

Hence, it is applied to several parts of the body, that bear a resemblance thereto; as *rima pudendi*, fissura magna, the same with vulva: and *rima laryngis*, the aperture of the larynx, called the *glottis*.

Rima is also used for a narrow aperture of a small cavity under the fornix, opening into the infundibulum; called also the third ventricle of the brain.

Rima, in *Geography*, a river of Hungary, which runs into the Theysse, near Bolgar.

RIMAC, a river of Peru, which passes by Lima, in a valley to which it gives name, on which Lima is built, and runs into the Pacific ocean, S. lat. 12°.

RIMAGIONE, a town of Genoa; 5 miles S.S.W. of Spezza.

RIMASZOMBAT, a town of Hungary; 14 miles E.S.E. of Altsol.

RIMBA, a province of Benguela, in Africa, on the banks of the Morano.

RIMBACH, a town of the duchy of Wurzburg; 3 miles S. of Volckach.

RIMBU, a town of Thibet; 71 miles W. of Lassa. N. lat. 30° 35′. E. long. 89° 50′.

RIME, in *Poetry*. See Rhyme.

Rime, in *Rural Economy*, a sort of hoary or white frosty appearance, sometimes on the ground in the autumnal winter and early spring mornings.

RIMENANT, in *Geography*, a town of France, in the department of the Two Nethes; two miles E. of Malines.

RIMERS are moveable bars to support the sluices and over-falls in opening-weirs.

RIMFORSA, in *Geography*, a town of Sweden, in West Gothland; 17 miles S. of Linkoping.

RIMINI, a sea-port town of Italy, capital of the department of the Rubicon, late in the Romagna; formerly situated on the sea, but the sea has for some centuries receded to a distance. The harbour on the river Marechia, on which the city is built, is now so choaked up with sand, as scarcely to admit of small barks. This city was once very flourishing, but besides other calamities which have befallen it, it suffered extremely from an earthquake in 1671. It is the see of a bishop, suffragan of Ravenna. This is the ancient Ariminum, the first town of which Cæsar took possession, after passing the Rubicon. In the market-place there is a kind of stone pedestal, with an inscription, declaring, that upon it Cæsar had stood and harangued his army; but the authenticity of this is not ascertained to the satisfaction of antiquaries. Besides this suggestum of doubtful antiquity, here is a triumphal arch, erected to the emperor Augustus, and the remains of an amphitheatre. This city is said to have been built 500 years earlier than Rome itself, and to have been made a colony in the year of Rome 483. It derived its name from the river Arminus, which washed its walls, and separated the Via Flaminia from the Via Æmilia. Two councils were held here, one of orthodox bishops, in the year 358, and another in the following year, of Arian prelates. Vitalien, governor of the city for the emperor Justinian, defended it against Vitiges, king of the Goths, with such vigour, as to oblige the Goths to raise the siege. Some time after it became subject to the Lombards; but when their last king, Didier, was conquered and taken prisoner by Charles the Great, Rimini returned to the allegiance of the western emperors. The liberality of Otho III. conferred the dominion of it on the Malatesta family: at last the Venetians gained possession of it, and by a treaty with pope Julius II. gave it to the holy see. The harbour at Rimini was formerly famous, being covered with marble, and of such extent, as to contain a considerable fleet; but its mouth being filled up with sand, Sigismond Pandolfo Malatesta destroyed it, and with the marble stones, raised out of its ruins, built the Franciscan church, which is the finest in Rimini; 57 miles S.E. of Bologna. N. lat. 44° 4′. E. long. 12° 38′.

RIMIS, a ſmall iſland in the Baltic, near the coaſt of Pomerania, N. lat. 54° 11′. E. long. 13° 26′.

RIMNIK. See Ribnik.

RIMONT, a town of France, in the department of the Arriege; 8 miles W.N.W. of Taraſcon.

RIN, in *Rural Economy*, a provincial word uſed to ſignify brine.

RINÆUS, in *Anatomy*. See Nasalis.

RINALDI, Oderic, in *Biography*, a learned Italian eccleſiaſtical hiſtorian in the 17th century, was a native of Treviſo, and entered the eſtabliſhment belonging to the prieſts of the congregation of the Oratory at Rome, of which Baronius had been a member. After the death of that cardinal, Rinaldi undertook the laborious taſk of continuing his "Eccleſiaſtical Annals," from the year 1198, with which the work of Baronius terminated, to the year 1564, when the council of Trent had been diſſolved. It abounds with many curious and valuable documents, taken from the archives at the Vatican, and other collections. It conſiſts of ten large volumes in folio, which made their appearance in Rome at different periods, from 1646 to 1677. Rinaldi publiſhed a ſufficiently copious abridgment, in Italian, of the whole annals, compiled both by Baronius and himſelf.

RINALDO di Capua, an eminent Neapolitan compoſer, who flouriſhed in the middle of the laſt century, and whoſe ſtory is ſomewhat ſingular.

He was the natural ſon of a perſon of very high rank in that country, and at firſt only learned muſic as an accompliſhment; but being left by his father with only a ſmall fortune, which was ſoon diſſipated, he was forced to make it his profeſſion. He was but ſeventeen when he compoſed his firſt opera at Vienna.

In the courſe of a long life, Rinaldo experienced various viciſſitudes of fortune, ſometimes in vogue, ſometimes neglected. However, finding old age coming on, he collected together his principal works, ſuch as had been produced in the zenith of his fortune and fancy, thinking theſe would be a reſource in diſtreſsful times; thoſe times arrived; various misfortunes had happened to him and his family; when, behold! this reſource, this *ſole* reſource, the accumulated produce of his pen, had by a graceleſs ſon been ſold for waſte paper!

This compoſer, whoſe productions were, during many years, the delight of all Europe, in 1770 was reduced at Rome to the utmoſt indigence. Diogenes the Cynic was never more meanly clad through choice, than Rinaldo through neceſſity: a patched coat, and ſtockings that wanted to be patched or darned! We, having often received great pleaſure from his works, courted his acquaintance and converſation, which was very lively and intelligent; but though a good-natured man, his opinions were very ſingular and ſevere on his brother compoſers.

He thought they, at that time, "had nothing left within the reach of their invention to entitle them to reputation for novelty, but the refuſe of thouſands, which had been often tried and rejected, either as impracticable or diſpleaſing. The only chance which a compoſer has for introducing new modulation in ſongs, was in a ſhort ſecond part, (every ſerious ſong then ended with a *da capo*,) in order to *fright* the hearer back to the firſt, to which it ſerves as a foil, by making it comparatively beautiful." He included himſelf in the cenſure, and frankly confeſſed, that though he had written full as much as his neighbours, yet out of all his works, perhaps not above *one* new melody could be found, which had not been wire-drawn in different keys, and different meaſures, a thouſand and a thouſand times.

We ſubſcribed to theſe opinions at the time, till we heard Haydn's quartets and ſymphonies, Paeſiello's vocal compoſitions, and Mozart's latter works, vocal and inſtrumental.

Rinaldo cenſured, with great ſeverity, the noiſe and tumult of inſtruments in modern ſongs;—what would he ſay now to our double-drums and tromboni?

Rinaldo had the reputation at Rome of being the inventor of accompanied recitatives; but in ſearching for old compoſitions in the archives of San Girolamo della Carita, at Rome, we found an oratorio of Aleſſandro Scarlatti, which was compoſed at the latter end of the 17th century, before Rinaldo di Capua was born, and in which there are *accompanied recitatives*. But he did not, himſelf, pretend to the invention; all that he claimed was the being among the firſt who introduced ritornels, or interſtitial ſymphonies, in recitatives of ſtrong paſſion and diſtreſs, which expreſs or imitate what it would be ridiculous for the voice to attempt. There have been ſince many fine ſcenes of this kind in the works of Jomelli, Perez, Galuppi, Sarti, Piccini, Sacchini, and Paeſiello.

Rinaldo ſeems to have been a ſucceſsful compoſer from 1737 to 1758. His firſt ſerious opera at Rome was "Il Ciro Riconoſciuto," in 1737; and "Adriano in Siria," the laſt, in 1758.

A very fine air from "Vologeſo" was ſung by Monticelli in England, and printed by Walſh among the favourite ſongs in the opera of Gianguir,—"Nell' orror di notte oſcura,"—to which we refer as a ſpecimen of his ſerious ſtyle. Indeed the whole ſcene in that opera, beginning by the accompanied recitative, "Berenice, ove ſei?" and terminated by the air, "Ombra che pallida," is admirable, and a proof to what perfection dramatic muſic was brought in Italy fifty or ſixty years ago; and the curious will do well to procure a copy of this ſcene whenever they have an opportunity.

It has been ſaid, perhaps with ſome truth, that the ſcience of this compoſer was not equal to his genius; for being educated as a dilettante, he probably did not ſubmit to all the drudgery of dry ſtudy, which one intended for the profeſſion of muſic is obliged to undergo.

RINAR, a word uſed by the chemiſts, to expreſs filings of any thing.

RINAUR, in *Geography*, a town of Hindooſtan, in Myſore; 25 miles E. of Chinna Balabarum.

RINCADROLEAN Point, a cape on the W. coaſt of Ireland, in the county of Kerry. N. lat. 52° 44′. W. long. 10° 13′.

RIND, a ſkin of any fruit that may be cut off, or pared. The outer coat of the cheſnut, ſet with prickles, is particularly called the *urchin-like rind*.

Rind is alſo uſed for the inner bark of trees; or that ſoft, whitiſh, juicy ſubſtance, adhering immediately to the wood.

Through this it is that the ſap has been ſuppoſed to return from the extremities of the branches to the root: the veſſels hereof are by ſome alſo ſuppoſed to do the office of arteries; whence Mr. Bradley calls them *arterial* veſſels. See Plants.

Rind, *Grafting in the*. See Engrafting.

Rind-*Gall*, a damage a tree receives when young, ſo that the bark or rind grows in the inner ſubſtance of the tree.

RINDE, in *Geography*, a river of Hindooſtan, which runs into the Jumna, 15 miles S.E. of Corah.

RIN-

RINDERA, in *Botany*. See CYNOGLOSSUM *lævigatum*, n. 14.

RINDGE, or RINGE, in *Geography*, a town of America, in the county of Cheſhire, New Hampſhire, ſituated on the Maſſachuſett's line, about 80 miles W. of Portſmouth, and 70 N.W. of Boſton. This town was incorporated in 1768, and contains 1226 inhabitants. This townſhip has 13 ponds of water of different ſizes, in which are perch, trout, eels, &c. It has alſo, towards the northern part, a mine of ochre of a Spaniſh brown. One half of the water of this town runs to the Merrimack, and the other to the Connecticut river.

RINDOMS, a town of Spain, in Catalonia; 11 miles N.W. of Tarragona.

RINDSAKER, a town of Norway; 60 miles N.N.E. of Chriſtiania.

RINEKENBERG, a town of the duchy of Carinthia; 6 miles E. of Wolkenmarck.

RINEUS MARINUS, a name given by ſome botanical writers to the crithmum, or ſamphire, a ſea-plant, uſed as a pickle.

RING, ANNULUS, a little moveable, put on the finger, either by way of ceremony, or of ornament.

The biſhop's ring makes a part of the pontifical apparatus; and is eſteemed a pledge of the ſpiritual marriage between the biſhop and his church.

The epiſcopal ring is of a very ancient ſtanding. The fourth council of Toledo, held in 633, appoints that a biſhop condemned by one council, and found afterwards innocent by a ſecond, ſhall be reſtored, by giving him the ring, ſtaff, &c.

From biſhops, the cuſtom of the ring has paſſed to cardinals, who are to pay a very great ſum, *pro jure annuli cardinalitii*.

RINGS, *Origin of*. Pliny (lib. xxxvii. cap. 1.) obſerves, that we are in the dark as to the perſon who firſt invented, or wore the ring; becauſe what is ſaid of Prometheus, as alſo of Midas's ring, are fables. The firſt people among whom we find the ring in uſe, are the Hebrews, (Gen. xxxviii.) where Judah, Jacob's ſon, gives Tamar his ring, or ſignet, as a pledge of his promiſe; but the ring appears to have been in uſe at the ſame time among the Egyptians, from Gen. xli. where Pharaoh puts his ring upon Joſeph's hand, as a mark of the power he gave him. And in the firſt book of Kings, chap. xxi. Jezebel ſeals the warrant ſhe ſent for the killing of Naboth, with the king's ring.

The ancient Chaldeans, Babylonians, Perſians, and Greeks, had likewiſe the uſe of the ring; as appears from ſeveral paſſages in Scripture, and from Quintus Curtius, who tells us, that Alexander ſealed the letters he wrote into Europe with his own ſeal; and thoſe in Aſia with Darius's ring.

The Perſians will have Guiamſchild, the fourth king of the firſt race, to have firſt introduced the ring, for ſealing his letters and other acts. The Greeks, Pliny thinks, knew nothing of the ring in the time of the Trojan war; the reaſon he gives is, that we find no mention of it in Homer, but that when letters, &c. were to be ſent away, they were tied up, and the ſtrings knotted.

The Sabines had rings in Romulus's time; and it is to them, probably, the practice firſt came from the Greeks; and from them that it paſſed to the Romans; though it was ſome time before it got footing there. Pliny cannot learn which of the kings of Rome firſt adopted it; but there are no ſigns of it in any of their ſtatutes, before thoſe of Numa and Servius Tullius. He adds, that it was alſo in uſe among the ancient Gauls and Britons.

RINGS, *Matter of Ancient*. There were ſome of one ſingle metal, and others of a mixture, or two. For the iron and ſilver were frequently gilt; or at leaſt the gold part was fixed within the iron, as appears from Artemidorus, lib. ii. cap. 5. The Romans were contented with iron rings a long time; and Pliny aſſures us, that Marius firſt wore a gold one in his third conſulate, which was in the year of Rome 650. Sometimes the ring was iron, and the ſeal gold; ſometimes it was hollow, and ſometimes ſolid; ſometimes the ſtone was engraven, and ſometimes plain; and the graving ſometimes was in relievo, and ſometimes in creux: the laſt were called *gemmæ ectypæ*; the former *gemmæ ſculptura prominente*.

RING, *the manner of wearing the*, has been various. From Jeremiah, chap. xxii. it appears, that the Hebrews wore it on their right hand. Among the Romans, before they came to be adorned with ſtones, and while the graving was yet on the metal itſelf, every one wore them at pleaſure, on what hand and finger he pleaſed. When ſtones came to be added, they wore them altogether on the left hand; and it would have been held an exceſſive foppery to have put them on the right.

Pliny ſays, they were at firſt worn on the fourth finger; then on the ſecond or index; then on the little finger; and at laſt on all the fingers, excepting the middle one.

The Greeks wore them altogether on the fourth finger of the left hand, as we are informed by Aul. Gellius, lib. x. and the reaſon he gives for it is, that having found from anatomy, that this finger had a little nerve that went ſtraight to the heart, they eſteemed it the moſt honourable, by reaſon of this communication with that noble part. Pliny ſays, the Gauls and ancient Britons wore the ring on the middle finger.

At firſt they only wore a ſingle ring, then one on each finger, and at length ſeveral on each finger. (Martial, lib. xi. epig. 60.) At laſt one on each joint of each finger. (Ariſtoph. in Nub. &c.) Their foppery at length aroſe to that pitch, that they had their weekly rings.

Juvenal, Sat. vii. ſpeaks of *annuli ſemeſtres*; as alſo of winter and ſummer rings. But of all others, Lampridius, cap. 32. obſerves, that Heliogabalus carried the point fartheſt, who never wore the ſame ring, or the ſame ſhoe, twice.

Rings have been alſo worn in the noſe, and as pendants in the ears. Bartholin has an expreſs treatiſe, "De Annulis Narium," *Of Rings of the Noſtrils*. St. Auguſtine aſſures us, it was in his time the faſhion of the Moors; and Pietro della Valle obſerves the ſame of the modern orientals.

In effect, there is no part of the body where rings have not been worn. Several Eaſt India travellers affirm, that the natives now commonly wear them on their noſe, lips, cheeks and chin. Ramuſio tells us, that the ladies of Narſinguay, in the Levant, and Diodorus Siculus, lib. iii. that thoſe of Ethiopia uſed to adorn their lips with iron rings.

As to the ears, the cuſtom ſtill obtains of wearing rings in them, both of men and women, almoſt all over the world. See PENDANT.

The Indians, particularly the Guzzarats, have worn rings on their feet. And when Peter Alvarez had his firſt audience of the king of Calicut, he found him all covered with ſtones ſet in rings, having bracelets and rings both on the hands and fingers, and even on the feet and toes.

Louis Bartome repreſents a king of Pegu as ſtill more extravagant, having rings ſet with precious ſtones on every toe.

RINGS, *Uſe of*.—The ancients had three different kinds; the

the firſt ſerved to diſtinguiſh conditions or quality. Pliny aſſures us, that the ſenators at firſt were not allowed to wear the gold ring, unleſs they had been ambaſſadors at ſome foreign court. Nor was it even allowed them to wear the gold ring which was given them in public, except on public occaſions; at other times they wore an iron one. And thoſe who had a triumph obſerved the ſame rules.

At length the ſenators and knights were allowed the common uſe of the gold ring; but Acron on Horace, lib. ii. ſat. vii. obſerves, they could not do it unleſs it were given them by the prætor.

In after days the gold ring became the badge of the knights, the people wearing ſilver rings, and the ſlaves iron ones; though the gold ring was ſometimes alſo allowed the people, and Severus granted it to his common ſoldiers. Auguſtus allowed it to the liberti or freedmen; and though Nero made a regulation to the contrary, yet it was ſoon ſet aſide.

A ſecond kind of rings comprehended the *annuli ſponſalitii*, wedding-rings. Some carry the origin of this cuſtom as far back as the Hebrews, on the authority of a text in Exodus, xxxv. 22. Leo of Modena, however, maintains, that the ancient Hebrews did not uſe any nuptial ring. Selden, in his Uxor. Ebraica, lib. ii. chap. xiv. owns, that they gave a ring in the marriage, but that it was only in lieu of a piece of money of the ſame value which had uſed to have been given before. The Greeks and Romans did the ſame, and from them the Chriſtians took it up very early, as appears from Tertullian, and in ſome ancient liturgies, where we find the form of bleſſing the nuptial ring.

The third kind of rings included thoſe uſed as ſeals, called *cerographi* or *cirographi*; an account of which, ſee under the article SEAL.

Richard, biſhop of Saliſbury, in his Conſtitutions, anno 1217, forbids the putting of ruſh rings, or any the like matter, on women's fingers, in order to the debauching them more readily; and he inſinuates the reaſon of his prohibition, that there were ſome people weak enough to believe, that what was thus done in jeſt was a real marriage.

De Breveil, in his Antiquities of Paris, ſays, it was an ancient cuſtom to uſe a ruſh-ring in the nuptials of ſuch as had had an affair together before their marriage.

RING, in *Angling*, an inſtrument intended to free the hook when accidentally entangled among weeds. See ANGLING.

RING, in *Aſtronomy*. The ring of Saturn is a thin, broad, opaque, circular arch, encompaſſing the body of that planet, like the horizon of an artificial globe, without touching it, and appearing double, when ſeen through a good teleſcope.

The diſcovery of it is owing to M. Huygens, who, after frequent obſervation of Saturn, with teleſcopes which magnified two or three times more than any that had been before made, perceived two lucid points, or anſæ, ariſing out from the body in a right line.

Hence, as in ſubſequent obſervations, he always found the ſame appearance, he concluded that Saturn was encompaſſed with a permanent ring; and accordingly produced his new ſyſtem of Saturn in 1659.

However, Galileo firſt diſcovered that the figure of Saturn was not round. It appeared to him like a large globe between two ſmall ones; and he announced this diſcovery in the year 1610. Proſecuting his obſervations till the year 1612, he was then ſurpriſed to find only the middle globe; but in proceſs of time he again diſcovered the globes on each ſide, which appeared to change their form; ſometimes appearing round, ſometimes like an acorn, ſometimes ſemicircular, then with horns towards the globe in the middle, and growing by degrees ſo long and wide as to encompaſs it, as it were, with an oval ring. Huygens, who, as we have ſaid, completed the diſcovery, makes the ſpace between the globe of Saturn and the ring equal to, or rather bigger than, the breadth of the ring; and the greateſt diameter of the ring, in proportion to that of the globe, as 9 to 4. But Mr. Pound, with an excellent micrometer, applied to the Huygenian teleſcope of 123 feet in length, determined this proportion to be as 7 to 3.

Mr. Whiſton, in his "Memoirs of the Life of Dr. Clarke," informs us, that the doctor's father once ſaw a fixed ſtar between the ring and the body of Saturn. M. Caſſini, in 1675, obſerved upon the ring a dark elliptical line, dividing it, as it were, into two rings; the inner of which appeared brighter than the other. He alſo perceived a dark belt upon the planet, parallel to the greater axis of the ring. Mr. Hadley obſerved, that the outer part of the ring ſeemed narrower than the inner part, and that the dark line was fainter towards its upper edge; he alſo ſaw two belts, and obſerved the ſhadow of the ring upon Saturn. In October, 1714, when the plane of the ring very nearly paſſed through the earth, and was approaching it, M. Maraldi obſerved, that while the arms were decreaſing, both in length and breadth, the eaſtern arm appeared a little larger than the other for three or four nights, and yet it vaniſhed firſt; for after an interruption for two nights by clouds, he ſaw the weſtern arm alone. This inequality of the ring made him ſuſpect that it was not bounded by exactly parallel planes, and that it turned about its axis. In the ſequel of this article we ſhall give the ſubſtance of Dr. Herſchel's obſervations, which, on account of his accuracy as an obſerver, and the ſuperior excellence of his teleſcopes, are much more important than any others, as he has diſcovered many circumſtances which had eſcaped all other obſervers.

This ring, ſeen from Saturn, appears like a large luminous arc in the heavens, as if it did not belong to the planet. When we ſee the ring moſt open, its ſhadow upon the planet is broadeſt; and from that time the ſhadow grows narrower, as the ring appears to do to us; until, by Saturn's annual motion, the ſun comes to the plane of the ring, or even with its edge; which, being then directed towards us, becomes inviſible, on account of its thinneſs.

The principal phenomena of Saturn's ring are familiarly illuſtrated by a view of *Plate* XIX. *Aſtronomy*, *fig.* 14. Let S be the ſun, A B C D E F G H Saturn's orbit, and I K L M N O the earth's orbit. Both Saturn and the earth move according to the order of the letters; and when Saturn is at A, his ring is turned edgewiſe to the ſun S, and he is then ſeen from the earth as if he had loſt his ring, let the earth be in any part of the orbit whatever, except betwnen N and O; for whilſt it deſcribes that ſpace, Saturn is apparently ſo near the ſun as to be hid in his beams. As Saturn goes from A to C, his ring appears more and more open to the earth; at C the ring appears moſt open of all; and ſeems to grow narrower and narrower as Saturn goes from C to E; and when he comes to E, the ring is again turned edgewiſe both to the ſun and earth: and as neither of its ſides is illuminated, it is inviſible to us, becauſe its edge is too thin to be perceptible; and Saturn appears again as if he had loſt his ring. But as he goes from E to G, his ring opens more and more to our view on the under ſide; and ſeems juſt as open at G as it was at C; and may be ſeen in the night-time from the earth in any part of its orbit, except about M, when the ſun hides the planet from our view. As Saturn

Saturn goes from G to A, his ring turns more and more edgewise to us, and therefore it seems to grow narrower and narrower; and at A it disappears as before. Hence, while Saturn goes from A to E, the sun shines on the upper side of his ring, and the under side is dark; and whilst he goes from E to A, the sun shines on the under side of his ring, and the upper side is dark. The ring disappears twice in every annual revolution of Saturn, *viz.* when he is in 19th degree of Pisces and of Virgo, and when Saturn is in the middle between these points, or in the 19th degree either of Gemini or of Sagittarius, his ring appears most open to us; and then its longest diameter is to its shortest, as 9 to 4. Ferguson's Astr. sect. 204.

Dr. Herschel (Phil. Trans. for 1790, vol. lxxx. pt. 1.) observes, that the black disc, or belt, upon the ring of Saturn, which we have already mentioned, is not in the middle of its breadth; and that the ring is not subdivided by many such lines, as some astronomers have represented; but there is one single, dark, considerably broad line, belt, or zone, which he has constantly found on the north side of the ring. (See *Plate* XIX. *Astronomy*, *fig.* 15.) "Since the year 1774, to the present time," as Dr. Herschel says (Phil. Trans. for 1792, vol. lxxxii. pt. 1.) "I can find only four observations where any other black division of the ring is mentioned, than the one which I have constantly observed: these were all in June, 1780." As this dark belt is subject to no change, it is probably owing, as the doctor remarks, to some permanent construction of the surface of the ring. This belt cannot be the shadow of a chain of mountains, since it is visible all round on the ring; for at the ends of the ansæ there could be no shade visible on account of the direction of the sun's illumination, which would be in the line of the chain; and the same argument will hold against any caverns or concavities. It is, moreover, fully evident, that this dark zone is contained between two concentric circles, as all the phenomena answer to the projection of such a zone. Thus in *fig.* 16, we may see that the zone is continued all round the ring, with a gradual decrease of breadth towards the middle, answering to the appearance of a narrow circular plane, projected into an ellipsis. The matter of the ring is undoubtedly no less solid than the planet itself; and it is observed to cast a strong shadow upon the planet. The light of the ring is also generally brighter than that of the planet; for the ring appears sufficiently bright when the telescope affords scarcely light enough for Saturn. From many repeated observations, which we cannot here detail, Dr. Herschel establishes the fact of the extreme thinness of the ring. He farther observes, that there may be a refraction through a very rare atmosphere on the two planes of the ring, by which the satellite may be elevated and depressed, so as to become visible on both sides of the ring, even though the ring should be equal in thickness to the diameter of the smallest satellite, which may amount to 1000 miles. From a series of observations upon luminous points of this ring, (Phil. Trans. vol. lxxx. pt. 2.) he has discovered that it has a rotation about its axis, in $10^h\ 32'\ 15''.4$.

The ring is invisible when its plane passes through the sun, or the earth, or between them: in the first case, the sun shines only upon its edge, which is too thin to reflect sufficient light to render it visible; in the second case, the edge only being opposed to us, it is not visible, for the same reason; in the third case, the dark side of the ring is exposed to us, and therefore the edge being the only luminous part which is towards the earth, it is invisible, for the same reason as before. Observers have differed ten or twelve days as to the time of its becoming invisible, owing to the difference of the telescopes, and of the state of the atmosphere. The disappearance of the ring seems to occur only with the telescopes in common use among astronomers; for Dr. Herschel, with his large telescopes, has been able to see it in every situation. He thinks the edge of the ring is not flat, but spherical, or spheridical. He observes, that the ring was seen in his telescope, when we were turned towards the unenlightened side; so that he either saw the light reflected from the edge, or else the reflection of the light of Saturn upon the dark side of the ring, as we sometimes see the dark part of the moon. He cannot, however, say which of the two might be the case; especially as there are very strong reasons for thinking, that the edge of the ring is of such a nature as not to reflect much light. M. de la Lande thinks, that the ring is just visible, with the best telescopes in common use, when the sun is elevated 3′ above its plane, or three days before its plane passes through the sun; and when the earth is elevated 2′ 20″ above the plane, or one day from the earth's passing it. In the Phil. Trans. for 1790, Dr. Herschel ventured to suggest a suspicion that the ring was divided; this conjecture was strengthened by subsequent observations, after he had an opportunity of seeing both sides of the ring. His reasons are these; 1st, the black division upon the northern side of the ring, is in the same place, of the same breadth, and at the same distance from the outer edge, that it always appeared upon the northern side; 2dly, with his seven-feet reflector and an excellent speculum, he saw the division in the ring, and the open space between the ring and the body, equally dark, and of the same colour with the heavens about the planet; 3dly, the black division is equally broad on each of the rings. From these observations, Dr. Herschel thinks himself authorised to say, that Saturn has two concentric rings, situated in one plane, which is probably not much inclined to the equator of the planet. The dimensions of the ring are in the following proportions, as nearly as they could be ascertained.

	Parts.
Inside diameter of the smaller ring - -	5900
Outside diameter - - - - -	7510
Inside diameter of the largest ring - -	7740
Outside diameter - - - - -	8300
Breadth of the inner ring - - - -	805
Breadth of the outer ring - - -	280
Breadth of the space between the rings -	115

M. de la Place, in the "Mem. de l'Acad. at Paris," supposes that the ring may have many divisions; but Dr. Herschel remarks, that no observations will justify this supposition.

From the mean of a great many measures of the diameter of the larger ring, Dr. Herschel makes it 46″.677, at the mean distance of Saturn. Hence, its diameter : the diameter of the earth :: 25.8914 : 1. From the above proportions, therefore, the diameter of the ring must be upwards of 204,883 miles; and the distance of the two rings 2839 miles.

The ring being a circle, appears elliptical from its oblique position; and it appears most open, when Saturn is 90° from the nodes of the ring, upon the orbit of Saturn; or when Saturn's longitude is about $2^s\ 17°$, and $8^s\ 17°$. In such a situation, the lesser axis is very nearly equal to half the greater, when the observations are reduced to the sun; consequently the plane of the ring makes an angle of about 30° with the orbit of Saturn.

The breadth of the ring (as stated by Dr. Herschel, Phil. Trans. vol. xcvi. pt. 2. p. 467.) is to the space between the ring and the body of Saturn as about 5 to 4.

Kepler, in his Epitom. Aſtron. Copern., and after him Dr. Halley, in his Inquiry into the Cauſes of the Variation of the Needle, Phil. Tranſ. N° 195, ſuppoſe our earth may be compoſed of ſeveral cruſts or ſhells, one within another, and concentric to each other. If this be the caſe, it is poſſible the ring of Saturn may be the fragment or remaining ruin of his former exterior ſhell, the reſt of which is broken or fallen down upon the body of the planet.

Ring is alſo the name of an inſtrument uſed in navigation, for taking the altitudes of the ſun, &c.

It is uſually of braſs, about nine inches diameter, ſuſpended by a little ſwivel, 45° from the point of which is a perforation, which is the centre of a quadrant of 90°, divided in the inner concave ſurface.

To uſe it, they hold it up by the ſwivel, and turn it to the ſun, till the ſun-beams, falling through the hole, make a ſpot among the degrees, which marks the altitude required.

This inſtrument is preferred to the aſtrolabe, becauſe the diviſions are here larger than on the aſtrolable. See Astrolabe.

Ring is alſo uſed for the ſound or tone of a *bell;* which ſee.

The ringing of bells, though now a recreation chiefly of the lower claſs of people, is a very curious exerciſe. As for the tolling of a bell, this is nothing more than the producing of a ſound by the ſtroke of the clapper againſt the ſide of a bell; the bell itſelf being in a pendant poſition, and at reſt. In ringing, the bell, by means of a wheel and rope, is elevated to a perpendicular: in its motion to this ſituation, the clapper ſtrikes forcibly on one ſide, and, in its return downwards, on the other ſide of the bell, producing at each ſtroke a ſound. The muſic of bells is altogether melody; but the pleaſure ariſing from it conſiſts in the variety of interchanges, and the various ſucceſſion and general predominance of the conſonances in the ſounds produced.

The practice of ringing bells in change is ſaid to be peculiar to this country, which for this reaſon is called the ringing iſland; but the antiquity of it is not eaſily aſcertained. There are in London ſeveral ſocieties of ringers, particularly one known by the name of the College Youths. Merſennus has ſaid nothing of the ringing of bells in changes; and Kircher has only calculated the poſſible combinations ariſing from a given number. See Alternations.

In England, the practice of ringing is reduced to a ſcience; and peals have been compoſed, which bear the names of the inventors. Some of the moſt celebrated peals now known were compoſed about fifty years ago, by Mr. Patrick, ſo well known as the maker of barometers.

For the method of ringing in the Low Countries, ſee Carillons.

Ring, or *Annulus*, in *Geometry*. See Annulus.

The area of the ring included between the circumferences, A B P A, D E Q D, of two concentric circles, (*Plate* XII. *Geometry*, *fig.* 12.) is obtained by the rule given under Annulus: *viz.* Multiply the ſum of the diameters by their difference, and the product by .7854, and the ultimate product will be the area required: for the ring being equal to the difference of the two circles, if the diameters be called D, d, and .785398, &c. $= a$, we ſhall have the ring $= aD^2 - ad^2 = a \times \overline{D + d} \times \overline{D - d}$. Hence if D W be a perpendicular to the radius C D A, DW^2 will be equal to $AD \times \overline{AC + CD} = \overline{D - d} \times \overline{D + d}$, and aDW^2, or the area of a circle whoſe radius is D W, will be $= aD^2 - ad^2 =$ the area of the ring. Hence alſo it appears, that the ring is equal to an ellipſe whoſe axes are $D + d$ and $D - d$. See Ellipse.

The area of the ring may alſo be had, by multiplying half the ſum of the circumferences by half the difference of the diameters, the product being the area. For the circumferences are equal to $4aD$, $4ad$: therefore $a \times \overline{D + d} = \frac{1}{4}C + \frac{1}{4}c$; which, by ſubſtitution in the laſt rule, will give $a \times \overline{D + d} \times \overline{D - d} = \overline{\frac{1}{4}C + \frac{1}{4}c} \times \overline{D - d} = \frac{1}{2}C + \frac{1}{2}c \times \frac{1}{2}D - \frac{1}{2}d$, as in the rule. The ſame rule will ſerve alſo for a part of the ring, A B E D A, included between the parts, A D, B E, of two radii, uſing for C and c the lengths of the intercepted arcs.

Another rule for finding the area of the ring is as follows: Multiply the perpendicular breadth of the ring, that is, the difference of the radii, by the circumference R S T, (or part R S for the part A B E D A,) having the ſame centre with, and equally diſtant from, the bounding arcs. For this circumference, being equally diſtant from the other two, will be equal to half their ſum. Hence the whole ring, or any part of it A B E D A, included between two radii, is equal to a parallelogram on the ſame baſe A D, and whoſe altitude is equal to R S, the middle circumference.

Ring, *Solid*, is a ſolid returning into itſelf; of which every ſection perpendicular to the axis, or line paſſing through the middle, of the ſolid, is every where the ſame figure, and of the ſame magnitude.

To find the Surface of a ſolid Ring.—Multiply the axis by the perimeter of a ſection perpendicular to it, and the product will be the ſurface. *E. gr.* a workman having made for a jeweller a circular ring, or a ring whoſe axis forms the circumference of a circle; it is required to find the expence of the gilding, at a penny the ſquare inch; the thickneſs of the ring, or the diameter of a ſection of it, being 2 inches; and the inner diameter, acroſs from ſide to ſide, 18 inches. Here $18 + 2 = 20 =$ the diameter of the circle formed by the axis; and conſequently $20 \times 3.14159 =$ the length of the axis. But $2 \times 3.14159 =$ the circumference of a ſection of it; therefore $20 \times 3.14159 \times 2 \times 3.14159 = 40 \times 3.14159^2 = 394.785$ ſquare inches, nearly, $= 394.785$ pence $= 1l.$ 12*s.* $10\frac{1}{4}d.$ nearly, the expence required.

To find the Solidity of a Ring.—Multiply the axis by a ſection perpendicular to it, and the product will be the ſolidity. *E. gr.* required the price of a ring of iron, whoſe dimenſions are the ſame with thoſe in the laſt example, at four-pence a pound; a cubic inch of iron weighing 4.423 ounces avoirdupois. Here the area of a ſection being $2^2 \times .785398 = 3.14159$, which expreſſes half the circumference, and the axis being the ſame as before, the ſolidity will evidently be expreſſed by half the ſurface in the laſt example; *i. e.* the ſolidity $= 197.3925$ cubic inches, which multiplied by 4.423, gives 873.065 ounces $= 54.56657$ pounds; which, at 4*d.* each, will amount to 18*s.* $2\frac{1}{4}d.$, the price required.

It is needleſs to multiply examples, as the mode of operation is the ſame in all forms, with thoſe for priſms, both with regard to the ſurfaces and ſolidities: for it is evident that any ring is equal to a priſm, whoſe altitude and end are reſpectively equal to the axis and ſection of the ring, both as to ſurface and ſolidity, and, therefore, the rules for them both muſt be the ſame; and, on this account, any demonſtration of the rules for rings is unneceſſary. Hutton's Menſuration.

Rings *of Colours*, in *Optics*, a phenomenon firſt obſerved

in thin plates of various ſubſtances, by Mr. Boyle, and Dr. Hooke, but afterwards more fully explained by ſir Iſaac Newton. Mr. Boyle having exhibited a variety of colours in colourleſs liquors, by ſhaking them till they roſe in bubbles, as well as in bubbles of ſoap and water, and alſo in turpentine, procured glaſs blown ſo thin as to exhibit ſimilar colours; and he obſerves, that a feather of a proper ſhape and ſize, and alſo a black ribband held at a proper diſtance between his eye and the ſun, ſhewed a variety of little rainbows, as he calls them, with very vivid colours. Boyle's Works by Shaw, vol. ii. p. 70.

Dr. Hooke, about nine years after the publication of Mr. Boyle's Treatiſe on Colours, exhibited the coloured bubble of ſoap and water, and obſerved, that though at firſt it apppeared white and clear, yet as the film of water became thinner, there appeared upon it all the colours of the rainbow. He alſo deſcribed the beautiful colours that appear in thin plates of Muſcovy glaſs; which appeared, through the microſcope, to be ranged in rings ſurrounding the white ſpecks or flaws in them, and with the ſame order of colours as thoſe of the rainbow, and which were often repeated ten times. He alſo took two thin pieces of glaſs, ground plain and poliſhed, and putting them one upon another, preſſed them till there began to appear a red coloured ſpot in the middle; and preſſing them cloſer, he obſerved ſeveral rings of colours encompaſſing the firſt place, till, at laſt, all the colours diſappeared out of the middle of the circles, and the central ſpot appeared white. The firſt colour that appeared was red, then yellow, then green, then blue, then purple, then red again; yellow, green, blue, and purple; and again in the ſame order, ſo that he ſometimes counted nine or ten of theſe circles, the red immediately next to the purple; and the laſt colour that appeared before the white was blue; ſo that it began with red, and ended with purple. Theſe rings, he ſays, would change their places, by changing the poſition of the eye, ſo that, the glaſſes remaining the ſame, that part which was red in one poſition of the eye, was blue in a ſecond, green in the third, &c. Birch's Hiſt. of the Royal Society, vol. iii. p. 54.

Sir Iſaac Newton, having demonſtrated that every different colour conſiſts of rays which have a different and ſpecific degree of refrangibility, and that natural bodies appear of this or that colour, according to their diſpoſition to reflect this or that ſpecies of rays (ſee Colour), purſued the hint ſuggeſted by the experiments of Dr. Hooke, already recited, and caſually noticed by himſelf, with regard to thin tranſparent ſubſtances. Upon compreſſing two priſms hard together, in order to make their ſides touch one another, he obſerved, that in the place of contact they were perfectly tranſparent, which appeared like a dark ſpot; and when it was looked through, it ſeemed like a hole in that air, which was formed into a thin plate, by being impreſſed between the glaſſes. When this plate of air, by turning the priſms about their common axis, became ſo little inclined to the incident rays, that ſome of them began to be tranſmitted, there aroſe in it many ſlender arcs of colours, which increaſed, as the motion of the priſms was continued, and bended more and more about the tranſparent ſpot, till they were completed into circles, or rings, ſurrounding it; and afterwards they became continually more and more contracted.

By another experiment with two object-glaſſes, he was enabled to obſerve diſtinctly the order and quality of the colours from the central ſpot, to a very conſiderable diſtance. Next to the pellucid central ſpot, made by the contact of the glaſſes, ſucceeded blue, white, yellow, and red. The next circuit immediately ſurrounding theſe conſiſted of violet, blue, green, yellow, and red. The third circle of colours was purple, blue, green, yellow, and red. The fourth circle conſiſted of green and red. All the ſucceeding colours became more and more imperfect and dilute, till, after three or four revolutions, they ended in perfect whiteneſs.

In order to determine the thickneſs of the plate of air, by which he ſuppoſed the colours were produced, he meaſured the diameters of the firſt ſix circles, at their moſt lucid parts, and found their ſquares to be in the arithmetical progreſſion of the odd numbers 1, 3, 5, 7, 9, 11; and hence he concluded, that the intervals of the glaſſes at theſe circles muſt be in the ſame progreſſion. He alſo meaſured the diameters of the dark or faint rings between the more lucid colours, and found their ſquares to be in the arithmetical progreſſion of the even numbers 2, 4, 6, 8, 10, 12; and he concluded, after an accurate menſuration, the thickneſs of the air at the darkeſt part of the firſt dark ring, made by perpendicular rays, to be in the neareſt round numbers $\frac{1}{3000}$th part of an inch, half of which, multiplied by the progreſſion 1, 3, 5, 7, 9, 11, &c. gives the thickneſs of the air at the moſt luminous parts of all the brighteſt rings, their arithmetical means being its thickneſs at the darkeſt parts of all the dark ones. In examining the under ſide of the thin plate, in order to obſerve what light was tranſmitted, he found that the central ſpot was white, and the order of the colours was yellowiſh-red; black, violet, blue, white, yellow, red; violet, blue, green, yellow, red, &c.; but theſe colours were very faint and dilute, except when the light was tranſmitted very obliquely through the glaſſes. When he put water between the glaſſes, and meaſured the rings again, he found the proportion of their diameters to the diameters of the like circles made by air, to be about 7 to 8; ſo that the intervals of the glaſſes, at ſimilar circles, cauſed by water and air, were about 3 to 4.

When theſe rings were examined in a darkened room, by the coloured light of a priſm caſt on a ſheet of white paper, they became more diſtinct, and viſible to a far greater number than in the open air. He ſometimes ſaw more than twenty of them, whereas in the open air he could not diſcern above eight or nine.

From other curious obſervations on theſe rings, made by different kinds of light thrown upon them, he inferred, that the thickneſſes of the air between the glaſſes, where the rings are ſucceſſively made, by the limits of the ſeven colours, red, orange, yellow, green, blue, indigo, and violet, in order, are one to another as the cube roots of the ſquares of the eight lengths of a chord, which ſound the notes in an octave, *ſol, la, fa, ſol, la, mi, fa, ſol;* that is, as the cube roots of the ſquares of the numbers 1, $\frac{8}{9}$, $\frac{5}{6}$, $\frac{3}{4}$, $\frac{2}{3}$, $\frac{3}{5}$, $\frac{9}{16}$, $\frac{1}{2}$. Theſe rings appeared of that priſmatic colour with which they were illuminated; and by projecting the priſmatic colours immediately upon the glaſſes, he found that the light, which fell on the dark places between the coloured rings, was tranſmitted through the glaſſes without any change of colour. From this circumſtance he thought that the origin of theſe rings is manifeſt; becauſe the air between the glaſſes is diſpoſed, according to its various thickneſs, in ſome places to reflect, and in others to tranſmit the light of any particular colour, and in the ſame place to reflect that of one colour, where it tranſmits that of another.

In examining the phenomena of colours made by a denſer medium ſurrounded by a rarer, ſuch as thoſe which appear in plates of Muſcovy glaſs, bubbles of ſoap and water, &c. the colours were found to be much more vivid than the others, which were made with a rarer medium ſurrounded by

by a denſer. From the preceding phenomena it is an obvious deduction, that the tranſparent parts of bodies, according to their ſeveral ſizes, reflect rays of one colour, and tranſmit thoſe of another; on the ſame account that thin plates, or bubbles, reflect or tranſmit thoſe rays; and this Newton ſuppoſed to be the reaſon of all their colours. Hence alſo he has inferred, that the ſize of thoſe component parts of natural bodies that affect the light, may be conjectured by their colours. See COLOUR and REFLECTION.

Sir Iſaac Newton, purſuing his diſcoveries concerning the colours of thin ſubſtances, found that the ſame were alſo produced by plates of a conſiderable thickneſs, diviſible into leſſer thickneſſes. The rings formed in both caſes have the ſame origin, with this difference, that thoſe of the thin plates are made by the alternate reflections and tranſmiſſions of the rays at the ſecond ſurface of the plate, after one paſſage through it; but that, in the caſe of a glaſs ſpeculum, concave on one ſide, and convex on the other, and quickſilvered over on the convex ſide, the rays go through the plate, and return before they are alternately reflected and tranſmitted. Newton's Optics, p. 169, &c. or Newton's Opera, Horſley's edit. vol. iv. p. 121, &c. p. 184, &c.

The abbé Mazeas, in his experiments on the rings of colours that appear in thin plates, has diſcovered ſeveral important circumſtances attending them, which were overlooked by the ſagacious Newton, and which tend to invalidate his theory for explaining them. In rubbing the flat ſide of an object-glaſs againſt another piece of flat and ſmooth glaſs, he found that they adhered very firmly together after this friction, and that the ſame colours were exhibited between theſe plane glaſſes, which Newton had obſerved between the convex object-glaſs of a teleſcope, and another that was plane; and that the colours were in proportion to their adheſion. When the ſurfaces of pieces of glaſs, that are tranſparent and well poliſhed, are equally preſſed, a reſiſtance will be perceived; and wherever this is felt, two or three very fine curve lines will be diſcovered, ſome of a pale red, and others of a faint green. If the friction be continued, the red and green lines increaſe in number at the place of contact; the colours being ſometimes mixed without any order, and ſometimes diſpoſed in a regular manner; in which caſe the coloured lines are generally concentric circles, or ovals, more or leſs elongated, as the ſurfaces are more or leſs united. When the colours are formed, the glaſſes adhere with conſiderable force; but if the glaſſes be ſeparated ſuddenly, the colours will appear immediately upon their being put together, without the leaſt friction. Beginning with the ſlighteſt touch, and increaſing the preſſure by inſenſible degrees, there firſt appears an oval plate of a faint red, and in the centre of it a ſpot of light green, which enlarges by the preſſure, and becomes a green oval, with a red ſpot in the centre; and this enlarging, in its turn, diſcovers a green ſpot in its centre. Thus the red and green ſucceed one another in turns, aſſuming different ſhades, and having other colours mixed with them. The greateſt difference between theſe colours exhibited between plane ſurfaces, and thoſe by curve ones, is, that, in the former caſe, preſſure alone will not produce them, except in the caſe above-mentioned. In rubbing together two priſms, with very ſmall refracting angles, which were joined ſo as to form a parallelepiped, the colours appeared with a ſurpriſing luſtre at the places of contact, and differently coloured ovals appeared. In the centre there was a black ſpot, bordered by a deep purple; next to this appeared violet, blue, orange, red tinged with purple, light green, and faint purple. The other rings appeared to the naked eye to conſiſt of nothing but faint reds and greens. When theſe coloured glaſſes were ſuſpended over the flame of a candle, the colours diſappeared ſuddenly, though they ſtill adhered; but being ſuffered to cool, the colours returned to their former places, in the ſame order as before. At firſt the abbé Mazeas had no doubt but that theſe colours were owing to a thin plate of air between the glaſſes, to which Newton has aſcribed them; but the remarkable differences in the circumſtances attending thoſe produced by the flat plates, and thoſe produced by the object-glaſſes of Newton, convinced him that the air was not the cauſe of this appearance. The colours of the flat plates vaniſhed at the approach of flame, but thoſe of the object-glaſſes did not. Nor was this difference owing to the plane glaſſes being leſs compreſſed than the convex ones; for though the former were compreſſed ever ſo much by a pair of forceps, it did not in the leaſt hinder the effect of the flame. Afterwards he put both the plane glaſſes and the convex ones into the receiver of an air-pump, ſuſpending the former by a thread, and keeping the latter compreſſed by two ſtrings; but he obſerved no change in the colours of either of them, in the moſt perfect vacuum that he could make. Suſpecting ſtill that the air adhered to the ſurface of the glaſſes, ſo as not to be ſeparated from them by the force of the pump, he had recourſe to other experiments, which rendered it ſtill more improbable that the air ſhould be the cauſe of theſe colours. Having laid the coloured plates, after warming them gradually, on burning coals; and thus, when they were nearly red, rubbing them together, he obſerved the ſame coloured circles and ovals as before. When he ceaſed to preſs upon them, the colours ſeemed to vaniſh; but they returned, as he renewed the friction. In order to determine whether the colours were owing to the thickneſs of ſome matter interpoſed between the glaſſes, he rubbed them together with ſuet and other ſoft ſubſtances between them; yet his endeavours to produce the colours had no effect. However, by continuing the friction with ſome degrees of violence, he obſerved, that a candle appeared through them encompaſſed with two or three concentric greens, and with a lively red inclining to yellow, and a green like that of an emerald; and at length the rings aſſumed the colours of blue, yellow, and violet. The abbé was confirmed in his opinion that there muſt be ſome error in Newton's hypotheſis, by conſidering that, according to his meaſures, the colours of the plates varied with the difference of a millionth part of an inch; whereas he was ſatisfied that there muſt have been much greater differences in the diſtance between his glaſſes, when the colours remained unchanged. From other experiments he concluded, that the plate of water introduced between the glaſſes was not the cauſe of their colours, as Newton apprehended; and that the coloured rings could not be owing to the compreſſion of the glaſſes. After all he adds, that the theory of light, thus reflected from thin plates, is too delicate a ſubject to be completely aſcertained by a ſmall number of obſervations. Berlin Mem. for 1752, or Memoirs Preſentes, vol. ii. p. 28—43.

For M. du Tour's experiments and obſervations, ſee Mem. Preſ. vol. iv. p. 288.

M. Muſchenbroeck is alſo of opinion, that the colours of thin plates do not depend upon the air; but as to the cauſe he is not ſatisfied. Introd. ad Phil. Nat. vol. ii. p. 738. See on this ſubject Prieſtley's Hiſt. of Light, &c. per. 6. ſect. 5. p. 498, &c.

Sir Iſaac Newton's explanation of the appearance of the above-mentioned coloured concentric rings, who accounts for the production of them by aſcribing to the rays of light certain fits of eaſy reflection and eaſy tranſmiſſion alternately returning and taking place with each ray at certain

certain ſtated intervals, not being ſatisfactory to Dr. Herſchel, he inſtituted a ſeries of experiments with a view of inveſtigating the cauſe of theſe phenomena. Newton's hypotheſis appears to him not eaſily reconcileable with the minuteneſs and extreme velocity of the particles of which theſe rays, according to the Newtonian theory, are compoſed. The detail of this celebrated aſtronomer's experiments would far exceed our limits; we muſt therefore content ourſelves with referring for an account of them to the Phil. Tranſ. for 1807, vol. xcvii. pt. 2. and with merely ſtating the conſequences which he has deduced from them.

It is evident, ſays our author, that the phenomena of concentric rings muſt have an adequate cauſe, either in the very nature or motion of the rays of light, or in the modifications that are given to them by the two eſſential ſurfaces that act upon them at the time of the formation of the rings. Hence he infers, that the true cauſe may be reduced to an alternative that may be determined; for if it can be ſhewn, that a diſpoſition of the rays of light to be alternately reflected and tranſmitted cannot account for the phenomena which this hypotheſis is to explain, a propoſal of accounting for them by modifications that may be proved, even on the principles of ſir Iſaac Newton, to have an exiſtence, will be readily admitted. Accordingly Dr. Herſchel offers ſome arguments for removing an obſtacle to the inveſtigation of the real cauſe of the formation of the concentric rings; for after the very plauſible ſuppoſition of the alternate fits, which agrees ſo wonderfully well with a number of facts that have been related, it will hardly be attempted, if theſe ſhould be ſet aſide, to aſcribe ſome other inherent property to the rays of light, by which we might account for them: and thus we ſhall be at liberty to turn our thoughts to a cauſe, that may be found in the modifications ariſing from the action of the ſurfaces, which have been proved to be the only eſſential ones in the formation of rings. Our author proceeds to obſerve, that concentric rings cannot be formed by an alternate reflection and tranſmiſſion of the rays of light; for if we adopt one of the moſt ſimple methods of obtaining a ſet of concentric rings, which is that of laying a convex lens upon a plain metalline mirror, we can in this caſe have no tranſmiſſion of rays, nor conſequently any alternate reflection and tranſmiſſion of them. He further obſerves, that alternate fits of eaſy reflection and eaſy tranſmiſſion, if they exiſt, do not exert themſelves according to the various thickneſſes of thin plates of air. In the following experiment, he placed a plain well-poliſhed piece of glaſs 5.6 inches long, and 2.3 thick, upon a plain metalline mirror of the ſame length with the glaſs, and in order to keep the mirror and glaſs at a diſtance from each other, he laid between them, at one end, a narrow ſtrip of ſuch paper as is commonly put between prints. The thickneſs of that which was uſed in this caſe was the 640th part of an inch. Upon the glaſs was put a 39-inch double convex lens; and having expoſed this combination to a proper light, two complete ſets of coloured rings were viſible in this arrangement. The rays which convey the ſecondary ſet of rings to the eye muſt paſs through a thin wedge of air, and if theſe rays are endowed with permanent fits of eaſy reflection and eaſy tranſmiſſion, or abſorption, their exertion, according to ſir I. Newton, ſhould be repeated at every different thickneſs of the plate of air, which amounts to the $\frac{1}{2960}$d part of an inch, of which he ſays, "hæc eſt craſſitudo aeris in primo annulo obſcuro radiis ad perpendiculum incidentibus exhibito, qua parte is annulus obſcuriſſimus eſt." The length of the thin wedge of air, reckoned from the line of contact, to the beginning of the interpoſed ſtrip of paper, is 5.2 inches, from which, by calculation, it will have the above-mentioned thickneſs at $\frac{1}{77}$th of an inch from the contact; and therefore at $\frac{1}{154}$, $\frac{3}{154}$, $\frac{5}{154}$, $\frac{7}{154}$, $\frac{9}{154}$, $\frac{1}{11}$, &c. we ſhall have the thickneſs of air between the mirror and glaſs equal to $\frac{1}{1760000}$, $\frac{3}{1760000}$, $\frac{5}{1760000}$, $\frac{7}{1760000}$, &c. of which the ſame author ſays that they give "craſſitudines aeris in omnibus annulis lucidis, qua parte illi lucidiſſimi ſunt." Hence it follows that, according to the above hypotheſis, the rings of the ſecondary ſet, which extended over a ſpace of .14 of an inch, ſhould ſuffer more than ſeven interruptions of ſhape and colour in the direction of the wedge of air.

In order to aſcertain whether ſuch an effect had any exiſtence, Dr. Herſchel viewed the ſecondary ſet of rings upon every part of the glaſs-plate, by moving the convex lens from one end of it gradually to the other; and his attention being particularly directed to the third, fourth, and fifth rings, which were extremely diſtinct, he ſaw them retain their ſhape and colour all the time without the ſmalleſt alteration.

The ſame experiment was repeated with a piece of plate-glaſs inſtead of the metalline mirror, in order to give room for the fits of eaſy tranſmiſſion, if they exiſted, to exert themſelves, but the reſult was ſtill the ſame; and the conſtancy of the brightneſs and colours of the rings of the ſecondary ſet plainly proved, that the rays of light were not affected by the thickneſs of the plate of air through which they paſſed.

Our author next proceeds to ſhew, that alternate fits of eaſy reflection and eaſy tranſmiſſion, if they exiſt, do not exert themſelves according to the various thickneſſes of thin plates of glaſs. In proof of this he ſelected a well-poliſhed plate of coach-glaſs 17 inches long, and about 9 broad. Its thickneſs at one end was $\frac{33}{200}$ths, and at the other $\frac{31}{200}$ths of an inch; ſo that in its whole length it differed $\frac{1}{100}$th of an inch in thickneſs; and it was regularly tapering from one end to the other. This plate, with a double convex lens of 55 inches laid upon it, being placed upon a ſmall metalline mirror, and properly expoſed to the light, exhibited the uſual two ſets of rings. In the ſecondary ſet, which was the object of attention, 12 rings were counted, and the central ſpace between them was eſtimated to be about $1\frac{1}{2}$ times as broad as the ſpace occupied by the 12 rings on either ſide; ſo that the whole ſpace taken up might be reckoned equal to the breadth of 40 rings of a mean ſize; for the 12 rings, as uſual, were gradually contracted in breadth as they receded from the centre, and by a meaſure of the whole ſpace thus occupied, it was found that the breadth of a ring of a mean ſize was about the 308th part of an inch.

According to ſir I. Newton's calculation of the action of the fits of eaſy reflection and eaſy tranſmiſſion in thick glaſs-plates, an alternation from a reflecting to a tranſmitting fit requires a difference of $\frac{1}{137545}$th part of an inch in thickneſs (Newton's Optics, p. 277.); and by calculation this difference took place in the glaſs-plate, that was uſed at every 80th part of an inch of its whole length. The 12 rings, as well as the central colour of the ſecondary ſet, ſhould conſequently have been broken by the exertion of the fits at every 80th part of an inch; and from the ſpace over which theſe rings extended, which was about .13 inch, it was found, that there muſt have been more than 10 ſuch interruptions or breaks in a ſet of which the 308th part was plainly to be diſtinguiſhed. But when the glaſs-

plate was drawn gently over the ſmall mirror, keeping the ſecondary ſet of rings in view, their ſhape and colour were found to be always completely formed.

This experiment was alſo repeated with a ſmall plain glaſs, inſtead of the metalline mirror put under the large plate. In this manner it ſtill gave the ſame reſult, with no other difference but that only ſix rings could be diſtinctly ſeen in the ſecondary ſet, on account of the inferior reflection of the ſubjacent glaſs.

Our author next ſhews, that coloured rings may be completely formed without the aſſiſtance of any thin or thick plates, either of glaſs or of air. Sir I. Newton placed a concave glaſs mirror at double its focal length from a chart, and obſerved, that the reflection of a beam of light admitted into a dark room, when thrown upon this mirror, gave "four or five concentric iriſes or rings of colours like rainbows" (Optics, p. 265.); and he accounts for them by alternate fits of eaſy reflection and eaſy tranſmiſſion, exerted in their paſſage through the glaſs-plate of the concave mirror. Ibid. p. 277.

The duke de Chaulnes concluded from his own experiments of the ſame phenomena, that theſe coloured rings depended upon "the firſt ſurface of the mirror, and that the ſecond ſurface, or that which reflects them after they had paſſed the firſt, only ſerved to collect them, and throw them upon the paſteboard, in a quantity ſufficient to make them viſible." (Prieſtley's Hiſt. &c. p. 515.) Mr. Brougham, after having conſidered what the two laſt-mentioned authors had done, ſays, "that upon the whole there appears reaſon to believe, that the rings are formed by the firſt ſurface out of the light, which, after reflection from the ſecond ſurface, is ſcattered, and paſſes on to the chart." Phil. Tranſ. for 1796, p. 216.

Dr. Herſchel's experiment is as follows. He placed a highly poliſhed ſeven-feet mirror, but of metal inſtead of glaſs, that he might not have two ſurfaces, at the diſtance of fourteen feet from a white ſcreen, and through a hole in the middle of it, one-tenth of an inch in diameter, he admitted a beam of the ſun into his dark room, ſo directed as to fall perpendicularly on the mirror. In this arrangement the whole ſcreen remained perfectly free from light, becauſe the focus of all the rays, which came to the mirror, was by reflection thrown back into the hole through which they entered. After this preparation, an aſſiſtant ſtrewed ſome hair-powder with a puff into the beam of light, while he kept his attention fixed upon the ſcreen. As ſoon as the hair-powder reached the beam of light the ſcreen was ſuddenly covered with the moſt beautiful arrangement of concentric circles, diſplaying all the brilliant colours of the rainbow. A great variety in the ſize of the rings was obtained by making the aſſiſtant ſtrew the powder into the beam at a greater diſtance from the mirror; for the rings contract by an increaſe of the diſtance, and dilate on a nearer approach of the powder. This experiment, ſays our author, is ſo ſimple, and points out the general cauſes of the rings which are here produced in ſo plain a manner, that we may confidently ſay, they ariſe from the flection of the rays of light on the particles of the floating powder, modified by the curvature of the reflecting ſurface of the mirror. From this experiment our author concludes, that the principle of thin or thick plates, either of air or glaſs, on which the rays might alternately exert their fits of eaſy reflection and eaſy tranſmiſſion, muſt be given up: and that the fits themſelves of courſe cannot be ſhewn to have any exiſtence. It will hardly be neceſſary to add further, that the whole theory relating to the ſize of the parts of natural bodies and their interſtices, which ſir I. Newton has founded upon the exiſtence of fits of eaſy reflection and eaſy tranſmiſſion, exerted differently, according to the different thickneſs of the thin plates of which he ſuppoſes the parts of natural bodies to conſiſt, will remain unſupported; for if theſe fits have no exiſtence, the whole foundation on which the theory of the ſize of ſuch parts is placed, will be taken away, and it will be neceſſary to explore another baſis for a ſimilar edifice. This baſis, our author conceives, is to be found in the modifying power, which the two ſurfaces that have been proved to be eſſential to the formation of rings, exert upon the rays of light.

Our author having pointed out a variety of methods that ſerve to produce coloured concentric rings between two glaſſes of a proper figure applied to each other, and having proved that only two ſurfaces, namely, thoſe that are in contact with each other, are eſſential to their formation, proceeds in the inveſtigation of the ſubject to ſhew, that priſmatic phenomena aſſume the ſhape of rings, in conſequence of the ſole uſe of ſpherical curves in producing them. Our author found, by an appropriate experiment, that, as ſpherical curves gave circular rings, cylindrical forms produce ſtreaks; that cylindrical and ſpherical ſurfaces combined produce coloured elliptical rings; and that irregular curves produce irregular figures. Hence he infers, that the curvature of ſurfaces is the cauſe of the appearance, as well as of the ſhape of the coloured phenomena which are produced. If we can invariably predict, from the nature of the curves that are employed in an experiment, what will be the appearance and form of the colours that will be ſeen, it certainly muſt prove the efficacy of theſe curvatures in the production of ſuch phenomena. This concluſion is further confirmed by the conſideration, that coloured appearances cannot be produced between the plain ſurfaces of two parallel pieces of glaſs applied to one another.

Having proved that no more than two ſurfaces are eſſential to the formation of Newton's coloured rings, and that the configuration of the coloured phenomena ariſes from the curvature of one or both of the two eſſential ſurfaces, Dr. Herſchel infers from theſe principles, that we are to diſtinguiſh between the production of the colours and that of their configuration when produced. The cauſe of the configuration has been already explained; and our author next proceeds to inveſtigate the production and arrangement of the colours. The order of the colours is priſmatic; that is, red, orange, yellow, green, blue, indigo, and violet. Dr. Herſchel's experiments for aſcertaining this arrangement are too numerous and various to be here recited. We ſhall therefore ſtate the general propoſition, and ſpecify the reſults of the experiments by which it is eſtabliſhed. The general propoſition is, that the critical ſeparation of the colours, which takes place at certain angles of incidence, is the primary cauſe of the Newtonian coloured rings between optic glaſſes. The reſults of the experiments are as follow: theſe experiments (for which we refer to Phil. Tranſ. for 1809, vol. xcix. pt. 2.) explain in what manner a critical ſeparation of the colours, which takes place at certain angles of incidence, is the cauſe of the appearance of the blue and red bows; ſince the different reflexibility of the rays of light, by which Newton has accounted for the blue bow, brings on a critical ſeparation of the blue colours, and ſince alſo the different intromiſſibility by which the author has explained the red bow, occaſions an equally critical ſeparation of the red ones. Dr. Herſchel has not only proved that all the various appearances, which were produced by convex glaſſes, may be equally

equally well obtained by the uſe of a priſm, but he has alſo ſhewn, that the great ſimplicity of this valuable optical inſtrument has cleared up great difficulties, by pointing out to us that the colours which are modified into ſuch various ſhapes, are in all priſmatic experiments excluſively produced by the critical ſeparation of the rays of light. As this fact muſt be admitted, it certainly will not be philoſophical to look for a different cauſe of the ſame or ſimilar effects, when convex glaſſes, which have all the required priſmatic properties, are uſed to produce them. In order to ſhew the great ſimilarity, or rather the identity of theſe effects, it will be ſufficient to take the moſt ſimple caſe of each, namely, the coloured rings that are produced when a plano-convex lens is laid with its convex ſide upon a plain reflecting ſurface: and the coloured ſtreaks which are produced when the baſe of a right-angled priſm is in the ſame manner placed upon ſuch a ſurface. The reſults of the experiments, with the reaſonings annexed to them, are contained in the following propoſitions. The form of rings ariſes from the ſpherical figure of the lens: the right-lined appearance of the ſtreaks is owing to the ſtraight figure of the plain ſurface of the priſm. The colour of the rings may ſuddenly be changed; the colours of the blue bow-ſtreak may as inſtantly be converted into thoſe of the red bow. The cauſe of the ſudden change of the rings has been ſhewn to be that the ſets of one colour are ſeen by reflection, and thoſe of the other by tranſmiſſion; it has alſo been ſhewn, that the blue bow-ſtreaks are ſeen by reflection, and thoſe of the red bow by tranſmiſſion. In a lens we may, at the ſame time, ſee, in half the ſet, the colours of the reflected, and in the other half, the colours of the tranſmitted rings; and in a priſm held before an open window, when the eye is cloſe to it, and when half the bow falls on the ſide of the room, we may ſee blue ſtreaks by reflection from half the blue bow, and green ſtreaks by tranſmiſſion from half the red bow. When deep convex, or concave, glaſſes are laid upon the firſt ſurface of a lens, the rings are not affected by it; and when the ſame glaſſes are laid upon the firſt ſurface of a priſm the ſtreaks remain unaltered. When the convexity of the lens, which is placed on the reflecting ſurface, is changed, the ſize of the rings is alſo changed; and when the angle of the priſm is increaſed or diminiſhed, the diſtance of the ſtreaks undergoes a proportional alteration. When the lens is preſſed upon the plain glaſs, the rings increaſe in diameter; and by a preſſure of the plain glaſs againſt the priſm the diſtance of the ſtreaks grows larger. To form rings by a lens, ſcattered rays only are required: and the ſame light is beſt for the production of ſtreaks by a priſm. Many other inſtances of ſimilarity might be adduced, but it is needleſs. Now, as it has been clearly proved, that the critical ſeparation of the colours, which takes place at certain angles of incidence, occaſions all the phenomena of the blue and red bows, and of the ſtreaks, rings, and other regular or irregular appearances, that may be ſeen in a priſm, it cannot be doubted that the Newtonian rings obſerved between object-glaſſes are owing to the ſame cauſe.

Dr. Herſchel concludes an elaborate paper on this ſubject with the following remarks on the Newtonian alternate fits of eaſy reflection and eaſy tranſmiſſion.

"In attempting to reſcue the ſcience of optics from what has been ſo long conſidred as unſatisfactory for explaining the great queſtion about the cauſe of the coloured rings, I have made uſe of a principle, the effects of which have ſo near a reſemblance to thoſe of the ſuppoſititious fits of eaſy reflection and eaſy tranſmiſſion, that the author of them might eaſily be miſled by appearances. But although the principle of a critical ſeparation of the colours, ſubſtituted for theſe fits, admits the reflection of ſome rays at the ſame angles of incidence at which others are tranſmitted, yet ſince the Newtonian different refrangibility of light will account for theſe critical reflections within glaſs, and equally critical intromiſſions from without, we can have no longer any reaſon to aſcribe original fits to the rays of light, which in the firſt part of this paper they have already been proved not to poſſeſs, and which now, in all priſmatic experiments, I have ſhewn are not neceſſary for explaining appearances that may be accounted for without them."

In the Philoſ. Tranſactions for 1810, vol. c. pt. 2, we have a third paper, as a ſupplement to the other two papers, containing additional obſervations on the cauſe of coloured concentric rings between object-glaſſes, and other appearances of a ſimilar nature, in which Dr. Herſchel further explains what ſome may have thought obſcure, and obviates certain objections againſt his theory. His fundamental principle for explaining the colour of the rings, which he has illuſtrated both by reaſoning and experiment, is this: that the colours in all priſmatic phenomena are produced either by the interior critical ſeparation ariſing from the different reflexibility of the rays which cauſe the blue bow, or by the exterior critical ſeparation ariſing from the different intromiſſibility of the rays which cauſe the red bow. In this paper he ſubjoins ſome additional arguments to thoſe before given, in order to prove, that there are two primary priſmatic bows, a blue one and a red one; and he maintains, that the red bow is a phenomenon of equal originality with the Newtonian blue bow, and that as one of theſe bows cannot be the converſe of the other, we have two critical ſeparations eſſentially different, *viz.* the reflective and intromiſſive. But we muſt refer to the author's own account, *ubi ſupra*.

For an account of the rings of colours produced by electrical exploſions, ſee COLOURS *of Natural Bodies*, CIRCULAR *Spots*, and FAIRY *Circles*.

RINGS *of Flies*, in *Natural Hiſtory*, the ſeveral rounds or circular portions, of which the bodies of theſe and other inſects are compoſed.

In the fly kind theſe are cruſtaceous or cartilaginous, and conſequently of a matter little capable of extenſion; many actions of theſe inſects require, however, that their bodies, or a part at leaſt of their bodies, ſhould be able to inflate or diſtend, and contract their ſize occaſionally. Were every ring of the body one entire ſcale, or ſhelly ſubſtance, theſe changes could not be eaſily effected; nature has therefore ſo provided, that the tender bodies of theſe little creatures are ſufficiently defended, and yet all the neceſſary motions may be performed.

RING, in *Agriculture*, a ſort of hoop made of iron, which is uſed for various purpoſes, as faſtening horſes and cattle by in the ſtalls. In theſe caſes they ſhould be made large and ſtrong.

RING, in *Commerce*, a term uſed in reckoning at Hamburgh, and is equivalent to 240 of things that are ſold by number. Staves are ſold in rings of 4 ſchoaks (a ſchoak being 60) and 8 pieces: 3 rings of hogſhead ſtaves, or 6 rings of barrel ſtaves, are reckoned equal to 2 rings of pipe ſtaves.

RING, a ſtout circle of iron in the upper part of the ſhank of an anchor, to which the cable is bent.

RINGS are alſo circles of iron or other metal, let over the points of bolts, whereon they are clenched, to prevent their drawing. Hatch-rings, or ring and ſtarts, are thoſe which are fixed in the hatches or ſcuttles to open or ſhut them with.

RINGS *in Timber*, in *Rural Economy*, the concentric layers by which the wood is formed. Theſe rings are, according to Dr. Darwin, annually produced from the alburnum, and

are

are ſuppoſed to be thicker on that ſide of the trunk of the tree which has a ſouthern aſpect than on the contrary, and thicker in thoſe ſummers moſt favourable to vegetation than in others. It is added, that theſe rings, as they loſe their vegetable life, and at the ſame time a part of their moiſture, by evaporation or abſorption, gradually become harder and of a darker colour, inſomuch, that by counting their number, it is ſaid, that not only the age of the tree, but the mildneſs or moiſture of each ſummer, during the time of its growth, may be eſtimated by the reſpective thickneſs of the rings of timber.

Ring, *Baſe*. See Base.

Ring-*Bolt*, in a *Ship*, is an iron bolt with an eye at one end, in which is fitted a circular ring, and uſed for various purpoſes; particularly for hooking the tackles, by which the cannon of a ſhip is managed and ſecured. They are driven by the ſides of the gun-ports in ſhips for ſecuring the guns; and in the deck for ſtopping the cable, and are therefore called ſtopper-bolts. The rings are ſometimes made angular, to receive many turns of laſhing; ſuch are the ring-bolts driven through the ſhip's ſide along the waiſt for laſhing the booms and ſpare anchors.

Ring-*Bone*, among *Farriers*, &c. a hard callous ſubſtance, growing in the hollow circle of the little paſtern of a horſe, above the coronet.

It ſometimes goes quite round, like a ring, whence its name; ſometimes it is hereditary, derived from the ſtallion or mare; but it oftener comes by accident, as from a ſtrain, a blow of a horſe, &c.

Ring, *Corniche*. See Corniche.

Ring-*Dial*. See Dial.

Ring-*Dove*. See Dove, and Columba *Palumbus*.

Ring, *Fairy*. See Fairy.

Ring-*Head*, an engine uſed in ſtretching of cloth.

Ring, *Natal*. See Natal.

Ring *Ouzel* or *Amſel*. See Ouzel, and Turdus *torquatus*.

Ring, *Reinforce*. See Reinforce.

Ring-*Ropes*, in a *Ship*, ſhort pieces of rope, tied occaſionally to the ring-bolts of the deck, to faſten the cable more ſecurely, when the ſhip rides in a tempeſt, or turbulent ſea, or rapid current. They are uſed more particularly in veering away the cable gradually in thoſe circumſtances, in order to freſhen the hauſe.

Ring-*Scalpel*. We have a deſcription and a figure of a ring-ſcalpel, for aſſiſting the delivery of women in childbirth, by Dr. Thomas Simſon, in the Medical Eſſays of Edinburgh, vol. v. art. 39.

Ring-*Tail*, in *Ornithology*, the Engliſh name for the *ſubbuteo*, or *pygargus accipiter*; which has been generally ſuppoſed to be the female of the hen-harrier; but males have lately been found of this ſpecies. See Falco *Pygargus*.

The ring-tail is a moderately large bird. It has a ſort of ring, or chain of feathers, round the back part of its head, reaching to its chin on each ſide, which ſtand erect, and are brown in the middle, and of a reddiſh-white at the edges, and make a ſort of crown, which ſurrounds the head; on the top of the head and cheeks the feathers are duſky, bordered with ruſt-colour; under each eye is a white ſpot; the back is duſky, the rump white, with oblong yellowiſh ſpots on each ſhaft; the tail is long, and its tip white; the breaſt and belly are of a yellowiſh-brown, marked with oblong duſky ſpots; its legs are yellow, and the inſide of its mouth is black; it feeds on ſmall birds, and its eggs are of a reddiſh hue, with very little clear white appearing in them. Theſe birds fly higher than the hen-harrier, and ſometimes perch on trees.

Ring-*Tail Eagle*. See *White-tailed* Eagle, and Falco *Albicilla*.

Ring-*Tail*, in a *Ship*, is a quadrilateral ſail, occaſionally hoiſted abaft the after-leech of the boom-mainſails, to which the fore-leech is made to correſpond. The head is bent to a ſmall yard at the outer end of the gaff, and the foot is ſpread on the boom, which is prolonged by a piece laſhed to the outer end. A triangular ſail of this ſort is uſed in light favourable winds, extended on a ſmall maſt, occaſionally erected for that purpoſe on the taffarel of ſmall veſſels.

Ring, *Trunnion*. See Trunnion.

Ring-*Walk*, among *Hunters*, a round walk. See Hunting.

Ring-*Worm*, in *Medicine*. See Ringworm.

Ring *Iſland*, in *Geography*, a ſmall iſland off the coaſt of Maſſachuſetts, oppoſite to Newbury port, to the eaſtward.

RINGAN, a town of Germany, in the principality of Culmbach; 14 miles S. of Culmbach.

RINGANDEE, a town of Bengal; 30 miles W. of Rogonatpour.

RINGELBERGIUS, Joachim-Fortius, in *Biography*, vernacularly Sterck, an eminent Flemiſh philoſopher and mathematician, who flouriſhed in the 16th century, was born at Antwerp. He was patronized by the emperor Maximilian I., in whoſe palace he had an apartment, and he there received his firſt inſtructions in the rudiments of learning. When he was ſeventeen years of age, he was ſent to the univerſity of Louvain, where he ſtudied the learned languages, philoſophy, and the mathematical ſciences. He became a public profeſſor in that univerſity, and taught rhetoric, coſmography, the mathematics, and the Greek language, with very high reputation. So numerous were the claſſes which attended his lectures, that they frequently occupied his attention twelve hours every day, for a month together. In the year 1528 he went into Germany, and taught the mathematical ſciences and the Greek tongue in various ſeminaries of that country. From Germany he went to France, where he filled the profeſſor's chair at Paris, Orleans, Bourdeaux, and other places. He died about the year 1536. He wrote a number of eſteemed works, which were publiſhed at Baſil, Antwerp, and other places, and reflected honour on his learning and judgment. The titles of ſome of them are, "De Ratione Studii;" "De Uſu et Differentiis vocum quarundam apud Latinos;" "De Uſu Vocum quæ non flectuntur;" "Grammaticæ Græcæ Elementa;" "Dialectica, et Tabulæ Dialecticæ;" "De conſcribendis Epiſtolis Lib.;" "Rhetoricæ, et quæ ad eam ſpectant;" "Sententiæ;" "De Formis dicendi, Lib.;" "De Periodis;" "Synonyma;" "Sphæra, ſive Inſtitutionum Aſtronomicarum, Lib. iii.;" "Coſmographia;" "Optica;" "Chaos Mathematicum;" "Arithmetica." The whole of his works were collected and publiſhed at Leyden, in 1531.

RINGELSLOFF, in *Geography*, a town of Auſtria; 4 miles E.N.E. of Ziſterſdorff.

RINGEN, a town of Ruſſia, in the government of Riga; the birth-place of the empreſs Catharine I., near Dorpat.

RINGENDORF, a town of France, in the department of the Lower Rhine; 7 miles W. of Haguenau.

RINGENT Corolla, in *Botany* and *Vegetable Phyſiology*, named from its reſemblance to the mouth and ſnout of ſome animal; ſee Corolla. Certain Engliſh authors, literally tranſlating the original word (*ringens*), uſe the ludicrous term of *a grinning corolla*.

RIN-

RINGENTHAL, in *Geography*, a town of Saxony, in the circle of Erzgebirg; 1 mile N. of Mitweyda.

RINGERIKE, a town of Norway; 24 miles N.N.E. of Chriſtiania.

RINGES, in *Rural Economy*, a provincial term, ſignifying rows of hay, mown corn, quicks, &c.

RINGKIOBING, in *Geography*, a town of Denmark, on the coaſt of a large gulf of the North ſea, to which it gives name. The inhabitants are almoſt wholly employed in trading to Holland and Norway. The bay affords plenty of good fiſh, particularly oyſters. It is of a good depth, and ſecure, except at the entrance, which is rendered dangerous by ſand-banks; 48 miles N.W. of Ripen. N. lat. 56° 2′. W. long. 8° 18′.

RINGLEBEN, a town of Saxony, in the principality of Eiſenach; 6 miles N. of Erfurt. N. lat. 51° 6′. E. long. 11° 2′.

RINGO's Town, a town of America, in Hunterden county, New Jerſey; 15 miles N.W. of Princeton.

RINGSTED, a town of Denmark, in the iſland of Zealand, anciently a large city, but reduced by fires into a ſmall town: but it is ſtill famous for its court of judicature, to which lies an appeal from almoſt all the courts of Zealand, whereas no appeal lies from this but to the ſupreme court at Copenhagen; 29 miles S.W. of Copenhagen. N. lat. 55° 28′. E. long. 11° 48′.

RINGWOOD, a town of America, in Hunterden county; 25 miles N. of Morriſtown, containing 2605 inhabitants.

Ringwood, a market-town and pariſh in the hundred of Ringwood, New Foreſt, weſt diviſion, county of Southampton, England, is ſituated on the eaſtern bank of the river Avon, at the diſtance of 14 miles W. by S. from Southampton, and 90 miles S.W. by W. from London. This town is of great antiquity, and is ſuppoſed by Camden to have been the Regnum of the Romans, which others, however, have fixed, with greater probability, at Chicheſter, in Suſſex. But whatever it may have been during the Roman government, it unqueſtionably attained conſiderable importance in the time of the Saxons; and in Domeſday book, it is eſtimated at a higher value than Thuinam, or Chriſtchurch.

Ringwood is noted for its breweries of ſtrong beer and ale. A market is held here on Wedneſday, weekly; and there are fairs on the 10th of July, and 11th of December. The petty ſeſſions for New Foreſt, weſt diviſion, are holden in this town. The unfortunate duke of Monmouth is very generally ſtated to have been taken in a field near Ringwood, after his defeat at Sedgemoor; but this ſtatement is erroneous, that prince having been actually ſeized in the woodlands in Dorſetſhire. According to the parliamentary returns of 1811, the town and pariſh contained 658 houſes, and a population of 3269 perſons.

North from Ringwood is the village of Ellingham, where formerly was a religious houſe, founded by William de Salariis, in the reign of Henry II., and appropriated as a cell to the abbey of St. Saviour le Vicompte, in Normandy. When the alien priories in this country were diſſolved, Henry VI. granted Ellingham and its poſſeſſions to the college at Eton. Some remains of the buildings of this eſtabliſhment are ſuppoſed to form the nave of the preſent church, and the opinion is certainly not improbable, as it is more ancient than the reſt of the fabric. The altar-piece here is a painting of the Day of Judgment, preſented to the pariſh by the late lord Windſor, whoſe anceſtor, brigadier Windſor, brought it from Port St. Mary, in the bay of Cadiz, among the trophies of an expedition againſt that city in the year 1702. In the church-yard is a plain ſtone, to the memory of dame Alicia Liſle, whom the blood-thirſty Jeffreys condemned to be executed in her old age, on a charge of harbouring known rebels in her manſion at Moyles-Court. This manſion is ſtill ſtanding, ſurrounded by a very pleaſant, but ſmall, park. Its former poſſeſſors, the Liſles, were originally ſettled in the Iſle of Wight, where they had large eſtates, and whence they derived their name. Colonel John Liſle, huſband to the above-mentioned Alicia, was one of the judges who paſſed ſentence on king Charles I. and alſo one of the lords commiſſioners of the great ſeal during the protectorate of Cromwell. On the eve of the reſtoration he fled to the continent, was proſcribed by the parliament of Charles II., and aſſaſſinated at Lauſanne, in Switzerland, by three villains, hired for that purpoſe by ſome of the royal family, or their friends. Beauties of England and Wales, vol. vi. by John Britton, F.S.A. and E. W. Brayley, Lond. 1805.

RINGWORM, in *Medicine*, a popular appellation, applied to various ſuperficial affections of the ſkin, which aſſume ſomewhat of a circular form. But the fact is, that almoſt all the partial cutaneous diſeaſes have more or leſs a tendency to the annular figure, and riſe in ſomewhat irregular patches, approximating to the oval or the circle, which is ſometimes perfect, and ſometimes broken. It is only by referring to an intelligible nomenclature, ſuch as that propoſed by the late Dr. Willan, that any diſcrimination can be clearly made in the varieties of theſe eruptions. If we examine theſe ringworms according to this ſyſtem, we ſhall find, that there are ſeveral diſeaſes, to which the term is applicable, and daily applied, and conſequently the ſame remedies recommended for their cure, which are, nevertheleſs, very different in their nature, and therefore require very different modes of treatment. Thus there is a circular eruption, which conſiſts of patches of *pimples*, the lichen circumſcriptus of Dr. Willan; even the *ſcaly* lepra occurs in circles of various ſizes, and is ſometimes called ringworm: the *puſtular* diſeaſe, called impetigo figurata, or moiſt tetter, and the *veſicular* eruption termed herpes circinatus, (ſee Dr. Bateman's Pract. Synopſ. of Cutan. Diſeaſes,) are alſo diſtinguiſhed by their circular form, and it is to theſe two laſt that the term *ringworm* is moſt popularly applied. And above all, the contagious diſeaſe of the ſcalp, the porrigo ſcutulata, is ſo diſtinctly circular in its form, as to be diſtinguiſhed from the other ſpecies of the ſame diſorder, by the appellation of *ringworm*, or by ſome the *ringworm of the ſcalp*. See the ſame Synopſis, ord. v. gen. 2. See alſo Porrigo, Lichen, Herpes, &c. above.

The general treatment recommended for ringworms by the vulgar, is the application of common *ink*; and this, by its aſtringency, which is ſlight, may be partially uſeful in the decline of the *herpetic* ringworm, above-mentioned, or in the mildeſt forms of that of the ſcalp: but it will be certainly injurious if applied to the moiſt *tetter*, or to the *lichen* in its early ſtage; and the ſame effect can be produced by ſimilar aſtringents, in a more manageable and leſs dirty form; as by ſolutions of the ſulphate of iron or zinc in roſe-water or other diſtilled water. But in fact, the ringworm of the ſcalp requires much more active remedies, on the one hand; and on the other, the herpetic ringworm diſappears in a ſhort time ſpontaneouſly; ſo that the remedy may be deemed in both caſes uſeleſs. It is obvious, then, that diſeaſes, which are puſtular, ſcaly, veſicular, and papular reſpectively; ſome of which are inflamed, and others not; ſome contagious, and others not; ſome diſappearing ſpontaneouſly, and others reſiſting the moſt active applications; ſome connected with diſorder of the conſtitution, and

others merely local, cannot be treated with advantage, or even with impunity, by the ſame ſet of medicines, and ought not to be confounded under the ſame appellation; but popularly, the *name* of a diſeaſe is alone inquired for, and the remedy is appropriated to the name. By diſcarding the term ringworm, or uniting with it the epithets puſtular, veſicular, or herpetic, porriginous, &c. this practical error may be avoided.

RINLING, or AINLING, in *Geography*, a town of Bavaria; 8 miles N.N.W. of Aicha.

RINNE, a river of Thuringia, which runs into the Saale, two miles below Rudelſtadt.

RINOREA, in *Botany*, a name of uncertain derivation, but probably beſtowed on this genus by Aublet, from its native appellation in Guiana.—Aubl. Guian. 235. Juſſ. 287. Lamarck Dict. v. 6. 211. Illuſtr. t. 134.—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Berberides*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, villous, cloven into five, oblong, acute ſegments. *Cor.* Petals ten, concave, ovate, oblong; the five inner ones ſmaller; all inſerted below the germen. *Stam.* Filaments five, ſhort, inſerted at the baſe of the outer petals; anthers oblong, two-celled, with two valves burſting from the baſe to the top. *Piſt.* Germen ſuperior, roundiſh, villous; ſtyle oblong, villous; ſtigma obtuſe. *Peric.* unknown.

Obſ. Juſſieu deſcribes *Rinorea* as having five longer petals, each furniſhed with an inner one at its claw or baſe.

Eſſ. Ch. Calyx five-cleft. Petals ten, the five inner ones ſmaller. Style one Stigma one.

1. R. *guianenſis*. Aubl. Guian. t. 93.—Native of cultivated ground in Guiana, where it flowered in January.—A *tree* ſix or ſeven feet high, whoſe *trunk* is branched very thickly, to the very ſummit, in a ſtraight alternate manner. *Leaves* alternate, ſtalked, ovate-oblong, acute, toothed. *Stipulas* ſhort, deciduous. *Flowers* white, in axillary, terminal cluſters, each placed on a ſhort ſtalk, which is furniſhed with two ſcales at its baſe.

RINTELN, in *Geography*, a town of Germany, in the county of Schauenburg, ſituated on the S. ſide of the Weſer. The univerſity of Stadthagen was removed to this town in the year 1621; its profeſſors of divinity are Lutheran, but thoſe of the other faculties are Calviniſts. The town church belongs to the Lutherans; the Calviniſts and garriſons uſe the univerſity church for their ſervice. The ramparts, ditches, and bulwarks, that environ the town, were begun in 1665, and finiſhed in 1668. The inhabitants are chiefly employed in agriculture, breeding of cattle, and brewing; 9 miles S.S.E. of Minden. N. lat. 52° 11′. E. long. 9° 8′.

RINUCCINI, OTTAVIO, in *Biography*, an Italian poet of Florence, who went into France in the ſuite of Mary of Medicis, queen to Henry IV. He was the inventor of the muſical drama or opera, that is, of the manner of writing or repreſenting comedies or tragedies in muſic, to which the firſt recitative was applied. (See RECITATIVE.) Others give this invention to a Roman gentleman of the name of Emilio del Cavaliere, who was more properly the inventor of the ſacred drama or oratorio, in a ſimilar ſpecies of muſic or recitative, ſo nearly at the ſame time, that it is difficult to determine which was firſt: both had their beginning in 1600. See CAVALIERE, and ORATORIO.

It is certain that Rinuccini was author of three lyric pieces, "Daphne," "Euridice," and "Ariadne," which all Italy applauded. Euridice, written for the nuptials of Mary of Medicis, was firſt performed with great ſplendour and magnificence at Florence, at the court and expence of the grand duke.

The poetry of Rinuccini is truly lyrical, ſmooth, poliſhed, and melliſluous. He died in 1621, at Florence; and his works were publiſhed in 1622, in the ſame city, in 4to. by his ſon, Pietro Franceſco Rinuccini. The family is noble, and was ſubſiſting in 1770.

RINVEEL POINT, in *Geography*, a cape of Ireland, in the county of Galway, N. of Ballinakiel bay. N. lat. 53° 41′. E. long. 9° 58′.

RINUM, a town of Perſia, in the province of Segeſtan or Seiſtan; 60 miles E.N.E. of Zareng.

RIO *de los Anzuelos*, a river of Mexico, which runs into the Spaniſh Main, N. lat. 11° 10′.—R. *dos Apoſtolos*, a river of North America, which runs into the northern part of the gulf of California.—R. *de Bogota*, a river of New Granada, which collects all the waters of the valley of Bogota, the bottom of which valley, according to Humboldt, is no leſs than 7460 feet above the level of the ſea, and finds its way through the mountains to the S.W. of the town of Santa Fé. (See BOGOTA.) The perfect level of the plain, its geological ſtructure, and the form of the rocks, which reſemble ſmall iſlands in the middle of the Savannahs, appeared to M. Humboldt to indicate the exiſtence of an ancient lake. If the ſingle outlet of the river were to be ſtopped, the valley would again be converted into a lake. The river, where it leaves the valley, is about 144 feet wide, half the breadth nearly of the Seine at Paris, between the Louvre and the Palace of the Arts. It then enters into a narrow rocky channel, not more than 40 feet wide, which appears, ſays the ſame intelligent and inſtructive traveller, to have been formed by an earthquake. After running for a little way in this crevice, the river precipitates itſelf, at two bounds, to the depth of 574 feet. After this tremendous fall, it purſues its way to the Magdalena, about 50 miles, ſtill deſcending with great rapidity, and at the rate of 150 feet to a mile. Although this is not the greateſt fall in the globe, there is not probably any which, from ſo great a height, precipitates ſo large a body of water. Bouguer makes the height between 1500 and 2000 feet; but he ſpeaks only from the information of others who had ſeen the fall, and pointed out to him ſuch heights as they thought might be nearly equal to it. The accompaniments of this waterfall, upon which the effect ſo much depends, are an aſſemblage of every thing that is ſublime, beautiful, and picturesque. Independent, ſays M. Humboldt, of the height and the ſize of the column of water, the figure of the landſcape, and the aſpect of the rocks; the peculiar character ſtamped on theſe great ſcenes of nature is owing to the luxuriant form of the trees and herbaceous plants, their diſtribution into groups, or into ſcattered thickets, the extent of the craggy precipice, and the freſhneſs of vegetation. Another feature in the character of this extraordinary cataract is probably quite peculiar to it:—the water deſcends from a cold region to a warm one. The plain of Bogota, eſpecially near the fall, is extremely fertile, and is ſuppoſed to owe ſome of its fruitfulneſs to the irrigation occaſioned by the great quantity of water from the fall, which is diſſolved in the air, and afterwards precipitated. The fine crops of wheat, the oak, the elm, and other plants, recall to mind the vegetation of Europe. Looking down from this terrace, one ſees, with ſurpriſe, at the bottom, a country producing the palm, the banana, and the ſugar-cane. This cannot ariſe from the difference of height; as it is known, that no very great change of temperature can be produced by a difference of level of 570 feet. M. Humboldt ſuggeſts, that it is probably owing to the ſhelter which

which the high country affords to the low. It is one of the circumftances that has added much to the marvellous height of the cataract; as the height is naturally fuppofed to be great, that carries one at once from the temperature of Europe, and one where the thermometer is fometimes at the freezing point, to that of the torrid zone. Although the river lofes a great part of its water in falling, which is reduced into vapour, the rapidity of the lower current forces the obferver to keep at the diftance of 150 yards from the bafin dug out by the fall. The folitude of the place, the richnefs of the vegetation, and the dreadful roar that ftrikes the ear, contribute to render the foot of the cataract of Tequendama one of the wildeft fcenes that can be found in the Cordilleras. (Humboldt's Refearches, &c. tranflated by Helm M'Williams, Lond. 1814.)—R. *Buenv*, a river of the ifland of Jamaica, which runs into the fea on the north coaft, N. lat. 18° 30′. W. long. 77° 19′.—R. *de Cedros*, a river of South America, which runs into the Pacific ocean, N. lat. 2° 30′.—R. *Cobre*, a river of Jamaica, which paffes by Spanifh Town, and runs into the fea, 4 miles N.W. of Kingfton.—R. *del Conches*, or *de Salinas*, a river of Mexico, which joins the Brava at its mouth.—R. *Dolce*, or *Freffhwater river*, a river of Brazil, which runs into the Atlantic, S. lat. 19° 20′.—R. *Dolce*, or *Dulce*, a river of South America, in the province of Tucuman, formed by the confluence of feveral rivers. After paffing by St. Yago del Eftero, &c. and purfuing a courfe of about 300 miles, it lofes itfelf in a falt lake, S. lat. 30° 40′.—R. *de los Doraces*, a river of Mexico, which runs into the Spanifh Main, N. lat. 9° 45′.—R. *dos Efmeraldas*, a river of America, on the ifthmus of Darien, which runs into the Pacific ocean, N. lat. 2° 42′.—R. *dos Efmeraldos*, a river of Peru, which runs into the Pacific ocean, N. lat. 0° 57′.—R. *Frifco*, a river of Africa, which runs from the Ivory coaft into the Atlantic, N. lat. 5° 8′. W. long. 5° 55′.—R. *dos Galinas*. See MAGUALBARI.—R. *Grande*, a river of South America, which runs into the Spanifh Main, between Carthagena and St. Martha.—Alfo, a river of the ifland of Jamaica, which runs into the fea, on the N. coaft, N. lat. 18° 15′. W. long. 76° 14′.—R. *Grande*, or *Civdad Nova*, a town of Brafil, in the jurifdiction of Fernambuco, formerly the feat of a jurifdiction. S. lat. 5° 44′.—R. *Grande*, a river of Brafil, fcarcely deferving the name, the mouth of which is fituated in S. lat. 3° 2′.—Alfo, a river of Africa, which paffes the coaft of Zanguebar, and runs into the Indian fea, forming the iflands of Patta and Lamo at its mouth. S. lat. 2° 5′. E. long. 41° 30′.—Alfo, a river of Africa, navigable for boats near 400 miles from the mouth, which lies on the Atlantic, N. lat. 11°. W. long. 14° 36′.—Alfo, a river of America, which rifes in the ifthmus of Darien, and runs into the Pacific ocean, three miles W. of Panama. See alfo VERMEJO, PATIXA, and HACHA.—R. *Hondo*, a river of Yucatan, which runs into the bay of Honduras.

RIO *de Janeiro*, a jurifdiction or independent government of Brafil, fo called by the Portuguefe when they became maffers of the country, from the river Janeiro, which runs through the middle of it; and the river probably derived its name from its having been difcovered on the day of the feaft of St. Januarius, or on the 1ft day of January, in 1516, by Solis. The province and the river are called by the natives "Genabara." At the mouth of the river, on the eaft fide, is the fort of Santa Cruz, and on the weft, that of St. Jago, together with the capital. The rivers in this government are few, and none of them large, except the Janeiro, which is rather a falt bay or gulf than a river, and two rivers that difcharge themfelves into this bay. At the mouth of it are feveral fmall iflands, that render its entrance fomewhat difficult and dangerous. Although the foil of this province is for the greateft part rich and fertile, the inhabitants manifeft little induftry either in the cultivation of the foil or the improvement of the country. It conifts chiefly, at leaft near the capital, in raifing garden vegetables for the whites, and rice and manioc for the blacks. Wheat is found to grow in other parts of the Brafils, with an increafe beyond what is known in Europe. A corn-mill, diftinguifhed by the fimplicity of its ftructure, attracted the notice of fir George Staunton; and he has thought it worthy of being defcribed. A wheel, a few feet only in diameter, was placed horizontally, much below the current of a ftream, as it fell from a fteep bank, and was received in hollows, 10 or 12 in number, fo obliquely fcolloped into the upper rim of the wheel, as to impel it to a quick rotatory motion, while its upright fhaft, paffing through an opening in the centre of an immoveable mill-ftone above the wheel, but of a narrower diameter, was fixed to a fmaller mill-ftone, which, forced round with the motion of the wheel and dependent fhaft, crufhed between it and the larger ftone beneath, the grain infinuated between them from a hopper. Thus that effect was produced by one wheel only, which is generally the refult of a much more expenfive and complicated machinery. A fimilar mill, it is faid, is in ufe in the Crimea. A foreft, not far from the capital, was found, by fir George and his affociates, to abound in palms and maftic wood; alfo mango and gouyava trees are found growing to the fize of trees, befides many other vegetables, never obferved before by thofe who were then travelling through it. The ipecacuanha plant is faid to grow at St. Catharine's within the government of Rio. The fize and vivid hue of many of the flowers throughout the foreft, and the gaudy plumage of the birds, which came occafionally in fight, were very ftriking. The woods, it is faid, abound in fnakes, fome of which are extremely large and formidable. But their hiffing noife puts thofe who hear it on their guard, and they feldom, without provocation, advance to an attack. The foreft now mentioned led to the cultivated valley of "Tijouca," fituated, as it were, in the bottom of a funnel, being furrounded on all fides by mountains, excepting to the fouthward, where a fmall opening admitted an arm of the fea. The valley was watered by a clear ftream, which, upon firft entering it, was precipitated down a fteep and broad rock of granite, forming a magnificent cafcade. Very little labour appeared neceffary in the plantations of Tijouca. Indigo, manioc, coffee, cacao, and chocolate-trees, fugar-canes, plantains, and orange and lime-trees, were commonly feen all growing promifcuoufly, and fome fpontaneoufly, in the fpace of 20 fquare yards. Coffee and indigo were the principal objects of attention. The temperature of the valley was exceffively hot, on account of its confined fituation, and the reflection of the fun's rays from the fides of the mountains, which in many places were very rocky. Fahrenheit's thermometer, about four in the afternoon, ftood, in the fhade, at 88°. Several diftricts of the government of Rio produced cotton, fugar, coffee, and cacao or chocolate, rice, pepper, and tobacco, in great abundance. That of Rio Grandé yielded plenty of excellent wheat. The vine grew in great perfection; but the grape is not fuffered to be preffed for wine, as fuch a procefs might interfere with the fale of the fame article from Portugal. But probably lefs caution may be exercifed in this refpect fince the removal of the Portuguefe government to the Brafils. Moft of the land, as far as Cook and his companions had an opportunity of obferving it, was laid down in grafs, upon which cattle were paftured in great plenty; but they were fo lean, that an Englifhman would fcarcely

ſcarcely eat their fleſh: the herbage of theſe paſtures conſiſts chiefly of creſſes, and conſequently is ſo ſhort, that though it may afford a bite for horſes and ſheep, it can hardly be grazed by horned cattle in a ſufficient quantity for keeping them alive. For other particulars relating to the climate, productions, commerce, and inhabitants of this province, ſee BRASIL, and the next article.

RIO *de Janeiro*, a city of Braſil, and capital of the above-mentioned government, and alſo of the whole country, and the Portugueſe dominions in America, ſituated on a river, or rather an arm of the ſea, of the ſame name. Formerly Bahia dos Todos, or Santos, was the principal ſeat of government, and chief mart for commerce in the Braſils; but the diſcovery and improvement of the gold and diamond mines, within about 100 leagues of Rio de Janeiro, and communicating immediately with it, gave a decided preponderancy to the latter. The city ſtands on a plain, cloſe to the ſhore, on the W. ſide of the bay, at the foot of ſeveral high mountains which riſe behind it. It is neither ill-deſigned nor ill-built; the houſes in general are of ſtone, and two ſtories high; every houſe having, after the manner of the Portugueſe, a little balcony before its windows, and a lattice of wood before the balcony. Its circuit was computed by lieutenant, afterwards captain, Cook, to be about three miles, and it appeared to be equal in ſize to the largeſt country towns of England, Briſtol and Liverpool not excepted; the ſtreets are ſtraight, and conveniently broad, interſecting each other at right angles; moſt of them, however, lie in a line with the citadel, called St. Sebaſtian, which ſtands on the top of a hill, that commands the town. The harbour is ſafe and capacious, and very convenient for commerce. Captain Mackintoſh, from experience, recommends to ſhips bound for this harbour, after getting in with cape Frio, inſtead of ſteering along ſhore, to ſhape their courſe between S.W. and S.W. by W. for 12 or 14 leagues. To this diſtance the land wind extends. The forenoons in general are calm, but almoſt every afternoon a freſh ſea-breeze ſets in from the S.W. It is proper to ſteer, in a direct courſe, from hence to the ſmall iſlands lying under the great inclining Sugar-loaf on the weſtern ſide of the entrance into Rio harbour. From theſe ſmall iſlands the wind will carry the ſhip to the oppoſite ſide of the harbour's mouth, where the fort of Santa Cruz is ſituated, and which may be approached within 50 yards, and from thence, ſafely and quickly, into harbour. The entrance of the harbour, as ſir Eraſmus Gower obſerves, will ſhew itſelf by diſcovering the caſtle or fort of Santa Cruz, and a ſmall fortified iſland, called Fort Lucia, nearly abreaſt of it. Between theſe is the channel into the harbour, near a mile wide; both ſhores are ſteep; that of Santa Cruz is perpendicular, there being ſix fathoms in the waſh of the ſea. The narrowneſs of the channel cauſes ſtrong tides; but as the ſea-breeze blows freſh, they do not impede entering into the harbour. In going in it is beſt to keep mid channel, or even nearer to Santa Cruz. About four miles outſide the harbour's mouth, the depth of water is 18 and 19 fathoms, which will decreaſe gradually to 8 or 7; and this, being the ſhalloweſt part, may be called the bar, which is about two miles outſide the fort. The water again deepens, on approaching to Santa Cruz, to 17 and 18 fathoms, nor will leſs be found in the fair way of the great road. Large ſhips may moor in ſhoaler water, but that depth, or thereabouts, is more adviſeable, as ſuch a ſituation affords the full advantage of the ſea-breeze, as well as that of avoiding the inſects, which are very troubleſome when nearer to the ſhore. In the inner harbour, formed by an iſland called "Ilheo dos Cobras," or Serpent iſland, are proper wharfs for heaving ſhips down by; but the mode of doing it alongſide hulks is now preferred. In the ſame harbour will ſhips anchor, which are loading or unloading goods, or want repairing; but the outer is the more healthy ſituation. Rio is ſituated in S. lat. 22° 54′, and W. long. 42° 44′. The variation of the compaſs is 4° 55′ W. of the pole. The tide flows 7½ hours, and riſes about 5½ feet perpendicular. Fahrenheit's thermometer, during ſir G. Staunton's ſtay, was between 77° and 82°.

The entrance into the harbour, from the ſea, is bounded, on one ſide, by the leaning cone already mentioned, meaſuring 700 feet in height, and by the huge maſs of granite, ſupporting the caſtle of Santa Cruz, on the other; and is interrupted, near the middle, by the little iſland on which Fort Lucia is erected. On entering into the harbour it was found to enlarge to a width of three or four miles, and to penetrate, in ſeveral branches, farther than the eye could reach. It is interrupted with many iſlands, ſome entirely green, and ſome covered with batteries or habitations. The ſhores of the harbour were diverſified and embelliſhed with villages, farms, and plantations, ſeparated by rivulets, ridges of the rocks, indentures of little ſandy bays, or the ſkirtings of a foreſt; the whole terminated, in diſtant proſpect, by an amphitheatre or ſcreen of mountains, riſing in a vaſt variety of rude and fantaſtic forms, but covered with trees to their very ſummits.

Within four miles of the harbour's mouth is ſituated, on the W., the city of St. Sebaſtian, uſually called Rio, built on a projecting tongue of land; but all the ground behind it is broken into hills and rocks, with woods, houſes, convents, and churches on their tops. A convent of Benedictines, and alſo a fort commanding the town, are ſituated upon the extreme point jetting into the harbour; oppoſite to this point is Serpent iſland, between which and the town is a narrow channel, ſufficiently deep, however, for the paſſage of the largeſt ſhips. Upon the iſland are, a dock-yard, magazines, and naval ſtore-houſes; and round its ſhores are the uſual anchoring places for the ſhipping which frequent this port. Beyond the town the harbour begins to widen conſiderably, and reſembles a large lake with many iſlands upon its ſurface. In the late improved ſtate of the town, the ſtreets are paved, with the addition of foot-paths, and though ſome of them are narrow, they are convenient in a hot climate by the ſhade which they afford. In the ſquares are refreſhing fountains, which ſupply the water conveyed to them by an aqueduct of conſiderable length; a circumſtance of moment, as Rio has no river cloſe to it of any note. This aqueduct is carried over vallies by a double row of arches, one placed above another; and thus preſents a ſtructure that adds great ornament to the town. A guard conſtantly attends at the fountains throughout Rio, to regulate the diſtribution of the water, which is, probably, ſcanty, as there are people who wait a long time with buckets for their ſhare. A ſufficient proportion of the water from the fountain upon the quay oppoſite to the palace, is allotted for the uſe of the ſhipping, and is conveyed to the caſks, remaining in the boat, by means of a woollen or canvas tube, called a hoſe, ſtretching from the fountain to the caſk. Capt. Cook complained that the water was not good; but this circumſtance ſir Eraſmus Gower aſcribes to ſome accidental impurities that muſt have remained in the caſks which he filled with it.

The ſhops of Rio, ſays Staunton, were full of Mancheſter manufactures, and other Britiſh goods, even to Engliſh prints, both ſerious and caricature. A Portugueſe merchant adverting to theſe ſupplies of goods, and the advantages gained by the country that furniſhed them, obſerved that the proſperity both of Portugal and its dependencies redounded

redounded chiefly to the benefit of England. The benefit has probably been reciprocal; and, it is hoped, will thus continue. The exterior appearance of the inhabitants indicated eafe and comfort; their dwellings were generally in good condition, many of them large, and well adapted to the climate; the magazines and markets well ftored with merchandize; new buildings, private and public, erected; tradefmen bufily employed; and befides the aqueduct and fountains, which adorned the city, it had fome public walks, and a fpacious quay of granite, of which material, found upon the fpot, many of the chief edifices were conftructed. The place, however, is faid to be unhealthy; and inftances of longevity are rare. This infalubrity may be owing, perhaps, to local and temporary circumftances, more than to the neceffary influence of the climate. The fituation of the town upon a plain, almoft wholly furrounded by hills thickly covered with foreft trees, deprives it of a free circulation of air, and expofes it to the morning and evening damps of humid nights, preceded by fcorching days, and of courfe putrid and intermitting fevers muft often be the confequence. Water is alfo fuffered to ftagnate in marfhes near the town; and to thefe difadvantages we may add the tormenting influence of infinite fwarms of mufquitoes, or large gnats, which attack ftrangers for fome time after their arrival. But none of thefe real, or any imaginary, evils reftrain the propenfity of all claffes of fociety towards gaiety and pleafures. See Brasil.

The inhabitants of Rio are very numerous, and confift of Portuguefe, Negroes, and Indians, the original natives of the country. This townfhip, which is but a fmall part of the capitanea, or province, is faid, according to Cook, to contain 37,000 white perfons, and 629,000 blacks, many of whom are free, amounting together to 666,000, in the proportion of 17 to 1. The Indians, who are employed to do the king's work in this neigbourhood, can fcarcely be confidered as inhabitants; their refidence is at a diftance, from whence they come by turns to their tafk, which they are obliged to perform for a fmall pay. The guard-boat was conftantly rowed by thefe people, who are of a light copper colour, and have long black hair. See Brasil.

When walking abroad, men of the lower claffes generally wear cloaks; and thofe of the middling and higher ranks never appear without fwords. The ladies wear their hair hanging down in treffes, tied with ribbands, and adorned with flowers; their heads being uncovered. In their vifits to the churches, both at matins and vefpers, they are regular; at other times they are generally feated at their windows or balconies. Many of them have fine dark eyes, with animated countenances. In the evenings they amufe themfelves by playing on fome kind of mufical inftrument, chiefly the harpfichord or guitar. At this time the doors and windows are thrown open for the admiffion of cool air. If a ftranger fhould happen to ftop to hear the mufic, it often happens that the father, hufband, or brother of the lady that is playing, fteps out and politely invites him into the houfe; and the ladies, not unfrequently, having bunches of flowers in their hands, exchange them with gentlemen as they pafs by. This practice may perhaps be an imitation of that of the ladies of Lifbon, who on particular days, called "days of intrufion," throw nofegays from their balconies upon perfons walking under them. Captain Cook charges the fame indelicate want of referve on the ladies of Rio; but we truft the accufation which fome perfons have brought againft them, that there is not one modeft woman among them, is not only too general, but founded on a mifrepreftentation of what they may conceive to be an allowable practice, founded in cuftom and courtefy. Some of the men, however, have been accufed of much worfe practices, in yielding to depraved and unnatural appetites.

Among the more innocent pleafures of both fexes are operas, plays, and mafquerades. Company often affemble at a garden, fituated near the fea, at one extremity of the town, and laid out in grafs plats, fhrubberies, and parterres, ornamented in various ways. In thefe receffes the gay fociety of Rio, after taking the exercife of walking in the evening, and after hearing fongs and mufic, fit down to partake of banquets, occafionally accompanied by mufic and fire-works. On the fide of this garden next the fea is a terrace, and at the extremities of the terrace there are two neat fquare buildings, like Englifh fummer-houfes. In one the walls are decorated with paintings, reprefenting views of the harbour, and particularly of the whale-fifhery, which was formerly carried on in it; until the large black whale, which formerly frequented it, was difturbed and driven away, in confequence of the increafed concourfe of fhipping. The cieling of this and the other fummer-houfe are covered with various appropriate devices, in fhell or feather work; and the walls of the latter are decorated with eight large paintings, defcriptive of the principal productions to which the country is indebted for its opulence, including views of the diamond and gold mines, with the operations performed in them; of the cultivation of the fugar-cane, and the proceffes by which its juice is extracted and granulated into fugar; of the manner of collecting the fmall animals which produce the cochineal, and preparing the rich dye from them; of the culture of the manioc, with the procefs of making caffada and tapioca; and of the culture and preparation of coffee, rice, and indigo. Near the town is another garden, originally intended for promoting the progrefs of botany, but now chiefly curious for a fmall manufacture of cochineal; but the garden at Rio does not produce annually above 30 pounds of this commodity. The preparation of cochineal, however, is now encouraged by the trade being laid open, which was formerly a monopoly to the crown. Another fpecies of manufacture is carried on in the vicinity of Rio; an exclufive privilege having been given to a company, upon paying one-fifth of its profits to the crown. To this harbour was brought, for the purpofe of converting it into oil, the blubber or firm fat of the black whales. The whalebone or cartilages of the jaw were alfo properly feparated and cleanfed here, before they were fent to Europe. In another part of the harbour of Rio, called Val Lengo, are warehoufes for the reception and fale of flaves. See Brasil.

The eftablifhment for the defence of Rio confifts of two fquadrons of cavalry, two regiments of artillery, fix regiments of infantry, two battalions of difciplined militia, befide above 200 difciplined free Negroes; making, in the whole, a body of at leaft 10,000 men, exclufively of a very numerous regiftered but undifciplined militia, of whom a confiderable proportion is in the city and its neighbourhood. The entrance of the harbour, which is fcarcely a mile from point to point, is croffed in every direction by heavy batteries. The fort of Santa Cruz is a work of fome ftrength, and the principal defence of the harbour. But the defence of the city of Rio is fuppofed to depend chiefly on the works erected on the Serpent ifland, which is about 300 yards long: it mounts 46 guns, 20 facing the fouth and fouth-eaft, and the remainder looking to the oppofite points. The parapet, along the front of the town, recently conftructed, will afford a good line for mufquetry and light guns.

The high conical rocks at the entrance of the harbour of Rio, and the furrounding hills, are all of granite, in which the

the only remarkable circumſtance is the large proportion of feld-ſpath contained in it. About two miles within the harbour, on the ſouth-weſt ſide, is one high rock, entirely compoſed of columnar maſſes, bearing the reſemblance of baſaltes: it reſts upon clay. In all the quarries of granite it is found incumbent upon clay and ſand. Here are three ſpecies of granite: the firſt, red-coloured, ſoft, and ſhining; the ſecond, deep blue coloured, harder, and of a cloſer texture; and the third of a whitiſh ſhining colour, containing much mica, and little feld-ſpath; its texture ſoft, and incapable of a good poliſh.

The government of Rio is, as to its form, mixed; and yet, in fact, very deſpotic. It conſiſts (we are now ſpeaking of its ſtate before the removal of the Portugueſe government thither) of the viceroy, the governor of the town, and a council. To reſtrain the people from travelling into the country, and penetrating into any diſtrict where gold or diamonds may be found, certain bounds are preſcribed to them, at the diſcretion of the viceroy, ſometimes at a few, and ſometimes at many, miles diſtance from the city. On the verge of theſe limits a guard conſtantly patroles, and any perſon that goes beyond it is ſeized and thrown into priſon.

The riches of this place conſiſt chiefly in the mines, that lie at a conſiderable diſtance in the country, from which much gold is brought, at the expence of many lives. Precious ſtones are alſo found here in ſuch plenty, that a certain quantity only is allowed to be collected in a year: they are diamonds, topazes of ſeveral kinds, and amethyſts. The mines called "general" are the neareſt to the city, at the diſtance, according to the ſtatement of M. Bougainville, in his account of his voyage round the world, of about 75 leagues. They yield to the king every year, for his right of fifths, at leaſt 112 arrobas of gold: in 1762 they yielded 119. Under the captaincy, the Minaes *Geraes* (which ſee) are comprehended thoſe of Rio de Morte, of Sabara, and of Serro-frio. The laſt, beſides gold, produces all the diamonds that come from Braſil. They are found at the bottom of a river, of which they turn the courſe, in order to ſeparate from the pebbles in its bed the diamonds, topazes, chryſolites, and other ſtones of inferior quality. Of all theſe ſtones, the diamonds alone are contraband: they belong to the undertakers, who are obliged to give an exact account of the diamonds found, and to place them in the hands of the intendant appointed by the king for this purpoſe, who depoſits them immediately in a caſket encircled with iron, and ſhut with three locks. He has one of the keys, the viceroy another, and the aſſayer of the royal treaſury the third. This caſket is encloſed in a ſecond, ſealed by the three perſons above-mentioned, and which contains the three keys of the firſt. The viceroy has not the power of viſiting its contents: he only conſigns the whole to a third ſtrong coffer, which he ſends to Liſbon, after having ſet his ſeal on the lock. They are opened in the preſence of the king, who chooſes what diamonds he pleaſes, and pays the price to the undertakers at the rate fixed by their agreement. The undertakers pay to his moſt faithful majeſty the value of a piaſtre Spaniſh money, for every ſlave employed in ſearching for diamonds; and the number of theſe ſlaves may amount to 800. Of all kinds of contraband trade, that of diamonds is the moſt ſeverely puniſhed.

The gold drawn from the mines cannot be carried to Rio de Janeiro, without being firſt brought to the ſmelting houſes eſtabliſhed in each diſtrict, where the right of the crown is received. What reſults to private perſons is remitted in bars, with their weight, number, and the royal arms. Thoſe bars belonging to individuals are regiſtered in the factory of La Prayburia, 30 leagues from Rio de Janeiro. In this ſtation are a captain, lieutenant, and 50 men; here is paid the right of fifths; and, beſides, a toll of a real and a half *per* head on men, cattle, and beaſts of burthen. Half of the product of this duty belongs to the king, and the other half is divided between the detachment according to rank. As it is impoſſible to return from the mines without paſſing by this office, all perſons are there ſtopped, and ſearched with the greateſt ſeverity. Individuals are afterwards obliged to carry all the gold in bars, which belongs to them, to the mint of Rio de Janeiro, where the value is given in coin, commonly in half doubloons, each worth eight Spaniſh dollars. Upon each of theſe half doubloons the king gains a dollar, by the alloy and the right of coinage. The mint of Rio Janeiro is one of the moſt beautiful which exiſt; it is furniſhed with every convenience to work with the greateſt celerity. As the gold arrives from the mines at the ſame time that the fleets arrive from Portugal, it is neceſſary to accelerate the work of the mint, and the coinage proceeds with ſurpriſing quickneſs. The arrival of theſe fleets renders the commerce of Rio Janeiro very flouriſhing, but chiefly that of the Liſbon fleet. The mines of St. Paolo and Parnaqua yield to the king four arrobas for the fifths every year. The moſt diſtant mines, as thoſe of Pracaton and Quiaba (Cuyaba), depend on the captaincy of Matogroſo. The fifth of the above mines is not received at Rio Janeiro, but that of the mines of Goyas is deducted. This captaincy alſo poſſeſſes diamond mines, the working of which is prohibited.

The whole of the expence of the king of Portugal at Rio Janeiro, for the payment of the troops and civil officers, and for the charges of the mines, the maintenance of the public buildings, the careening of veſſels, amounts to about 600,000 dollars. The expences of building ſhips of the line and frigates there ſtationed are not included.

Recapitulation, and Amount of the Average of different Objects of royal Revenue.

	Dollars.
150 arrobas of gold, the average produced by the royal fifths, are in Spaniſh money -	1,125,000
The duty on diamonds - - -	240,000
The duty on coinage - - -	400,000
Ten *per cent.* from the cuſtom-houſe - -	350,000
Two and a half *per cent.* of free gift -	87,000
Right of toll, ſale of employments, officers, and generally all the profits of the mines -	225,000
Duty on ſlaves - - - -	110,000
Duty on fiſh-oil, ſalt, ſoap, and the tenth on the proviſions of the country - -	130,000
Total	2,667,000

From which, deducting the above expences, it will appear that the king of Portugal draws from Rio Janeiro a revenue exceeding 10,000,000 of French livres, or 416,666*l.*

The coin that is current here, is either that of Portugal, conſiſting chiefly of 36*s.* pieces, or pieces both of gold and ſilver, which are ſtruck at this place: the pieces of ſilver, which are very much debaſed, are called patacks, and are of different value, being eaſily diſtinguiſhed by the number of rees marked on the outſide. Here is alſo a copper coin, like that in Portugal, of five and ten ree pieces. See Ree.

Upon the whole, Rio de Janeiro is a very good place for ſhips to put in at that want refreſhment: the harbour is ſafe and commodious; and proviſions, except wheaten bread and flour, may be eaſily procured: as a ſuccedaneum for bread, here

here are yams and caſſada in plenty: beef, both freſh and jerked, may be bought, ſays Cook in 1768, at about 2¼*d.* a pound, but it is very lean. The people here jerk their beef by taking out the bones, cutting it into large but thin ſlices, then curing it with ſalt, and drying it in the ſhade: it eats very well, and if kept dry, will remain good a long time at ſea. Mutton is ſcarcely to be procured, and hogs, and poultry, are dear. Of garden-ſtuff and fruit there is abundance; but none can be kept at ſea except the pumpkin: rum, ſugar, and molaſſes, all excellent in their kind, may be had at a reaſonable price; tobacco is alſo cheap, but not good. Cook's Voyages by Hawkeſworth, vol. ii. Staunton's Embaſſy, vol. i.

Rio *Infanta.* See *Great* Fish *river.*

Rio *de Limones*, a river of the iſland of Cuba, which runs into the Spaniſh Main, N. lat. 20° 21′. W. long. 78°.—R. *Mino*, a river of Jamaica, which runs into the ſea, on the W. ſide of Carliſle bay.

Rio *das Mortes*, a town of Braſil, in the juriſdiction of Minaes Geraes, ſituated on a river of the ſame name, which runs into the Parana.

Rio *Negro*, a conſiderable river of South America, which runs from the river Oronoko, in the kingdom of Granada, and enters the river of the Amazons, near Fort Rio Negro. S. lat. 3° 15′. W. long. 61° 31′.—R. *Nuevo Bay*, a bay on the N. coaſt of Jamaica. N. lat. 18° 26′. W. long. 76° 46′.—R. *de Oro*, a river of the iſland of Chiloe, which runs into the Pacific ocean, S. lat. 42° 45′.—R. *de Ouro*, a river of Africa, which runs into the Atlantic, N. lat. 23° 52′. W. long. 16°.—R. *de las Palmas.* See Palmas.—R. *das Palmas.* See Scherbro.—R. *de la Plata.* See Plata.—R. *des Patos*, a river of Braſil, which runs into the Atlantic, S. lat. 28° 30′.—R. *des Pedras*, a river of Africa, which runs into the Atlantic, N. lat. 9° 10′.—R. *de Pinos*, a river of the Iſthmus of Darien, which runs into the Spaniſh Main, N. lat. 9° 12′. W. long. 80° 25′.—R. *de Puercos*, a harbour on the N. coaſt of Cuba, S.W. of Bahia Honda.—R. *de los Rabados*, a river of Chili, which runs into the Pacific ocean, S. lat. 45° 10′.—R. *dos Ramos*, a river of Africa, which runs into the Atlantic, S. lat. 14° 37′.—R. *Real*, a river of Braſil, which divides the captainſhip of Sergippe from that of All-Saints. This river, if it were not for the bar at the entrance, on which there is but ten feet of water, would be an inlet to the moſt fertile and pleaſant part of the Braſils. Over the bar there is room enough, and depth of water ſufficient, for the whole navy of England to ride in ſafety. About four leagues above the mouth, this river divides itſelf into four large branches, one running N.N.W. called Rio Fundo, another N.W. navigable for any veſſel that can get near the bar, as far as the towns of St. Lucia and St. Euſtatia, from the latter of which it takes its name, a third, called Rio de Pao Grand, or Great Timber river, which runs W.N.W. The main branch, which runs W.S.W. is alſo navigable as far as the town of Bahia, about 20 leagues from its mouth. On the banks of theſe branches there are many fine plantations, and ſmall villages, which ſend great quantities of ſugar, tobacco, and mandioc to Bahia or Fernambuco, as the wind permits. This river runs into the ſea through four channels, formed by three ſmall ſandy iſlands, lying in the mouth of it. About 12 leagues to the S. of Rio Real is a ſmall harbour, called Torre Garcia de Avilla, defended by four pieces of cannon; the town lies about a mile above the port, on the higheſt land on this coaſt; and it is the beſt for a ſhip to make, that is bound to Bahia, while the N.E. wind blows.—R. *del Rey*, or *River Real*, a river of Africa, which runs into the Atlantic, N. lat. 4° 30′. E. long. 8° 5′. This river may be diſtinguiſhed by the extreme high lands of Amboyes, between it and the river Camarones, ſituated S.E. from the mouth. It appears like a deep large bay running N., 21 or 24 miles wide at the entrance, where the ground is oozy; the channel being exactly in the middle, free from ſhoals and ſands, except near the E. ſide, which is foul; the ſhore on both ſides is low and marſhy. The river which comes far from the N., is wide for a long interval into the country, and receives ſeveral conſiderable rivers in its courſe: the adjacent lands are populous and full of villages. The principal trade conſiſts in ſlaves and large elephants' teeth, and akkori or blue coral. The inhabitants are called *Calbongas* (which ſee).—R. *dos Reyes Magos*, a river of Braſil, which runs into the Atlantic, S. lat. 19° 20′.—R. *St. Balardo*, a river of New Albion, which runs into the Pacific ocean, N. lat. 34° 44′.—R. *St. Andre*, a river of Chili, which runs into the Pacific ocean, S. lat. 35° 40′.—R. *St. Maria*, a river of Chili, which runs into the Pacific ocean, S. lat. 51° 36′.—R. *de Sal*, a river of Mexico, which riſes in the province of Culiacan, on the borders of New Biſcay, and runs into the Pacific ocean, N. lat. 23° 40′.—R. *Salado*, a river of South America, in the province of Tucuman, which riſes about 60 miles W. of Salta, and firſt bears the name of "Rio del Paſſage," but being joined by ſeveral ſmaller ſtreams, it changes its name to Salado, and runs into the Parana at Santa Fé, in the province of Buenos Ayres; its whole courſe being about 500 miles.—R. *Salado*, or R. *des Apaches*, a river of North America, one of the branches of the river Bravo, which joins the main ſtream, about N. lat. 30° 40′. W. long. 86°.—R. *Salado*, a river of South America, which in the latter part of its courſe, divides Chili from Peru, and runs into the Pacific ocean, S. lat. 26° 15′.—R. *de los Sauces*, a river of South America, which riſes in Patagonia, and runs into the Atlantic by two ſtreams, forming between them a conſiderable iſland and the ſouthern mouth of the bay of Anegada, S. lat. 39° 45′.

Rio *Seco*, a town of Portugal, in the province of Beira, on the borders of Spain; 7 miles S.S.E. of Almeida.—R. *Seco*, a river of Peru, which runs into the Pacific ocean, S. lat. 7° 6′.

Rio *Secundo*, a town of South America, in the province of Cordova, on the river Secundo; 30 miles S. of Cordova.—R. *Selbola.* See Scherbro.—R. *Sin Fondo*, a river of Chili, which runs into the Pacific ocean, S. lat. 43° 50′.—R. *del Spiritu Santo.* See Manica.—R. *das Trombetas*, a river of Braſil, which runs into the river of the Amazons at Pauxi.—R. *de Vacas*, a river of Mexico, which runs into the Pacific ocean, N. lat. 14°.—R. *Verde*, a river of Peru, which runs into the Pacific ocean, N. lat. 1°.

Rio *Verde*, a town of Mexico, in the province of Guaſteca; 90 miles N.W. of St. Yago de los Valles.

RIOBAMBA, a juriſdiction of South America, in the viceroyalty of New Granada and audience of Quito; ſituated to the ſouth of the aſſiento of Latacunga. This juriſdiction is divided into two departments; the corregidor, who reſides at Riobamba, appointing a deputy, who lives at the aſſiento of Hambato, ſituated between the capital and Latacunga. The firſt department contains 18 principal villages. The productions and manufactures of the province of Riobamba excel all the reſt of the provinces of Peru. In various parts it has rich mines of gold and ſilver. The juriſdictions of Riobamba, Alauſi, and Cuença, by means of the warehouſes at Yaguache and Noranjel, carry on a conſiderable trade with Guayaquil. This trade, in the manufactures of the country, which conſiſt only of three ſorts, cloth,

cloth, bags, and linen, is attended with considerable profit to the dealers, and advantage to the country, as all the poor people, who are remarkably numerous, and persons of substance, except those of the capital, wear the goods manufactured in the country. Part of the wheat produced in the jurisdiction of Riobamba and Chimbo is sent to Guayaquil. This jurisdiction is (by mistake) described under *Hambato* (which see). We shall here subjoin an account of Hambato. This assiento stands in a wide plain at the bottom of a mountain, N. of Riobamba. On its N. side runs a large river, which has a bridge; the river having never been fordable on account of its depth and extreme rapidity. It is finely situated, and in extent of populousness nearly equal to Latacunga; the number of its inhabitants amounting to eight or nine thousand. The houses are built of unburnt bricks, well planned, and make a good appearance. They are of low elevation, for the purpose of avoiding the destructive effects of earthquakes. Here are a parish church, two chapels of ease, and a convent of Franciscans. The earthquake which made such terrible havock in the assiento of Latacunga proved also fatal to this, the horrors of which were augmented by the terrible eruptions from mount Carguariso, in consequence of which a muddy torrent, formed of ashes, cinders, and snow melted by the flames of the aperture, precipitated down the sides of the mountain, overflowing the fields, sweeping away the cattle, and every thing else in the way by its violence. The inhabitants, in their manners and customs, resemble those of Quero; but it has fewer families of distinction than Riobamba. The bread made at this assiento is famous all over the province, and accordingly it is sent to Quito and other parts, without being deteriorated by length of time. It has six villages. The Indian inhabitants of the village of Quero make all sorts of cabinet work; that of Petate is equally famous for abundance of sugar-canes and the excellent quality of its sugar; and that of Santa Rosa de Pilaguin, which, with its fields, lies on the side of Carguariso, is famous for the goodness of its barley, as the district bordering on the assiento is for its exquisite fruits; and to this district Quito owes most of the European kinds sold in that city. See Quito and Granada.

Riobamba, the capital of the jurisdiction above-mentioned, and described under Hambato. This elegant town, by the devastation occasioned by the terrible earthquake on the 4th of February 1797, became a heap of ruins, and soon totally disappeared; for the peak of Sicalpa falling on the town, and stopping the two rivers which pass by it, formed a lake, so that even the ruins were not visible. Of 9000 inhabitants, only about 400 escaped. Although Quito sustained little damage, Latacunga, and all the hamlets in its corregiamento, were utterly destroyed. Many persons perished, and the survivors were infected by the putridity of the dead bodies. Near Hambato many mountains split, and by their sudden fall occasioned still more awful destruction among the human race. Quero, mentioned in the preceding article, with all its people were buried, in an instant, under a cliff which fell on the town. Pelileo was overwhelmed by a stream of water and mud; the circumjacent lands were all transposed; and a deadly silence indicated the general ruin. Alausi and Guaranda also suffered greatly. The fate of Cuença, Loja, Jaen, and Guayaquil, was, at that time, unknown; but the shocks do not seem to have extended so far. The cause of this desolation seems to have proceeded from the volcano Tangarunga or Tangurugua, between Latacunga and Riobamba; as the tremendous subterraneous thunders all proceeded from that quarter, and the greatest ruin was in its vicinity; towards the N. the earthquake was faintly perceived at Pasto. Riobamba is distant 90 miles S. from Quito. S. lat. 1° 20′. W. long. 78° 30′. See Quito.

RIOCHICO, a town of New Mexico, in the province of Hiaqui, on the river Hiaqui; 800 miles N.W. of Mexico. N. lat. 29° 4′. W. long. 111° 36′.

RIOFRIO, a town of Spain, in Old Castile; seven miles S. of Segovia.

RIOJA, a town of South America, in the province of Tucuman; 240 miles W.S.W. of St. Yago del Esteros. N. lat. 29° 15′. W. long. 70°.

RIOLAN, John, in *Biography*, an able French physician, was born at Amiens. He was greatly distinguished by his attainments both in literature and science, and is said not only to have written and spoken the learned languages with facility, but to have been thoroughly intimate with the contents of almost all the writings of the ancients. He gave lessons in natural philosophy at the college of Boncour, at Paris, where he took his degree in the year 1574. Little is recorded respecting his life, but that he was elected dean of the faculty in 1586, and continued in that office in the following year. He died on the 18th of October 1606. He was one of the greatest ornaments of the profession at Paris in his time; and was a strenuous advocate for the doctrine of Hippocrates and the ancients, whom he defended with great ardour against the chemists. His works are indicative of genius; they were collected and published, together with some posthumous tracts, at Paris, in 1610, under the title of "Opera Omnia." Separately, we find the following; "De Primis Principiis Rerum Naturalium, Libri tres," Paris, 1571. "Ad Impudentiam quorundam Chirurgorum, qui Medicis æquare et Chirurgiam publicè profiteri volunt; pro veteri dignitate Medicinæ Apologia philosophica," ib. 1577. This was a sort of declaration of war against the surgeons, whom he attacked for attempting to teach without any knowledge of literature; it was followed by several pieces on both sides. "Commentarii in sex posteriores Physiologiæ Fernelii Libros," 1577. "Ars bene Medendi," Lugd. 1589. "Ad Libros Fernelii de abditis rerum causis Commentarii," Par. 1598. "Universæ Medicinæ Compendium," 1598. "Ad Libavii Maniam Responsio, pro Censura Scholæ Parisiensis contra Alchymiam latâ," 1600. "Chirurgia," Lipf. 1601. "Prælectiones in Libros Physiologicos et de abditis rerum causis. Accesserunt Opuscula quædam Philosophica," 1602. "De Febribus," 1640.

Riolan, John, the son of the preceding, was born at Paris in the year 1577. His father did not fail to afford every encouragement and opportunity for the cultivation of his rising talents, and his mind was naturally turned to the study of medicine by the reputation, zeal, and love of the profession, which the former possessed; his early studies were also greatly facilitated, and many difficulties removed, by the domestic instruction which he thus received. His progress accordingly was uncommonly rapid; and a very few years after he had received his degree in 1604, he came forward as an author in a way that laid the foundation of his subsequent reputation. In 1613 he was appointed royal professor of anatomy and botany by Louis XIII.; and in this latter capacity he petitioned the king for the establishment of a botanic garden in the university of Paris. He subsequently held the appointment of physician to queen Mary de Medicis, and accompanied that princess in her travels; he arrived at Cologne, after her death, in July 1642, and returned to Paris, where he resumed the practice of

of his profeſſion. After having twice undergone the operation of lithotomy, he lived to the age of eighty years, and died at Paris in February 1657.

Riolan was devoted to the ſtudy of anatomy, and was one of the moſt expert and learned anatomiſts of his time; his learning, indeed, was rather an obſtacle in the way of his progreſs as a diſcoverer, or perhaps we ſhould ſay his devotion to the ancients; for, in many caſes, he ſeemed to ſee only through their eyes. Yet he was arrogant in his claims to originality, and by his pertinacity and ſarcaſtic contempt of others, he raiſed himſelf many opponents and enemies. He publiſhed ſeveral original obſervations, however, reſpecting many parts of anatomical ſcience, eſpecially reſpecting the ſtructure of the colon, the biliary ducts, the uterus and vagina, the tongue, os hyoides, &c. None of his anatomical works contain any engravings; as he maintained that no repreſentations could ſuperſede the ſtudy of nature. All his ſtudies, however, were not confined to anatomy, as the following liſt of his works will evince. "Brevis excurſus in Battologiam Quercetani, quo Alchemiæ principia funditus diruuntur, et Artis veritas demonſtratur," Par. 1604. "Comparatio veteris Medicinæ cum nova, Hippocraticæ in Hermetica, Dogmaticæ cum Spagyrica," 1605. "Diſputatio de Monſtro Lutetiæ 1605 nato." "Incurſionum Quercetani depulſio," id. "Cenſura demonſtrationis Harveti pro veritate Alchymiæ," 1606. "Schola Anatomica novis et raris obſervationibus illuſtrata. Adjuncta eſt accurata fœtus humani hiſtoria," 1607; enlarged by the author with the title of "Anatome corporis humani," 1610. "In Librum Cl. Galeni de Oſſibus, ad Tyrones explanationes apologetica pro Galeno, adverſus novitios et novatores Anatomicos," 1613. "Gigantomachie," 1613, written in refutation of Habicot's account of the diſcovery of the bones of the giant Teutobochus. Riolan publiſhed two other tracts, or more, upon this controverſy, which ended with the appearance of his "Gigantologie; diſcours ſur la grandeur des Géants, &c." in 1618. "Oſteologia ex veterum et recentiorum præceptis deſcripta," 1614. "Diſcours ſur les Hermaphrodits, où il eſt démontré, contre l'opinion commune, qu'il n'y a point de vrais Hermaphrodits," 1614. "Anatomica, ſeu Anthropographia," 1618. "Enchiridium anatomicum et pathologicum," 1648, and many times reprinted; the beſt edition is of Paris, 1658. "Opuſcula anatomica nova," Lond. 1649, containing remarks on the anatomical works of the moſt celebrated phyſicians, and an attack upon Harvey, and his doctrine of the circulation, of which Riolan was a great antagoniſt. "Curieuſes Récherches ſur les écoles de Médécine de Paris et de Montpelier," 1651. He alſo publiſhed three different works, entitled "Opuſcula anatomica," in 1650, and the three following years, oppoſing the doctrines of Bartholine and Pecquet, reſpecting the abſorbents and lacteals, and Harvey's on the circulation; and two more on the ſame ſubjects, with the titles of "Reſponſio prima, et altera," 1652 and 1655. Eloy Dict. Hiſt. de la Med.

RIOLI, in *Geography*, a town of Naples, in Capitanata; 11 miles S. of Manfredonia.

RIOLO, a town of Italy, in the department of the Amone; nine miles W. of Faenza.

RIOM, a town of France, in the department of the Cantal, and chief place of a canton, in the diſtrict of Mauriac; 15 miles E.N.E. of Mauriac. The place contains 714, and the canton 7498 inhabitants, on a territory of 210 kiliometres, in 12 communes.

Riom, a town of France, and principal place of a diſtrict, in the department of the Puy-de-Dôme; eight miles N. of Clermont-Ferrand. The place contains 13,328 inhabitants in both its E. and W. diviſions; the canton of the former includes 12,433, and the latter 12,441 inhabitants; the territory of the former being 70, and that of the latter 24½ kiliometres, the former having ſeven, and the latter five, communes. N. lat. 45° 43′. E. long. 3° 11′.

RIONDO, in *Ichthyology*, a name uſed by ſome for the fiſh more commonly called *aper*, a ſmall fiſh, of the ſhape of the faber or doree, caught in the Mediterranean.

RIONE, or Rioni, in *Geography*, a river of Aſia, anciently called "Phaſis," which riſes in the principality of Georgia, and forming the ſouthern boundary of Mingrelia, runs into the Black ſea, N. lat. 42° 15′. E. long. 41° 25′.

RIONS, a town of France, in the department of the Gironde; three miles N.W. of Cadillac.

RIOPA, a town of Spain, in New Caſtile; 13 miles S. of Alcaraz.

RIOS, a town of France, in the department of the Upper Saone, and chief place of a canton, in the diſtrict of Veſoul. The place contains 578, and the canton 9028 inhabitants, on a territory of 230 kiliometres, in 34 communes.

Rios, a town of Chili; 90 miles N.N.E. of Valparayſo.

RIOSECO, a town of Spain, in the province of Leon; 96 miles N.N.W. of Madrid. N. lat. 41° 52′. W. long. 5° 7′.

RIOT, in *Law*, the forcible doing of an unlawful thing, of a private nature, by three or more perſons aſſembled together for that purpoſe; either with or without a common cauſe or quarrel (3 Inſt. 176.): as if they beat a man; or hunt and kill game in another's park, chaſe, warren, or liberty; or do any other unlawful act with force and violence; or even do a lawful act, as removing a nuiſance, in a violent and tumultuous manner.

The word is formed from the Latin *riota*, of *arietare*, to run at each other as rams do. Though, from an ancient Gauliſh verſion of the bible, quoted by Skinner, *riot* ſhould rather ſeem originally to ſignify luxury and exceſs; whence our law *riot* might proceed; becauſe theſe are frequently attended with quarrels.

For the difference between a riot, rout, and unlawful aſſembly, ſee Rout, and Unlawful *Aſſembly*.

The puniſhment of riots and routs, where a number of perſons from three to eleven are concerned, is, by the common law, fine and impriſonment only; to which, in very enormous caſes, the pillory has been ſometimes ſuperadded. (1 Hawk. P.C. 159.) And by the ſtat. 13 Hen. IV. c. 7. any two juſtices, together with the ſheriff or under-ſheriff of the county, may come with the poſſe comitatus, if need be, and ſuppreſs any ſuch riot, aſſembly, or rout, arreſt the rioters, and record upon the ſpot the nature and circumſtances of the whole tranſaction; which record alone ſhall be a ſufficient conviction of the offenders; and it is held that any battery, wounding, or killing the rioters, that may happen in ſuppreſſing the riot, is juſtifiable. The riotous aſſembling of twelve perſons or more, and not diſperſing upon proclamation, was firſt made high treaſon by ſtat. 3 & 4 Edward VI. c. 5. but repealed by ſtat. 1 Mary, c. 1. Nevertheleſs, the offence was made a ſingle felony by 1 Mar. ſtat. 2. c. 12. and by 1 Eliz. c. 16. with whom the law expired. However, it was revived, in order to ſupport the execution of the act of ſettlement, and made perpetual by 1 Geo. I. c. 5. which enacts, that if any twelve perſons are unlawfully aſſembled to the diſturbance of the peace, and any one juſtice of the peace, ſheriff, under-ſheriff, or mayor of a town, ſhall think proper

proper to command them by proclamation to diſperſe, if they contemn his orders, and continue together for one hour afterwards, ſuch contempt ſhall be felony, without benefit of clergy. And farther, if the reading of the proclamation be by force oppoſed, or in any manner wilfully hindered, ſuch oppoſers and hinderers are felons, without benefit of clergy; and all perſons concerned, knowing of ſuch hindrance, and not diſperſing, are felons, without benefit of clergy. And the act indemnifies the peace officers, and their aſſiſtants, if they kill any of the mob in endeavouring to diſperſe them. Moreover, if any perſons, ſo riotouſly aſſembled, begin, even before proclamation, to pull down any church, chapel, meeting-houſe, dwelling-houſe, or out-houſes, they ſhall be felons, without benefit of clergy. Blackſt. Comm. book iv. ch. xi.

RIOU, in *Geography*, a ſmall iſland in the Mediterranean, near the coaſt of France. N. lat. 43° 11′. E. long. 6° 25′.

Riou's *Iſland*, or *Rovahoga*, an iſland in the Pacific ocean, about 24 miles in circumference; diſcovered in the year 1792, by lieutenant Herget, commander of the Dædalus ſtoreſhip. S. lat. 8° 50′. E. long. 220° 50′.

RIOXA, a province of Spain, ſituated in Old Caſtile, on the borders of Biſcay, on the banks of the Ebro.

RIPA Candita, a town of Naples, in the province of Baſilicata; ſix miles S.W. of Venoſa.

Ripa *Limoſara*, a town of Naples, in the county of Moliſe; nine miles E. of Moliſe.

Ripa *Tranſona*, a town of the marquiſate of Ancona, the ſee of a biſhop, ſuffragan of Fermo; 12 miles N.E. of Aſcoli. N. lat. 42° 58′. E. long. 13° 49′.

RIPAILLE, a town of France, in the department of the Leman lake, on the S. ſide of the lake of Geneva, with a convent; one mile N. of Thenon.

RIPEN, a ſea-port of Denmark, in North Jutland, on the Gram; the ſee of a biſhop, and capital of the dioceſe. This town was probably built about the time of the introduction of Chriſtianity into this kingdom, and, next to Wiborg, is deemed the moſt ancient town in North Jutland. It was formerly one of the moſt celebrated and flouriſhing cities in the North; as it had four pariſh churches and five chapels, beſides the cathedral, four convents with their churches, a ſtrong caſtle, and between 600 and 700 free burghers. A conſiderable number of ſhips traded to Norway, France, England, Holland, &c. from this port; and the city had the privilege of coining money. But its grandeur and opulence were almoſt annihilated by a dreadful fire in 1580, and other conflagrations, by inundations, and by the ravages of war. The merchants' old Exchange is converted into a town-houſe. Some little trade is ſtill carried on at this place, in grain, horned cattle, horſes, &c.; but the ſhallowneſs of the river admits only ſmall veſſels to come up to the city, and theſe only at high water; 77 miles S. of Wiborg. N. lat. 55° 21′. E. long. 8° 46′.

RIPENERS, in *Medicine*, a ſort of topical remedies, called alſo *drawers*, *digeſtives*, *maturantia*, *ſuppuratives*, &c. See Maturation.

RIPENING *of Fruit*, in *Gardening*, may be forwarded ſeveral ways. See Caprification, Hot-*Beds*, and Forcing.

RIPERA, in *Geography*, a town of Hindooſtan, in Berar; 25 miles N.E. of Notchegong.

RIPERTNAU, a town of Weſtphalia, in the county of Lippe; three miles E.N.E. of Lemgow.

RIPIENO, Ital. in *Muſic*, implies full, in oppoſition to ſolo. In Corelli's concertos, the ſolo parts are ſaid to be *del concertino*, the little concert; and the *tutti* parts, or *ripieno*, *del concerto groſſo*, of the great concert. The firſt eight of Corelli's concertos were compoſed for the church, *a due cori*, for two bands or choirs, which are often in dialogue. By ripieno is always meant a ſubordinate part, to which few difficulties are entruſted; being what the French call *compliſſage*, or parts to fill up and complete the harmony.

RIPIERS, Ripiarii, in our *Old Writers*, thoſe that bring fiſh from the ſea-coaſt to the inner parts of the land.

They were thus called a *fiſcella, qua in devehendis piſcibus utuntur, Anglice*, a rip.

RIPLEY, in *Geography*, a market-town and pariſh, partly in the lower, and partly in the upper diviſion of the wapentake of Claro, Weſt-riding of Yorkſhire, England, is five miles N.W. from Knareſborough, and 214 miles N.N.W. from London. The town had formerly a caſtle attached to it, ſome part of which is yet ſtanding. The market here is held on Monday, weekly; and there are annual fairs on Eaſter Monday, and the 25th, 26th, and 27th days of Auguſt, for horſes, horned cattle, and ſheep. A free-ſchool at this place, as appears from an inſcription over its entrance, was built and endowed in the year 1702, by Mary, and Catharine Ingilby, daughters of ſir William Ingilby, then lord of the manor. The church is ancient, and contains many monumental erections in memory of that family. In the church-yard ſtands the pedeſtal of an ancient croſs, which contains eight niches curiouſly ornamented, but the effigies are gone, as likewiſe the ſhaft of the croſs. This pariſh, according to the parliamentary returns of 1811, contains 222 houſes, and 1053 inhabitants.

Ripley-caſtle, the ſeat of ſir John Ingilby, baronet, adjoins the town. The chief part of it was built by ſir William Ingilby, in the reign of Philip and Mary, but the great tower is far more ancient, having belonged to a former ſtructure. It has been much enlarged of late years; and is now a ſtately and commodious family manſion. Some of the apartments are finiſhed with great elegance; and the ſtaircaſe diſplays a large Venetian window of ſtained glaſs, on which is repreſented a ſeries of ſhields, ſhewing the quarterings and inter-marriages of the Ingilby family, ſince their ſettlement at Ripley, towards the cloſe of the fourteenth century.

Eaſtward from Ripley is Copgrove, an elegant manſion belonging to H. Duncombe, eſq. which contains an excellent collection of paintings, buſts, and prints from the moſt celebrated maſters. The pleaſure-grounds are extenſive, and are ornamented with a fine lake. Near this ſeat is that of Allerton-Mauleverer, the property of lord Stourton. The houſe is a modern edifice, built by his royal highneſs the duke of York. It is ſurrounded by a park, containing 400 acres of land, chequered by hills and dales. At this place was formerly a priory of Benedictines, ſubject to the abbey of Marmontier in France. It was founded by Richard Mauleverer in the reign of Henry II., and was diſſolved by Henry VI. who ſettled its revenues on King's college, Cambridge. Beauties of England Wales, vol. xvi. by John Bigland.

RIPOGONUM, in *Botany*, ſo called by Forſter, from ῥιψ, ῥιπος, *a ſlender twig*, and γονυ, *a joint*, becauſe of its ſlender, jointed, twining habit, was referred by the ſon of the author, as well as by the younger Linnæus, to Smilax; (ſee that article.) Mr. Brown, nevertheleſs, retains *Ripogonum*, in Prodr. Nov. Holl. v. 1. 293, becauſe of its hermaphrodite flowers, the two bracteas at the baſe of each, and the racemoſe inflorescence. Two ſpecies are mentioned,

R. album and *parviflorum*, the latter of which is Forster's plant, *Smilax Ripogonum*, Forst. Prodr. 70.

RIPOLL, in *Geography*, a town of Spain, in Catalonia; 14 miles N. of Vique.

RIPON, or RIPPON, a market and borough town in the lower division of the wapentake of Claro, liberty of Ripon, West-riding of Yorkshire, England, is situated at the distance of 11 miles N. from Harrowgate, and 222 miles N.N.W. from London. It occupies the declivity of a gentle eminence, between the rivers Ure and Skell, and not far from their confluence. Over these rivers are six bridges, within a mile of the town. One of these is a very handsome structure of stone, and has seventeen arches. The town is large, and the buildings are in general good; particularly in the principal street. According to the parliamentary returns of 1811, the parish contains 452 houses, and 2346 inhabitants, but this does not appear to include the borough, which is omitted in the reports.

The origin of Ripon is to be referred to a very remote era. By Salmon, it is supposed to have been the Roman Isurium, but this opinion is erroneous. The probability on the subject is, that it owes its foundation to the monastery which was established here in the year 661, by Eata, abbot of Melrose, in Scotland. About that period we find it first mentioned in historical record, when it is said to have consisted only of thirty houses. This town was destroyed by the Danes, and remained a heap of ruins for several years. At length, however, it was rebuilt; and in the year 886, king Alfred is said to have incorporated it as a royal borough, to be governed by a vigillarius, or wakeman, twelve elders, and twenty-four assistants. Ripon was destroyed a second time by king Edred in revenge of a revolt of the Northumbrian Danes. This event occurred in the year 950; after which Ripon was again rebuilt and began to flourish, but did not long remain in a state of tranquillity. In the year 1069 it once more shared in the fatal consequences of a revolt of the Northumbrians against the Norman Conqueror; and sixteen years later, at the time of the general survey, the town, and the country around it, still remained waste and uncultivated. Peace having been restored, however, Ripon again revived from its embers, and continued in a prosperous condition, till the wars between England and Scotland, in the reign of Edward. II. subjected it to new misfortunes. In the year 1323, Robert I. king of Scotland, having driven Edward and his army out of his kingdom, invaded England, laying waste the country with fire and sword to the very walls of York. Ripon suffered in the general devastation, the houses having been destroyed by fire, and most of its inhabitants put to the sword. No sooner, however, had the victorious career of Edward III. freed the country from the invaders, than it was restored to a prosperous condition, principally through the exertions of the archbishop of York, and the liberality of the neighbouring gentry, many of whom fixed their residence here. Since that time Ripon has been occasionally honoured by royal visits. Henry IV. retired hither, with his whole court, in 1405, when the plague raged in London. In the year 1604, a similar cause occasioned the removal of the lord president's court from York to this town.

Ripon first sent members to parliament in the 23d year of Edward I., but this privilege was soon after discontinued, and was not revived till the reign of Edward VI. The patronage of the borough is vested in Miss Laurence, of Studley-Royal, who possesses all the burgage tenements to which the right of election is attached. The number of voters is 146, and the mayor is the returning officer. The corporation, by virtue of a charter granted by king James I., and since confirmed, and, in some degree, extended, by succeeding monarchs, consists of a mayor, recorder, 12 aldermen, 24 assistants, a town-clerk, and other inferior officers. Ripon was formerly celebrated for its manufacture of spurs, which were, indeed, so highly esteemed, that it became a proverbial expression to say "As true steel as Ripon rowels," when speaking of a man of fidelity, honesty, or intrepidity. The manufacture of woollens likewise flourished here, in former times, but this branch of business is now completely decayed. The archbishop of York has his court and prison here for the liberty of Ripon. On the nomination of the archbishop, and by his majesty's commission, justices are appointed, who, in conjunction with the mayor and recorder, hold sessions for the town and liberty. The dean and chapter of Ripon minster have likewise a prison here, and hold a court for the decision of causes arising within their manor. The market day here is Thursday; and there are fairs on Thursday after 13th January, 12th and 13th May, first Thursday in June, first Thursday after 22d August, and 22d November. The market-place is a handsome and spacious square, surrounded by well-built houses, and having in the centre an obelisk 90 feet high, erected, in 1781, by William Aislabie, esq. of Studley, who represented this borough in parliament during the long period of sixty years. Here also stands the town-hall, built in 1801, from designs by Mr. Wyatt, and at the expence of the late Mrs. Allanson of Studley. A theatre was erected here in 1792, by the late George Hassell, esq. The free-grammar school was founded by king Edward VI., and was finished, and amply endowed, by his successor, queen Mary, in 1553. The other public establishments belonging to the town are, a dispensary, Sunday schools, a school of industry, and four hospitals, *viz.* that of St. Mary Magdalen, for six poor women; of St. John, a small building, appropriated to two poor women; St. Anne, which supports eight women; and Jepson's hospital, in which twelve poor boys are maintained, clothed, and educated. This hospital was founded, in 1672, by Zacharias Jepson, a citizen of York.

The monastery, previously mentioned as the probable nucleus which gave rise to the town, appears to have been of considerable celebrity. After the destruction of the original buildings in the reign of Alfred, king of Northumbria, it was re-erected in a style of more magnificence than was usual in that age, by the famous Wilfrid, archbishop of York. William of Malmesbury mentions the new structure as remarkable "for its curious arches, its fine pavements, and winding entries." The same author says it was much resorted to by the northern nobility, and was endowed with very extensive possessions. The memory of St. Wilfrid is still honoured by an annual feast and procession at this town. His monastery received extraordinary marks of royal munificence. The great king Athelstan granted to it many immunities, and particularly the privilege of sanctuary. From that period history records few particulars respecting this establishment, except its destruction by the Scotch in the reign of Edward II., when it ceased to be a monastic foundation. The church, however, was rebuilt and made collegiate by archbishop Melton, from whose time, till the reign of Henry VIII., it had seven prebends, with distinct revenues, attached to it; besides nine chantries within the church, which were dissolved by Edward VI. King James I. renewed the collegiate privileges of this church, by the establishment therein of a dean and six prebendaries, to whom he granted "divers lands, prebends, chantries, and rectories, belonging to the said church before the dissolution." In 1607 the same monarch added a subdean, and thus completed the college as it still exists.

Ripon church is dedicated to St. Peter and St. Wilfrid, and has, attached to it, a peculiar jurisdiction, under the archbishop of York. The king is patron of the deanery; and the subdean is nominated by the dean from among the prebendaries. When a vacancy occurs in the number of the latter, the dean and chapter present three persons to the archbishop, who collates one of them. As a building, this church has considerable claims to the notice of the antiquary, though its appearance has been much injured by additions and alterations executed at different periods and in different styles of architecture. Its general form is that of a cross, having two uniform square towers, each 110 feet high, at the west end, and a third, called St. Wilfrid's great tower, in the centre of the transept. From the last, there formerly rose a very noble spire, which was blown down Dec. 8th, 1660.

The sepulchral monuments in the church are too numerous to be mentioned in detail. There are many in commemoration of different branches of the principal families in the neighbourhood, especially the Blackets; the Kitchenmans; the Ridsdales; the Wanleys; the Oxleys; the Nortons, of Sawley; the Weddels, of Newby; the Mallories and Aislabies, of Studley; and the Markenfields, of Markenfield. Among these may be noticed a beautiful monument to the memory of W. Weddel, esq. the design of which was taken from that curious relic of antiquity, the Lantern of Demosthenes, at Athens. An altar-tomb, of grey marble, situated in the south aisle of the nave, is said to commemorate an Irish prince, who died at Ripon on his return from the Holy Land. On the entablature are represented the sculptured figures of a man and a lion in a grove of trees.

The environs of Ripon are rich, fertile, well wooded, in a high state of cultivation, and interspersed with villages, and seats of the nobility and gentry. Among the latter the principal are, Studley-Royal, and Newby-Hall. The first is the property of Miss Laurence, and is situated at the distance of nearly three miles S.W. from Ripon. The house is commodious and elegant, and contains many excellent pictures, and portraits by the best masters. But the chief objects of attention here, are the park and pleasure-grounds, which are generally ranked among the finest in England. The park, which is situated nearest the house, is diversified with gentle swells and declivities, and is adorned with ranges of lofty trees. The entrance to the pleasure-grounds displays a mass of the most luxuriant foliage, and the widely extended plantations which compose them, are judiciously varied, and finely adapted to the different situations. On one hand the hills gradually ascend with tufts of shade, interspersed over the verdure; on the other side they precipitately rise with lofty woods covering their brows, below which the rivulet, in one place, glides with a silent stream, and in another falls in cascades. Near the entrance is a building, called the Cold Bath, which is constantly supplied by a spring of pure water. Adjoining is the figure of a dying gladiator, and further on is a fine rustic bridge with the river rushing through it, and the back-ground so darkened by trees as to excite the idea of a cascade foaming through a cavern. Near this is a statue of Hercules destroying Antæus. The view now opens with a beautiful assemblage of new objects, most charmingly diversified. From a little grotto not far distant a fine expansive lake is seen winding round the base of an eminence, called Tent Hill, encircled by a magnificent amphitheatre of hanging wood. The lawn is laid out with exquisite taste, and here the water divides itself into various and beautiful forms, embellished at different points by statues of Neptune, Bacchus, Galen, a dying gladiator, and Roman wrestlers. On rising grounds are situated a temple of Piety, a Chinese temple, a temple of Fame, a banquetting-house, and various other ornamental buildings.

Near Studley-Royal are the venerable ruins of the once celebrated Abbey of Fountains, which was founded in the year 1132, for the monks of the Cistertian order, but soon afterwards suffered total demolition by fire. It was rebuilt, however, in 1204, in the early pointed style of architecture, which then began to prevail; this house continued to flourish till the general dissolution in the reign of Henry VIII., when its annual revenues, according to Speed, were valued at 1073*l.* 0*s.* 7½*d.* This abbey, with all its offices and appendages, covered about twelve acres of ground. The church, the walls of which are still almost entire, appears to have been a very large and magnificent structure. The nave, in particular, is a most majestic specimen of building, uniting simplicity with lightness and elegance. The Ancient and Modern History of the Loyal Town of Rippon, by Thomas Gent of York, 8vo. 1733. History of Ripon, 12mo. 1801. Beauties of England and Wales, vol. xvi., by John Bigland. Drake's Eboracum, folio.

RIPOSTE, in the *Manege*, is the vindictive motion of a horse that answers the spur with the kick of his foot.

RIPOUR, in *Geography*, a town of Hindoostan, in the circar of Gohud; 40 miles S.S.W. of Gwalior.

RIPPACANOT Creek, a river of America, near the western branch of the river Wabash.

RIPPERDA, John William, in *Biography*, baron of, was born in 1680, of a noble family, in the province of Groningen. He was educated in the principles of the Catholic religion, but upon marrying a Protestant heiress, he conformed to the Protestant faith. He appears to have entered the army while he was young, and for some time he was in the service of the States-General as colonel of the infantry, which post he occupied in the year 1715, when he was sent from the States to the court of Spain, to negociate a commercial treaty. Having ingratiated himself with the king, Philip V., he returned to the Catholic religion, and took up his abode at Madrid. His first wife being dead, he married, in 1721, a Castilian lady of high birth, and rapidly rose in the confidence of the king. In 1725 he was sent to Vienna to negociate an accommodation with the imperial court. In the same year he signed a treaty at Luxembourg with the emperor's plenipotentiaries; and on his return to Madrid he was created a grandee of the third class, and duke of Ripperda. He also obtained the office of secretary of state for foreign affairs; and the management of the war, marine, and financial departments, was entrusted to him, so that he had all the power, without the name, of prime minister. In a short time he was not only dismissed from his employments, but confined in the castle of Segovia, where he remained two years, when, having found means to make his escape into Portugal, he passed from thence into England, where he remained till 1730, when he went to the Hague, and resumed the Protestant religion. After this he formed a connection with an envoy from Morocco, and in 1731 embarked for that country. He was favourably received by the sovereign, Muley Abdallah, to whom he proposed a scheme of uniting the Barbary states against Spain, and of invading that country. He engaged the Moors to undertake the siege of Ceuta, and having declared himself a convert to the Mahometan religion, and assumed the name of Osman, he was nominated to the chief command of the army employed for that purpose. By his military talents he inspired the Moors with confidence in their enterprize, when the arrival of a Spanish army in Africa, which laid siege to Oran, disconcerted his plans. Nevertheless, he persisted in the siege of Ceuta,

Ceuta, and defeated the garrison which had sallied out against him. But a nocturnal surprise of the Moors in the trenches broke up the siege, and Ripperda, who fled in his shirt to Tetuan, was received so coldly at the court of Morocco, that he meditated an escape to some other country. He was stopped by the emperor, and fully expected to pay the forfeit of his life, on account of his success; but he pleaded his cause with so much effect, that he was, after a short imprisonment, set at liberty. He now formed a new project, which was a consolidation of different religions, especially the Mahometan and Jewish, which he endeavoured to render compatible by admitting the prophetic character of Mahomet, and inculcating the expectation of a future Messiah. He made some converts to his opinions; but at length became suspected of dishonest motives, and was obliged to retire. His projecting spirit continued to the last, and he advanced considerable sums to Theodore for his attempts on the crown of Corsica. He died at Tetuan, in 1737. Universal History. Gen. Biog.

RIPPERS, in the *Wire-works*, are the people who attend in the mills, take the prepared small rods of iron, and work at the barrels where they are drawn into wire.

RIPPIN, or Rupulam, in *Geography*, a town of Hungary; eight miles N.N.E. of Leopoldstadt.

RIPPINICA, a town of the duchy of Warsaw; 25 miles N. of Wladislaw.

RIPPLE, in *Agriculture*, a slight scratch or tear, sometimes applied to very slight ploughings, hence called ripplings.

Ripple, in *Rural Economy*, an implement of the comb kind, constructed with several upright triangular prongs, set near together in a strong piece of wood, for the purpose of rippling flax and hemp.

RIPPLING, in *Sea Language*, a broken and interrupted noise, produced by a current on or near the sea-coast.

Rippling *of Flax*, in *Rural Economy*, the operation of taking off the seed from the flax by drawing it through a ripple or large comb. See Flax, and Ripple.

RIPPON, in *Geography*. See Ripon.

RIPRAPPS, a narrow shoal in the English channel, between Folkstone and Boulogne, S.W. and N.E. about 10 miles; with a strong bottom, and at a low spring-tide not covered above 14 feet with the sea.

RIPRESA, Ital., the same as *reprise* in French, and *repeat* in English; which see.

RIPSA, in *Geography*, a town of Sweden, in Sudermanland; 13 miles N. of Nykoping.

RIPTON, a township of America, in the county of Addison and state of Vermont; containing 15 inhabitants.

RIQUEVILLE. See Richenveir.

RIQUEURIA, in *Botany*, a name in the Flora Peruviana, destined to commemorate Lewis Riqueur, apothecary to king Philip V. of Spain. *De Theis*.

RIS, in *Geography*, a town of France, in the department of the Puy-de-Dôme, near the Allier; nine miles N. of Thiers.

RISACO, a town of Dalmatia, in the bay of Cataro; 20 miles N.N.W. of Ragusa.—Also, a river of Istria, which runs into the gulf of Trieste, about three miles from Capo d'Istria.

RISARD, Francis, in *Biography*, a French mathematical writer in the eighteenth century, published several esteemed elementary works for the instruction of the young in the sciences. He was a native of Neufchateau, in Lorrain, and was made professor of philosophy in the college of Beauvais; he died at Paris in the year 1778. His productions consist of "Elements of the Mathematics," in 4to., of which the author published an abridgment, in 8vo.; "A Treatise on the Sphere," in 8vo.; "A Treatise on Gnomonics," in 8vo.; "Tables of Sines," in 8vo.; "Rectilinear Trigonometry," 8vo.; "Elements of Geometry," in 4to.; and "Institutiones Philosophicæ," in 2 vols.

RISBOROUGH, or Prince's Risborough, in *Geography*, a market-town and parish in the second division of the three hundreds of Aylesbury, county of Buckingham, England, is situated at the distance of 5 miles S.W. from Wendover, and 37 N.W. from London. The right of holding a market was granted to the inhabitants by king Henry III., who, at the same time, bestowed upon the townsmen many privileges. The market day is Saturday, weekly; besides which there is an annual fair on the 6th of May. The manor here was anciently vested in the families of Gifford and Humet; but having subsequently become vested in the crown, it was granted to Richard, earl of Cornwall, and king of the Romans, who died in 1272. It was afterwards the property of Edward the black prince, who is said "to have had a palace here, supposed to have stood within the scite of a spacious moat, now dry, which is in a field adjoining the church-yard." In the reign of Henry V. this manor was assigned to his queen, Catharine, in dower. Charles I. sold it to certain citizens of London, who, in 1637, conveyed it to the family of the Chibnalls; one of whom gave a considerable sum of money to the parish to supply clothing annually to 24 poor women. Since the Chibnalls, it has been occupied successively by the families of Abraham, Adeane, Pelham, Panton, and Grub, the present possessors. According to the parliamentary returns of 1811, this parish contains 324 houses, and 1644 inhabitants.

Adjoining to Prince's Risborough is the village of Monk's Risborough, at which place, it is said, there was formerly a cell of Benedictine monks, subject to the monastery of Christ-church, in Hampshire. The church here is a handsome building, in the later pointed style of architecture, and contains many monuments. Lysons's Magna Britannia, vol. i. Bucks, 4to.

RISBY, a town of Sweden, in the province of Finland, near the gulf of Bothnia; 32 miles N. of Biorneborg.

RISCHEBACH, a river of Saxony, which runs into the Elbe, near Wittenberg.

RISCHIN, a town of Bohemia, in the circle of Rakonitz; 30 miles S.E. of Rakonitz.

RISCLE, a town of France, in the department of the Gers; six miles S. of Nogaro.

RISCUS, among the Romans, sometimes signifies a chest or trunk covered with skins; sometimes it is used for a hamper, made of twigs or rushes to hold lint; and sometimes for a hollow place in the wall of a house, used likewise for holding lint, or the like.

RISEBERGA, in *Geography*, a town of Sweden, in the province of Skone; 28 miles N. of Lund.

RISENBURG, a town of Prussia, in the province of Oberland; 12 miles E. of Marienwerder.

RISENKIRCH, a town of Prussia, in the province of Oberland; 14 miles E. of Marienwerder.

RISENTITO, in the *Italian Music*, a brisk, lively, or expressive manner of playing.

RISHI, in *Hindoo Mythology*, is a general name for ancient sages or saints. Considerable difficulty occurs in determining, with any exactitude, who they were, whether they had any historical existence, or are merely the creatures

tures of the imagination. Seven of them are moſt frequently ſpoken of; by ſome ſaid to be the firſt rational beings created by Brahma. Each has a wife, and a numerous offſpring. The names of theſe ſeven differ in different authorities; but the following liſt is that uſually received. 1. KASYAPA; 2. *Atri*; 3. VASISHTA; 4. VISWAMITRA; 5. Gautama or GODAMA; 6. JAMADAGNI; 7. *Bharadwaja*. (The names diſtinguiſhed by capitals have furniſhed articles in this work.) The wives of theſe patriarchs have been transferred to the heavens, and are the ſtars called by weſtern aſtronomers the Pleiades; by the Hindoos, KRITIKA, under which word will be found ſome information reſpecting them, ſhewing that the aſtronomical fabuliſts of both races have common legends. The Riſhis are ſaid to be the bright ſtars in the great bear. How they became ſo diſtant from their ſparkling ſpouſes is explained in the article juſt referred to. In ſeveral languages of India, a bear is called Riſh; and there may be ſome alluſion both to the conſtellation and the ſages in queſtion. Sometimes the ſeven Riſhis, and the ſeven Menus, are confounded. (See MENU.) Another race of patriarchal ſages is alſo ſometimes confounded with both. Theſe are the Munis. See MUNI; in which article the reader is requeſted to correct a typographical error, in the ſecond column, third line from bottom, for *many-mothered, for*, read *many-mothered ſon*. Jamadagni, for inſtance, is uſually called a Riſhi; yet in our article given under the name of his wife, RUNEKA, he is, on Puranic authority, called "a great Muni." The Riſhis, as the immediate production of Brahma, are ſometimes called Brahmadikas, of whom likewiſe there are ſeven; but they are not uſually ſuppoſed to be the ſame with the Riſhis: ſome liſts have no names in common with thoſe of the Riſhis; others have ſeveral. As the production of Brahma, there is another ſet of ſeven beings of different names from any of the above-named liſts, but employed in early days in peopling the world; theſe are called Sanakadikas, of whom ſomething is ſaid under the name of their principal, SANAKA. The Hindoo books differ very much in their accounts of theſe varieties of perſons interpoſed between the Supreme Being and the created world; and it is not eaſy, if at all practicable, to reconcile their diſagreements; nor perhaps worth the pains were it otherwiſe.

We ſhall not attempt to notice the diſagreements, that could be picked out from high Hindoo authorities, reſpecting the equivocal perſonages named in this article. It may be briefly obſerved, that although *the ſeven* Riſhis are very commonly adverted to, the appellation is by no means confined to that number. In the Siva Purana, Brahma is ſaid to have produced Brighu and the ſeven Riſhis, and after that Nareda, from his thigh, Kardama the Riſhi from his ſhadow, and from the fore-finger of his right-hand, Dakſha. Theſe perſons are ſometimes called Riſhis, Brahmadikas, Maharſhis, Devarſhis, &c. A ſage of the name of Dadichi occurs in the Skanda Purana, as having ſwallowed the ſacred books, for their ſecurity, at a period of great wickedneſs and tumult. He is called a Riſhi; as is another named Uddalaka, who was half betrothed to Lakſhmi, the goddeſs of wealth; but eſpouſed her ſiſter Jyeſhta, goddeſs of poverty. Theſe allegories may be explained. (See UDDALAKA, and KARDAMA.) Other Puranas ſeem to identify in ſome parts the Riſhis and Munis, calling both "the virtuous ſages, who delight in protecting the people." In other parts diſtinctions are made. In the beginning of this article we have ſtated the term Riſhi to be, as it were, generic; meaning ſages, ſaints, patriarchs. This ſeems authoriſed by the Ramayana, where this note occurs. "There are four kinds of Riſhis, or ſages; the Rajarſhi, or royal ſage; the Maharſhi, or great ſage; the Brahmarſhi, or ſacred ſage; and the Devarſhi, or divine ſage. Of theſe the firſt is eſteemed the loweſt, and the laſt the higheſt." Theſe appear to be the ſpecific varieties. In addition to the articles already referred to, ſome farther points connected with the ſubjects of this will be found noticed under the following: MAHARSHIS, MATSYAVATARA, PIKESWARI, PITRIS, PULAHA, PULASTYA, RAJARSHI, RAVENA, RUNEKA.

RISIBILITY, the faculty of *laughter*; which ſee.

Riſibility is commonly ſuppoſed an attribute peculiar to man; as being the only creature capable of judging what is ridiculous.

Some philoſophers go ſo far as to aſſert, that the degree of judgment is always ſeen in that of laughter; fools always either have too little or too much of it.

Authors do not agree as to the peculiar mechaniſm in man, by which laughter is raiſed. It is uſually attributed to the communication between the plexus nervoſus, and the diaphragmatic nerves. See LUNGS.

RISIGALLUM, in the *Materia Medica*. See REALGAR.

RISING, in *Aſtronomy*, the appearance of the ſun, a ſtar, or other luminary, above the horizon, which before was hid beneath it.

By reaſon of the refraction of the atmoſphere, the heavenly bodies always riſe before their time; *i. e.* they are ſeen above the horizon, while they really are below it. See REFRACTION *of the Atmoſphere*.

There are three poetical kinds of riſing of the ſtars. The *Acronychal*, *Coſmical*, and *Heliacal*; which ſee reſpectively.

To find the riſing, &c. *of the ſun and ſtars by the globe*, ſee GLOBE.

RISING, in *Rural Economy*, a term ſometimes applied to yeaſt, or barm uſed for the purpoſe of fermenting different matters.

RISING, in *Ship Building*, a term derived from the figure of a ſhip's bottom in general, which gradually narrows or becomes ſharper towards the ſtem and ſtern-poſt. On this account it is that the floors, towards the extremities of the ſhip, are raiſed or lifted above the keel; otherwiſe the ſhape would be ſo very acute, as not to be obtained from timber with ſufficient ſtrength in the middle or cutting-down. The floor-timbers forward and abaft are therefore gradually lifted or raiſed upon a ſolid body of wood, called the *dead* or *riſing-wood*, which muſt of courſe have more or leſs riſing as the body of the ſhip aſſumes more or leſs fullneſs or capacity.

RISING *of Boats*, is a narrow ſtrake of board faſtened withinſide to ſupport the thwarts.

RISING-*Floors* are the foremoſt and aftermoſt floors, which, on account of the riſing of the body, are the moſt difficult to be obtained, as they increaſe in the acuteneſs of ſhape; and to preſerve ſtrength in the throat, the cutting-down muſt be deeper.

RISING-*Line*, an elliptical line drawn in the plan of elevation, by which line, with its correſponding half-breadth or narrowing line, the figure of the bottom near the floor-heads is determined.

RISING-*Square*, a ſquare uſed in whole moulding, upon which is marked the height of the riſing-line above the upper edge of the keel.

RISING-*Straight*, is a curve line uſed in whole moulding drawn in the ſheer plan, at the interſection of the ſtraight part

part of the bend mould, when continued to the middle line at each timber.

Rising-*Wood*, that part of the basis of a ship's body, forward and abaft, which is formed by solid pieces of timber scarfed together lengthwise on the keel. The rising-wood must be sufficiently high to seat the floors; and afore and abaft the floors, it is continued up to the cutting-down or upper side of the floors, for the purpose of securing the heels of the cant-timbers, and there left sufficiently broad to admit of a stepping or rabbit for the heels of those timbers, that they may not be continued downwards to sharp edges.

RISK, or Risque, the hazard or chance of a loss, damage, &c.

There is a great risk run in letting goods go upon credit to great lords, wives not authorized by their husbands, and young people not yet arrived at the age of majority.

Skinner derives the word from the Spanish *risco*, *steep*; Covarruvias, from *rigeo*. In the barbarous Greek, they say, ῥιζικαζω, for *periclitor*, *I hazard*; and ῥιζικον, for *lot* or *chance*; which words, as well as *risque*, Skinner thinks, may be deduced from ῥιπτω, for αναριπτω τον κυβον, *I cast the dye*.

To prevent any risk in invoices of merchandizes by sea, it is usual to insure them.

Accordingly the risk is a subject of primary consideration in cases of marine insurance. All the risks or perils, that are incident to sea-voyages, may be provided against by insurances, with certain exceptions founded on public policy and the interests of humanity. Thus, the insurer can, in no case, upon principles of natural justice, make himself answerable for any loss or damage, proceeding directly from the fault of the insured. No insurance can be made, even against the perils of the sea, upon illegal commerce. In most foreign countries, insurances on the lives of men are prohibited. In France they have been always deemed illegal, and are expresly forbidden by the ordinance of Lewis XIV.; nevertheless, French writers have held that this does not apply to Negro slaves. According to Valin, who has, by curious reasoning, attempted to vindicate this doctrine, the disposition to suicide is natural in Negro slaves, and imputable, as he expresses himself, to the "inherent vice of the article;" and, therefore, their death, proceeding from this cause, must be deemed natural death. But the killing of them, or the throwing of them overboard in a revolt, is a loss incident to this trade, and a peril within the policy. It is to be lamented, that, whilst the slave trade was countenanced and carried on in this country, the objects of this cruel traffic have been too much considered as mere merchandize; and the insured upon this trade formerly recovered, under the common policy, for any loss sustained in the voyage by the mortality of the slaves, whether they were thrown overboard, in cases of supposed necessity, or died a natural death, or perished by the perils of the sea. The legislature, however, while this infamous and savage traffic subsisted, interposed, and by an annual act, passed with a view to *interest* the persons concerned in this trade in the preservation of the lives and health of the slaves, declared, that though the policy remained in the same form as before, it cannot protect the insured against losses occasioned by natural death, ill treatment, throwing overboard, or by restraints of princes proceeding from attempts to get slaves by force. (See stat. 30 Geo. III. c. 33. § 8. 34 Geo. III. c. 80. § 10. and 39 Geo. III. c. 80. § 24.) But we trust the provisions of these and similar statutes are become wholly unnecessary in this country, and that the trade, of which we shall give some account in its proper place, is abolished never to revive.

The words of an English policy, which specify the various risks against which insurances are usually made, are these: "Touching the adventures and perils which we, the assurers, are contented to bear, and do take upon us in this voyage, they are of the seas, men of war, fire, enemies, pirates, rovers, thieves, jettisons, letters of mart and countermart, surprizals, takings at sea, arrests, restraints, and detainments, of all kings, princes, and people, of what nation, condition, or quality soever; barratry of the master and mariners; and of all other perils, losses, and misfortunes, that have or shall come to the hurt, detriment, or damage of the said goods and merchandizes, and ship, &c. or any part thereof, without prejudice to this insurance." The latter clause seems to be sufficiently comprehensive to embrace every species of risk to which ships and goods are exposed from the perils of sea-voyages. However, by the agreement of the parties, the general words of the policy may be altered or qualified; and any of the risks may be wholly or in part excluded, and the insurance may be made only against some particular risks, or up to, or beyond certain degrees, or upon particular articles. In England, it is now constantly stipulated in all policies, that upon certain enumerated articles of a quality peculiarly perishable, the insurer shall not be answerable for any partial loss whatever; that upon certain others, liable to partial injuries, but less difficult to be preserved at sea, he shall only be liable for partial losses above *five per cent.*; and that, as to all other goods, and also the ship and freight, he shall only be liable for partial losses above *three per cent.* This stipulation is made by a memorandum, in the form of a warranty, inserted at the bottom of all English policies. It was first introduced here about the year 1749; before which time the insurer was liable for every injury, however small, that happened to the thing insured. This clause prevented the necessity of adapting the premium to the nature of the commodity. Nevertheless our policies indemnify the insured against every loss, let it be ever so inconsiderable, arising from any cause affecting the general safety of the ship and cargo. Losses of this sort, being of the nature of "general average," are so called in the memorandum; and there is, therefore, annexed to each of the provisions above-mentioned, an exception of general average. In the policies of private insurers, the case of the "stranding of the ship" is likewise excepted. In the common policies, used in London by private underwriters, the memorandum runs thus: "Corn, (comprehending every sort of grain, and also pease and beans,) fish, salt, (excluding salt-petre,) fruit, flour, and seed, are warranted free from average, unless general, or the ship be stranded: sugar, tobacco, hemp, flax, hides, and skins, are warranted free from average, under *five per cent.*; and all other goods, also the ship and freight, are warranted free from average, under *three per cent.*, unless general, or the ship be stranded."

This form of the memorandum was generally used, not only by private underwriters, but also by the two insurance companies, from its first introduction in 1749, till the year 1754; when, in consequence of a particular case that occurred, the London Insurance Company left out of the memorandum in their policies the words, "or the ship be stranded;" and the same alteration was soon after adopted by the Royal Exchange Assurance Company. Private underwriters have, however, continued the memorandum in the old form. Many questions have arisen as to the true meaning of the words, "free from average, unless general,

or

or the ſhip be ſtranded." The word "unleſs" has been held to make an *exception*, and not a *condition;* and caſes have occurred in which judges of the higheſt eminence have put a different conſtruction upon the fore-mentioned clauſe. It is now ſettled, that if the ſhip be ſtranded, the inſurer is liable for any partial loſs in any of the articles in the memorandum, though ſuch loſs did not ariſe from the ſtranding, but from ſome other cauſe. Notwithſtanding the number of caſes, which have been decided upon the conſtruction of the memorandum, it ſtill remains a queſtion, whether the partial loſſes, from which the inſurer is exempted by it, comprehend the *total loſs* of an *entire individual*, as well as a partial injury to the *whole* of the ſpecies of goods exempted by the memorandum from ſmall average loſſes; as, *e. gr.* if out of 101 hogſheads of ſugar of equal value, five are ſo completely ſpoiled in the voyage, as to be worth nothing, and therefore *totally loſt*. If this loſs be calculated upon the whole 101 hogſheads, it will not amount to *five per cent.* In ſuch a caſe, it has been thought, that the inſurer would be protected by the memorandum, and not liable for the loſs. But the queſtion has not been decided.

There are certain injuries or loſſes, to which goods on ſhip-board are liable, that do not ariſe from the perils of the ſea; and for theſe the owners are liable. Theſe may be owing to ſome fault or defect of the ſhip: in this caſe the inſurer is not liable, becauſe, in every contract of inſurance, there is an implied warranty, that the ſhip is ſea-worthy; and if it appear otherwiſe, the contract is void. In many caſes, the maſter alſo, as well as the owners, is anſwerable. He is bound to deliver goods in the ſame ſtate in which he received them; and of courſe he, as well as the owners, is liable for all loſs or damage not proceeding from ſome inevitable misfortune. They are anſwerable for loſs or damage occaſioned by bad ſtowage, wet, theft, embezzlement, rats, &c. This is the rule of the marine law, and agrees with the common law. At common law, the owners and maſter were liable to the full value of the goods loſt; but now by 7 Geo. II. c. 15. they ſhall only be liable to the value of the ſhip and freight for any act done by the maſter or mariners. The maſter's liability, and that of the mariners, remains the ſame. But as this proviſion only extended to the caſe of embezzlement, &c. by the maſter or mariners, it did not afford a ſufficient protection to ſhip-owners. Therefore the 26 Geo. III. c. 86. limits the liability of the owners to the value of the ſhip and freight, though the maſter or mariners ſhould not be privy to ſuch robbery, &c.; and they are exempt from all liability for any loſs by fire. But though the owners are reſponſible to the amount of the value of the ſhip and freight, for loſſes occaſioned by external thieves; yet, under the policy, the inſurers are alſo liable; and, therefore, in ſuch caſes, the proprietor of the goods, or the inſurers in his name, may recover againſt the owners.

In order to charge the inſurer, the loſs muſt happen during the continuance of the riſk. This brings under conſideration a ſubject of importance. Every voyage inſured muſt have a fixed commencement and termination. It is proper, therefore, to inquire what is the duration of the riſk, with reference to inſurances upon *goods*, upon the *ſhip*, and upon *freight*. In France, and moſt other countries, it is provided, that if the time of the riſk be not regulated by the contract, it ſhall commence, as to *goods*, from the time they are put on board the ſhip, or put into barges, to be conveyed on board, that is, from the moment of their leaving the ſhore; and it continues till they are ſafely landed at the place of their deſtination. It is alleged, that the perils of the ſea commence from the moment in which the goods are on the water. In our policies, the words uſually employed to expreſs the commencement and end of the riſk on *goods* are theſe: "Beginning the adventure upon the ſaid goods and merchandize *from the loading thereof aboard the ſaid ſhip*, and ſo ſhall continue and endure until the ſaid ſhip, with the ſaid goods, ſhall be arrived at —— (her port of delivery), and until the ſame be diſcharged and ſafely landed." With us, therefore, the riſk does not commence until the goods are actually on board the ſhip; and, therefore, the inſurer is not anſwerable for any loſs or damage which may happen to them, while they are on their paſſage to the ſhip. And it may be laid down as a general rule, that the riſk on goods continues no longer than they are actually on board the ſhip mentioned in the policy; and that if they be removed from on board that ſhip, and landed, or put on board another ſhip, without the conſent of the inſurers, the contract is at an end, and the inſurers are diſcharged from all ſubſequent reſponſibility.

To this rule, however, there are ſeveral exceptions: as where the ſhip is diſabled, and the goods are put on board another veſſel, to be forwarded to their port of delivery; ſo, if it be agreed, that the goods ſhall be removed into another ſhip, at a particular place in the voyage, and no ſhip being there, they are put on board a ſtore-ſhip. The inſured is protected by the policy in carrying the goods in lighters to any part of the port of delivery, where ſuch goods are uſually landed. It is a general principle, that policies ought to be conſtrued according to the uſage of trade; and in doubtful caſes, in favour of the inſured. Although the general rule is, that the inſurance on goods ſhall continue "till they are diſcharged and ſafely landed," yet it has been holden by a very eminent and learned judge, that if the inſured take goods from on board the ſhip in his own lighter, the inſurer is diſcharged. Where goods are put into a public lighter, for the purpoſe of being landed, the riſk continues; but if the merchant ſend his own lighter, this will be a delivery to him, and the inſurer is diſcharged. Although the riſk on goods, according to the uſual words of the policy, is to continue till they are diſcharged and ſafely landed at the port of delivery, this is not to be underſtood as an authority for prolonging the riſk, after the ſhip's arrival at her port of delivery, for any indefinite length of time, at the pleaſure of the inſured; but the fair conſtruction of the clauſe is, that the goods ſhall remain under the protection of the policy for a *reaſonable time*, till they can be conveniently landed, and no longer.

As to the inſurance of the *ſhip*, the riſk, in ſome countries, is made to commence from the time ſhe begins to take in her firſt goods, or ballaſt, and to continue till after ſhe arrives at her place of deſtination, and is entirely diſcharged. In others, the riſk is made to end twenty-one days after the ſhip's arrival, or ſooner, if ſhe be unloaded. In France, if the time of the riſk on the ſhip be not regulated by the contract, it runs from the time ſhe ſets ſail, till her arrival at her port of deſtination, and till ſhe be there anchored and moored at the quay. In England, the commencement of the riſk on the ſhip varies in almoſt every caſe. In outward-bound voyages, it is generally made to commence from her beginning to load at her port of departure. Sometimes privateers on a cruize, ſhips engaged in the coaſting trade, or in ſhort voyages, are inſured for a limited period of time; and, in ſuch caſes, the riſk commences and ends with the term, wherever the ſhip may then happen to be. If a ſhip be inſured "*from*" the port of London to any other port, and before ſhe breaks ground, an accident happen to her, the inſurers are not anſwerable; for

for the riſk does not commence till ſhe ſets ſail on her departure from the port of London: but if the inſurance be "*at and from*" the port of London, the inſurers are liable for any accident that may happen to her, *from the time of ſubſcribing the policy*. When a ſhip, expected to arrive at a certain place abroad, is inſured "*at and from*" that place, or "*from her arrival*" there, the riſk begins from the firſt moment of *her arrival at the place* ſpecified; and the words "*firſt arrival*" are implied, and always underſtood in policies ſo worded. In ſuch caſes, the riſk continues there as long as the ſhip is preparing for the voyage inſured; but if all thoughts of the voyage be laid aſide, and the ſhip be ſuffered to lie there for a length of time, with the owner's privity, the inſurer is not liable; for this would be to ſubject him to the whim and caprice of the owner, who might chooſe to let the ſhip lie and rot there. In Engliſh policies, the riſk on the ſhip is uſually made to continue "until the ſhip hath moored at anchor twenty-four hours in good ſafety," and the inſurer is anſwerable for no loſs after the expiration of that time. If the ſhip, before the twenty-four hours are expired, be ordered to the proper place to perform quarantine, the riſk continues, though ſhe do not leave her moorings till long after the expiration of the twenty-four hours. Upon the ſame principle, if the ſhip, on her arrival at her port of deſtination, be ſubject to ſeizure under an embargo, and a declaration of repriſals, and ſhe be in fact ſeized within the twenty-four hours, though ſhe be permitted afterwards to load her cargo, the inſurer is liable. The riſk on the rigging, tackle, furniture, and proviſions of the ſhip inſured, continues no longer than they are attached to, or remain on board, the ſhip. But if it be neceſſary to put theſe articles on ſhore during a repair, which is the uſual practice in ſuch caſes, the riſk continues on them while on ſhore, and if they are loſt or damaged by any of the perils mentioned in the policy, the inſured is liable. An inſurance upon an India voyage includes the riſk of the country voyage by the uſage of the trade, with which, in this and other inſtances, the underwriter is preſumed to be fully acquainted. Thus an inſurance was made on a ſhip "at and from Bengal to any ports or places in the Eaſt Indies, China, Perſia, or elſewhere beyond the Cape of Good Hope, forwards and backwards, and during her ſtay at each place, until her arrival at London." In an action on this policy, tried before lord Mansfield, the plaintiff obtained a verdict. Upon a motion for a new trial, the court determined that, under all the circumſtances, the plaintiff was entitled to recover. The reaſons were, that the underwriters are preſumed to know the courſe of the Eaſt India trade, the terms of the charter-party, and the deſtination of the India ſhips, (which are under the direction of the company and not of their owners): that the charter-party is a printed form of very long ſtanding: that, beſides the liberty thereby given, to prolong the ſhip's ſtay for a year, it is very common, by a new agreement, to detain her a year longer; for no ſhip comes home in ballaſt, and the longer a ſhip is kept, the more beneficial to the owners: that the words of the policy are adapted to this uſage, being without limitation of time or place, and without any reference to the firſt voyage particularly mentioned in the charter-party: that the terms of the policy preciſely deſcribe the riſk in its utmoſt latitude, and neceſſarily extend to every prolongation of ſtay, and every country voyage: that the uſage of the India trade, and the courſe of the voyages in it, were notorious to inſurers, who muſt be ſuppoſed ſufficiently conuſant of them, and the obligation of the policy is taken from the uſage, and the words of the charter-party, which refer to that uſage, in the ſame manner as if it were expreſsly inſerted in the policy; whereas if every perſon inſured ſhould be obliged to ſtate to the inſurer all the grounds of his expectations, as to the ſhip's continuance in India, or her returning to England, it might produce great litigation and confuſion in caſes ariſing upon theſe policies: beſides, it would be contradictory to the policy, to ſay that the underwriter did not inſure for a country voyage.

If in a policy on an India voyage, there be liberty "to *touch*, *ſtay*, and *trade* at any ports or places;" this covers the riſk, even of a *ſecond* country voyage. In a like policy, the liberty was only to *touch* and *ſtay* at any port, &c. in the voyage, by the uſage of the trade. This covered the riſk on the intermediate voyages. Nevertheleſs, the general rule is, that a liberty to touch and ſtay at any ports and places, means only places in the uſual courſe of the voyage. A liberty to *touch* and *ſtay* does not authoriſe the inſured to break bulk and trade. If the voyage deſcribed in the policy has really been commenced, though at a time, and under circumſtances very different from thoſe which were in the contemplation of the parties at the time when the policy was effected; yet if there be no fraud, miſrepreſentation, or concealment on the part of the inſured, this ſhall be a good commencement of the riſk. Although the ſhip, through neceſſity, change the order of the places at which ſhe is to touch, yet if ſhe do not abandon the original voyage, the riſk continues.

In an inſurance upon *freight*, the riſk generally begins from the time when the goods are put on board. If an accident happen to the ſhip before any goods are put on board, which prevents her from ſailing, the inſured cannot recover for the loſs of freight, which the ſhip might have earned, if the accident had not happened; but if part of the cargo be put on board, and the reſt be ready to be ſhipped, the inſured may recover for the whole freight, upon a valued policy. If the ſhip be loſt on her way to her port of loading, or to a diſtant place where ſhe is to take in her cargo, the inſurer is liable for the whole freight.

If, after the inſurance is effected, any thing be done by the inſured to alter the nature of the riſk, this muſt be done with the conſent of the inſurers, otherwiſe it will avoid the contract. If a ſhip inſured as a private trader afterwards takes letters of marque, without the conſent of the underwriters, they are thus diſcharged, although no uſe be made of the letters of marque.

In connection with the ſubject of this article, we may add a few words on the loſs, *i. e.* the injury, or damage, which may be incurred by thoſe perils of the ſea that conſtitute the riſk, againſt which the inſurer undertakes to indemnify the inſured. This loſs may be either total or partial; the total loſs ſignifying, in a natural ſenſe, the abſolute deſtruction of the thing inſured; but, in a legal ſenſe, it means not only the total deſtruction, but likewiſe ſuch damage to the thing inſured, though it may ſpecifically remain, as renders it of little or no value to the owner. A loſs is alſo ſaid to be total, when, in conſequence of the misfortune that has happened, the voyage is loſt, or not worth purſuing; or, if the value of what is ſaved be leſs than the freight, &c. A partial loſs is any loſs or damage not amounting to a total loſs. Partial loſſes are ſometimes denominated "average" loſſes, becauſe they are ſuch as are the ſubjects of average contributions; and they are diſtinguiſhed into general and particular averages. Theſe loſſes may be incurred by the perils of the ſea, ſuch as the ſhip's foundering, ſtranding, or ſtriking ſuddenly againſt a rock, by running foul of another veſſel, by fire, by capture, (ſee RECAPTURE and RANSOM), by arreſt and detention of princes, by barratry, (ſee BARRATRY), by average contributions, by expence of ſalvage, or they may be wilful and fraudulent. The term *average*, derived from *averagium*, formed

formed from the verb *averare*, to carry, has been explained under that article. It is here used to signify a contribution made by the owners of the ship, freight, and goods on board, in proportion to their respective interests, towards any particular loss or expence sustained for the general safety of the ship and cargo; so as that the particular loser may not be a greater sufferer than the owner of the ship and the other owners of goods on board. This just and equitable contribution is called *general* or gross average, because it falls generally upon the whole or gross amount of the ship, freight, and cargo; and also to distinguish it from what is often, though improperly, termed *particular* average, but what, in reality, means a particular, and not a general loss, and has no affinity to average properly so denominated. The *petty* and *accustomed* averages are such as pilotage, towage, light-money, beaconage, anchorage, bridge-toll, quarantine, river-charges, signals, instructions, castle-money, pier-money, digging the ship out of the ice, &c. When these petty charges are incurred in the usual course of the voyage, they are not considered as a *loss* within the meaning of the policy, but only a necessary and ordinary expence; but if incurred for any extraordinary purpose in the voyage, as to provide against any impending danger, or in consequence of the ship's being driven out of her course by stress of weather, they will then be deemed gross or general average, for which the insurer will be liable. A contribution upon a general average can only be claimed when the sacrifice, occasioning the loss, was, after due deliberation, found to be indispensably necessary for the preservation of the ship and cargo, whenever it appears to have conduced to this purpose, and when the ship and rest of the cargo were actually saved. If goods put into lighters to enable a ship to get up a river be lost, the rest shall contribute; but if the ship be lost, the goods in the lighters shall not contribute. It has been said that the wages and expences of the crew during the detention of a ship unjustly captured, as well as the charge of reclaiming her, and that the charges of wages, &c. upon a ship that is obliged to go into port to refit after a storm, should be brought into a general average. This point has never been decided in a court of justice, but the principle seems to have been allowed by judges of great authority in cases that have occurred.

No injury occasioned by mere sea-damage can be the proper subject of a general average: as if the ship be damaged in her hull or her rigging, the goods on board shall not contribute; also, if a ship spring a-leak in a storm, by which goods on board are spoiled, this is a simple damage, or particular loss, and cannot be the subject of an average contribution.

The rule with regard to average contribution seems to be, that the ship, freight, and every thing remaining on board that can properly be deemed a part of the cargo, shall be subject to this charge; and therefore money, plate, and even jewels, must contribute according to their value. But the persons on board, their wearing apparel, and also the jewels and ornaments belonging to their persons, shall not contribute; neither are seamen's wages liable to contribution. When the captain arrives at his port of destination, it is his duty to settle the contribution; and the average, if not settled before, should be paid before the cargo is landed: for the owners of the ship have a *lien* on the goods on board, not only for the freight, but also to *answer all averages and contributions* that may be due. If he neglect his duty in this respect, Mr. Serjeant Marshall conceives that an action would lie against him, or against the owners. If the loss was in money paid, an action on the case for money paid would unquestionably lie against each person bound to contribute for his share; if in goods, a special action on the case, founded on the custom of trade, would lie against each person liable to contribute; or a bill in equity might be filed against them all. The mode of ascertaining each person's contribution, though not very accurately defined, is usually effected by ascertaining, after the ship's arrival at her port of discharge, the neat value of the ship, freight, and cargo, as if nothing had been lost; and valuing these at the price they would fetch in ready money at the port of discharge; and the neat amount, after deducting all charges, is the sum which is subject to the contribution; and each person's share of the loss will bear the same proportion to the value of his property, as the whole loss bears to the aggregate value of the ship, freight, and cargo. In England, some persons make the ship contribute for her full value and the freight; others, for half her value and one-third of the freight; and others, again, for half the value of the ship and freight: and she shall be valued at the price she was worth on her arrival at her port of delivery. The freight is valued at the sum the ship has earned on her arrival there.

As to the mode of valuing the jettison, it is now the settled practice with us to estimate the goods lost at the price they would have fetched at the port of delivery, on the ship's arrival there; freight, duties, and other charges being deducted. These contributions, under the general words of the policy, are a charge which the insurer is bound to pay; and it makes no difference whether the insured pay towards, or receive, this: he ought, in either case, to bear the proportion of the general loss, and that must fall on the insurers. For the loss by expence of salvage, see SALVAGE.

With regard to cases of wilful and fraudulent losses, the stat. 1 Ann. st. 2. c. 9. § 4 and 5. makes it a simple felony to destroy any ship, to the prejudice of the owners of the ship or goods on board; and takes away clergy, if committed on the high seas. And the 4 Geo. I. c. 12. extends this to the case of the owner or master who shall destroy any ship, to the prejudice of the owners of, or underwriters upon, goods. The 11 Geo. I. c. 29. takes away clergy from such offenders in all cases. See PIRATE.

In cases where the insured is entitled to call upon the insurer as for a total loss, he must "abandon;" that is, he must renounce and yield up to the insurer all his right, title, and claim to what may be saved, and leave it to him to make the most of it for his own benefit. The insurer then stands in the place of the insured, and becomes legally entitled to all that can be rescued from destruction. The idea of "abandonment," therefore, presupposes a total loss in this latter sense, and implies that something remains which may be saved, and which may be given up, or abandoned to the insurers. For if the insured could only abandon, in the case of a total loss, in the strict and natural sense of the words, there would be nothing to abandon, and abandonment would then be only an useless form. Some have said that the practice of abandoning dates its origin from the period when the contract of insurance itself first came into use; and yet it does not seem to be a right which necessarily results from the nature of the contract. It seems more probable that abandonment arose from the practice of occasionally introducing into policies particular stipulations, that if the thing insured should be spoiled, or greatly damaged, by any of the perils insured against, it should be abandoned to the insurers, who should be thereupon obliged to pay the entire sum insured; and that simply making good the damage should not be sufficient to discharge them: and such stipulations, being frequently introduced into the contract,

tract, became at length the foundation of general rules, which have been eſtabliſhed in ſome countries by poſitive law, and adopted in others as part of the general law of inſurance. In the firſt caſe of abandonment, that came before lord Hardwicke in the court of chancery, in the year 1744, he determined that where a recaptured ſhip and cargo were ſold to pay the ſalvage, the inſured had a right to abandon the ſurplus, and claim as for a total loſs.

By the law of inſurance, as underſtood in England, the inſured may abandon in every caſe, where, by the happening of any of the misfortunes or perils inſured againſt, the voyage is loſt, or not worth purſuing, and the projected adventure is fruſtrated; or where the thing inſured is ſo damaged, as to be of little or no value to the owner; or where the ſalvage is very high; or where what is ſaved is of leſs value than the freight; or where further expence is neceſſary, and the inſurer will not undertake, at all events, to pay that expence, &c. The ordinance of the marine of Lewis XIV. confines abandonment to the following five caſes: capture, ſhipwreck, ſtranding, arreſt of princes, or the entire loſs of the effects inſured. By the French law, the right to abandon ſeems to depend on the "ſpecies of misfortune" which has happened: with us, it depends rather on the "degree of loſs" ſuſtained in conſequence of it. Theſe general principles have been exemplified in caſes comprehending loſſes by capture and arreſt of princes, and alſo other loſſes. Capture, or arreſt of princes, is, *primâ facie*, a total loſs; and immediately upon the capture, or mere arreſt, or at any time while the ſhip continues under detention, the inſured may abandon, and give notice to the inſurer of his intention to do ſo; and thus entitle himſelf to claim as for a total loſs from the inſurer. There is, however, this difference between a policy *upon intereſt*, and a *wager* policy, that, in the one caſe, the inſured may, if he think proper, abandon the moment he has notice of a capture or detention; and this will bind the underwriters, whatever may be the ultimate fate of the ſhip. But in the caſe of a wager policy, there can be no abandonment, becauſe the inſured has nothing to abandon. Nevertheleſs, a capture or arreſt does not neceſſarily terminate in a total loſs: for if a captured ſhip be retaken, and permitted to proceed on her voyage, ſo that ſhe ſuffers but a ſmall temporary inconvenience, this would only be a partial, and not a total loſs. Neither does a recapture neceſſarily deprive the inſured of the right to abandon. The rule is, that if the thing inſured be recovered before any loſs is paid, the inſured is entitled to claim as for a total, or a partial loſs, according to the final event; that is, according to the ſtate of the caſe at the time he makes his claim. But if, after a total loſs has been actually paid, the thing inſured be recovered, the inſurer cannot oblige the inſured to refund the money he has received; but he ſhall ſtand in the place of the inſured: thus no injuſtice is done. Two caſes are adduced to ſhew that, though a captured ſhip be recaptured, yet if the voyage be loſt, the loſs will be total, and the inſured will have a right to abandon. In one caſe, a ſhip is taken and retaken, and ſold in a diſtant country to pay the recaptors for the ſalvage, and the reſidue of the produce of the ſales remains in the court of admiralty there; and in this caſe the inſured may abandon, and recover as for a total loſs. In the ſecond caſe, a ſhip, after throwing part of the cargo overboard in a ſtorm, and being diſabled from proceeding on her voyage, till refitted, was captured, and her crew taken out; but, after being eight days in poſſeſſion of the enemy, was recaptured, and carried into an Engliſh port; upon which the inſured gave notice to abandon. Before the ſhip could be refitted, the reſt of the cargo was ſpoiled. This was a total loſs, and the inſured entitled to abandon. A title to reſtitution, ariſing from recapture, cannot take away a veſted right to abandon, if the ſhip is unfit to perform the voyage. Serjeant Marſhall obſerves, that he cannot find a ſingle book, ancient or modern, which does not ſay that, in caſe of a ſhip *being taken*, the inſured may demand as for a total loſs, and abandon; and the propoſition is proved more ſtrongly by the general law which warrants him to abandon, in the caſe merely of arreſt, or an embargo, by a prince not an enemy. If, indeed, the capture proves but a ſmall temporary hindrance, the inſured cannot abandon. The inſured is in no caſe obliged to abandon; but he may abandon, if the voyage be defeated, or not worth purſuing: nevertheleſs he cannot, merely by abandoning, turn a partial into a total loſs. It is not univerſally true, that becauſe a ſhip has once been captured, the inſured may abandon at any time afterwards. The rule is, that if the thing inſured be recovered before any loſs is paid, the inſured is only entitled to a partial or a total loſs, according to the final event. By the marine law, the property was not changed by the capture, till after condemnation; but ſince the 29 Geo. II. c. 34. the "jus poſtliminii" continues for ever. While the ſhip is in the hands of the enemy, ſhe is conſidered as totally loſt; yet the property is not changed, but reverts to the original owner, upon a recapture. But a recapture does not, in all caſes, prevent the loſs being total. If the voyage be abſolutely loſt, or not worth purſuing; if the ſalvage be very high; if further expence be neceſſary; if the inſurer will not engage, at all events, to bear that expence, though it ſhould exceed the value, or fail of ſucceſs:—under theſe, and many other ſimilar circumſtances, the inſured may diſentangle himſelf, and abandon, notwithſtanding a recapture. Upon a recapture, the property returns to the original owner, pledged for the ſalvage. Although there has at one time been a total loſs, yet the inſured cannot abandon, after the *final event* has determined it to be only a partial loſs at the time of the action brought. There is no veſted right to recover as for a total loſs, till the inſured, having a right to abandon, elects to do ſo. If the thing inſured be recovered before the loſs is paid, the inſured can only recover according to the final event. If a ſhip be recovered after a long detention, it is not a total loſs, even upon a wager policy. When the ſhip is ſafe, and the voyage is not loſt, the inſured ought not to be permitted to abandon. The inſurer ought never to pay leſs than the value of the loſs, nor the inſured receive more. The inſured can only recover an indemnity for his loſs, at the time of the action brought, or offer to abandon. If, after a total loſs has been paid, the ſhip be reſtored, the inſured ſhall not be obliged to refund the money, and take the ſhip or goods. If, upon a recapture, the captain ſell the ſhip and cargo, as being the beſt courſe to take for all parties concerned, the inſured may abandon, and recover as for a total loſs. If the captain purchaſe the ſhip from the captors, for account of his owners; the money paid, being in nature of a ſalvage, is only a partial loſs.

There are other caſes, beſides capture and arreſt of princes, in which the right of abandoning may be conſidered. Shipwreck is generally a total loſs; but the mere ſtranding of the ſhip is not, of itſelf, deemed a total loſs, ſo as to entitle the inſured immediately to abandon. It is a rule that, to entitle the inſured to abandon, there muſt have been, at ſome period of the voyage inſured, or during the continuance of the riſk, a total loſs, and caſes have occurred, from which it appears that no partial loſs, however great,

occa

occaſioned by the perils of the ſea, can be turned into a total loſs. But if the voyage be loſt, from whatever cauſe, it is a total loſs, not only of the ſhip and freight, but alſo of the cargo, if no other ſhip can be procured to carry it to its port of deſtination. If a cargo be damaged ſo as to be reduced in value to leſs than the freight, it will be a total loſs.

Another circumſtance to be here conſidered is the time within which the inſured may abandon. In France, Spain, and Holland, the times are limited by law, according to the diſtance of the place where the loſs happens, within which the abandonment muſt be made. In England no time is limited by law for abandoning; but our courts have laid down a rule, which ſeems better ſuited to the practice of commerce, and more likely to prevent frauds than thoſe juſt alluded to. This rule is, that as ſoon as the inſured has received advice of a total loſs, he muſt make his election whether he will abandon or not; if he determines to abandon, he muſt give the underwriters notice of this "within a reaſonable time" after the intelligence arrives; and any unneceſſary delay in giving this notice will amount to a waver of his right to abandon, for unleſs the owner does ſome act, ſignifying his intention to abandon, it will be only a partial loſs, whatever may be the nature of the caſe, or the extent of the damage. When the inſured has determined to abandon, and to demand as for a total loſs, he is not obliged, as in ſome foreign countries, to make a formal proteſt, but merely to give notice of the loſs to the underwriters, and of his determination to abandon. But there is no particular form for this purpoſe; in whatever form an abandonment is declared, it muſt be explicit, and it is not to be taken as matter of inference from an equivocal act. The notice may be given either to the underwriter himſelf, or to the agent who has ſubſcribed for him. If the inſurance be entire, the inſured cannot abandon for part only; but if different articles be ſeparately inſured, or ſeparately valued, any one of them may be abandoned. The abandonment muſt be ſimple and unconditional, otherwiſe it will not transfer the entire property to the inſurers, which conſtitutes the eſſence of the abandonment. If, therefore, I abandon a captured ſhip, on condition that in caſe ſhe ſhall be releaſed, ſhe ſhall continue my property, and I ſhall repay with intereſt the ſum which the inſurers ſhall have paid me, ſuch an abandonment would be void.

As to the effect of an abandonment, we obſerve that it transfers the property inſured to the inſurers in proportion to their reſpective ſubſcriptions; and this transfer relates back to the commencement of the voyage. As in England freight is inſurable ſeparately from the ſhip, the abandonment of the ſhip does not, as in France, transfer to the inſurer the freight ſhe has earned. Where the intereſt of the inſured is not entirely covered by the inſurance, he may abandon to the extent of the ſum inſured; for he is his own inſurer for the reſidue. If goods be partly inſured, and money borrowed on reſpondentia for the reſidue, the inſurer will have the legal title to what is abandoned, and the lender only an equitable claim to his proportion. If there be three inſurances; one on the ſhip and cargo, one on the ſhip only, and one on the cargo only; Emerigon thinks, that the inſurers on the ſhip and cargo have an equal claim on the effects ſaved, with the inſurers on the cargo only, and that they have a like claim on the freight, and the remains of the ſhip, with the inſurers on the ſhip only, in proportion to their reſpective ſubſcriptions; *e. g.* If a ſhip be valued at 5000*l.*, the cargo 5000*l.*, making a total of 10,000*l.*, and theſe are inſured by different policies, thus:

On ſhip and cargo - -	£3000
On the ſhip only - -	3000
On the cargo only - -	3000
Uninſured - - -	1000
	10,000

A ſhipwreck happens, and the net proceeds of the wreck of the ſhip are 500*l.*, and of the cargo 500*l.*, total 1000*l.*; Emerigon would adjuſt the claims of all parties thus:

To the owners for their part of ſhip and cargo uninſured, - - - - -	£100
To the inſurers on ſhip and cargo, a moiety of the produce of the wreck, - - -	225
The like to the inſurers on the ſhip, - -	225
To the inſurers on the cargo, a moiety of the produce of the goods ſaved, - - -	225
The like to the inſurers on the ſhip and cargo, -	225
	1000

By this adjuſtment the inſurers on the ſhip and cargo would have a double ſhare of the effects abandoned, which is manifeſtly unjuſt. An Engliſh merchant would, we conceive, adjuſt the different claims thus:

To the owners for their part of ſhip and cargo uninſured, - - - - -	£100
To the inſurers on ſhip and cargo, a moiety of three-fifths of the produce of the wreck, - -	150
To the inſurers on the ſhip, three-fifths of the produce of the wreck, - - - -	300
To the inſurers on the cargo, three-fifths of the produce of the goods ſaved, - - -	300
To the inſurers on the ſhip and cargo, a moiety of three-fifths of the produce of the goods ſaved, -	150
	1000

The abandonment does not only entitle the underwriters to all that can be ſaved of the effects inſured; but if compenſation be made to the inſured for the injury from which the loſs aroſe, this compenſation ſhall go to the underwriters; for when they have paid the loſs, they, and not the inſured, are the real ſufferers.

If, after a total loſs happening, the ſhip be abandoned, but ſhe afterwards arrives ſafe, this ſhall not avoid the abandonment; but the inſurers ſhall have all the profit of the voyage. But they cannot compel the inſured to take back the thing inſured and refund the money.

An abandonment once properly made upon a ſufficient ground, and accepted by the inſurers, is abſolute and binding upon both parties; nor can it be revoked but by mutual conſent; but if it be not upon ſufficient ground, it will be void.

In caſe of misfortune, the inſured is bound to uſe his endeavours to ſave as much as poſſible; and to enable him to do this, without prejudicing his right of abandonment, our policies make ſeveral proviſions for certain acts to be performed for this purpoſe, without prejudice to the inſurance, "to the charges of which, the inſurers agree to contribute, each according to the rate and quantity of his ſubſcription." The captain, in particular, is to exert himſelf to the utmoſt of his power in the preſervation both of the ſhip and cargo; and for whatever is recovered of the effects inſured, he is accountable to the inſurers.

We

We ſhall here ſubjoin a few remarks on the adjuſtment of loſſes. In the adjuſtment of a loſs, the firſt thing to be conſidered is how to aſcertain the "quantity of damage" for which the underwriters are liable; and the next point to be ſettled is by what rule this ſhall be "appretiated." In order to aſcertain the quantity of damage, the inſured ought to know whether the loſs be total or partial; if it be total, and the policy is a valued one, the inſured is entitled to receive the whole ſum inſured, ſubject to ſuch deductions as may have been agreed, by the policy, to be made in caſe of loſs. On a valued policy, the value is admitted, and the inſured has only to prove, if the inſurance was on goods, that the goods valued were on board. Upon an open policy, it is moreover neceſſary to prove the value of them, for which value (not exceeding the ſum inſured) the inſurers are reſponſible. But in the caſe of a partial loſs, the indemnity, ſecured by either ſort of policy, is, that if the thing inſured do not come ſafe to the deſtined port, but is leſſened in value by damage received in the voyage, the loſs ſhall be borne by the inſurer. When the loſs conſiſts in the total loſs of one entire individual parcel of the goods inſured, and this is capable of a diſtinct valuation; as if, out of 100 hogſheads of ſugar, 10 are loſt, the inſurer muſt pay the value of the 10. When a part of the goods inſured is ſaved, and this exceeds the amount of the freight, the practice is to deduct the freight from the ſalvage, and to make up the loſs upon the difference. But where the freight exceeds the ſalvage, then it is a total loſs. Where the goods inſured are damaged in the whole or in part, it is neceſſary to aſcertain the quantity of ſuch damage, by taking the value of the damaged goods from the prime coſt, and the remainder will be the amount of the loſs. If ſeveral articles be inſured for one entire ſum, but with a diſtinct valuation to each, and only one be put in riſk; if that one be loſt, the inſured ſhall recover ſuch a proportion of the ſum inſured as the value of the article bore to the value of the whole. If there be a clauſe in the policy, to be free of average from a particular riſk, under ſo much *per cent.*, and a loſs occaſioned by that riſk takes place, the proportion which the loſs bears to the cargo muſt be calculated upon the cargo which was on board when the loſs happened, not upon that which was on board at any other time.

In appretiating the loſs, averages are ſettled according to the price of the articles at the time of ſettling. This is the rule of the Rhodian law, and of the laws of Wiſbuy. In France, where almoſt all policies are valued, the inſured has his election to fix the previous valuation, either at the prime coſt, or at the current price at the time and place of loading. The ſame rule that applies to goods, applies alſo to the ſhip, which is always valued at the ſum ſhe is worth at the time of her departure, or at leaſt at the commencement of the riſk. Goods brought from a diſtance, may be valued at their improved price; but in France it is uſually ſtipulated in the policy, that the ſhip ſhall remain of the ſame value during the voyage.

In England, if the policy be an open one, it is an invariable rule to eſtimate a total loſs at the prime coſt of the goods; that is, the invoice price, and all duties and expences till they are put on board, together with the premium of inſurance. A ſhip is valued at the ſum ſhe is worth at the time ſhe ſails on the voyage inſured, including the expences of repairs, the value of her furniture, proviſions and ſtores, the money advanced to the ſailors, and, in general, every expence of the out-fit, to which is added the premium of inſurance.

A partial loſs, upon either ſhip or goods, is that proportion of the prime coſt, which is equal to the diminution in value occaſioned by the damage. And in a caſe which occurred with regard to a valued policy upon goods, it was determined that the diminution in value was that proportion of the value, in the policy, which the difference between the price of the ſound, and the price of the damaged, bore to the price of the ſound in the port of delivery. An inſurer is never to be involved in the riſe or fall of the market.

An adjuſtment being indorſed on the policy, and ſigned by the underwriters, with a promiſe to pay in a given time, is *primâ facie* evidence againſt them, and amounts to an admiſſion of all the facts neceſſary to be proved by the inſured to entitle him to recover in an action on the policy. It is like a note of hand, and being proved, the inſured has no occaſion to go into proof of any other circumſtance. An adjuſtment, however, may be impeached by ſhewing that the underwriter was induced to ſign it by ſome fraud or concealment, or by ſome miſconception of the law or fact. Marſhall's Treatiſe on the Law of Inſurance. See POLICY, RECAPTURE, and WARRANTY.

In matters of inſurance, it is a maxim, that all is never to be riſked on one bottom, or in the ſame veſſel; to denote, that aſſurers muſt act with diſcretion in the ſigning of policies, and not hazard too much on each veſſel; there being more to be expected from ſeveral than from one.

RISKUPITZ, in *Geography*, a town of Moravia, in the circle of Znaym; 9 miles W. of Krumau.

RISÖER, a ſea-port town of Norway, in the province of Chriſtianſand, on a peninſula projecting into the North ſea; 52 miles N.E. of Chriſtianſand. N. lat. 58° 43′. E. long. 9° 29′.

RISOLUTIONE, Ital. in *Muſic*, the reſolution of a diſcord. See DISCORD, and PREPARATION.

RISOLUTO, Ital. reſolved ſolution, as of a cloſe canon by putting it in ſcore, or by ſigns.

RISORIUS NOVUS, in *Anatomy*, a name given by Santorini to a muſcle, formed of that part of the quadratus genæ which ariſes from the cheek. See QUADRATUS *Genæ*.

RISPOSTA, or RIPOSTA, Ital. an *anſwer*, whether in a dialogue or to a regular fugue. For the bringing in the anſwer to a fugue agreeable to the rigid laws eſtabliſhed by the fathers of the ſcience, the old eccleſiaſtical compoſers, there are many rules to be obſerved. See FUGUE.

RISS, or RUSS, in *Geography*, a river of Germany, which paſſes by Biberach, and runs into the Danube, about ſix miles above Ulm.

RISTI, a town of Sweden, in the province of Cajana; 25 miles N.E. of Cajanaborg.

RISTIGOUCHE RIVER, a river of Canada, which runs into Chaleur bay, navigable for ſhips 20 miles from its mouth. It abounds with ſalmon and wild fowl. On its N. bank, near its mouth, is an Indian village.

RISTORFF, a town of Auſtria, near Schwannaſtadt.

RISVIGLIATO, Ital. in *Muſic*, when applied to a gay and lively movement ſucceeding one that is ſorrowful, implies vivacity and ſpirit.

RISUM, in *Geography*, a town of Eaſt Frieſland; 6 miles W. of Emden.

RISUS. See LAUGHTER, and LUNGS.

RISUS *Caninus* is a kind of laughter in which the lips are contracted, ſo as to ſhew all the teeth.

RISUS *Sardonius*, Sardonian laughter, is a forced, ſpiteful laughter; or a laughter that does not go beyond the teeth.

The phraſe is by ſome ſaid to be founded on this, that in Sardinia there is a venomous plant, which occaſions ſuch a contraction of the muſcles of the face in perſons it kills, that they ſeem to die laughing in this manner.

RISZOW, in *Geography*, a town of Poland, in the palatinate of Kiev; 30 miles N.E. of Bialacerkiev.

RITA, a town of Brasil, in the government of Goyas; 80 miles E. of Villaboa.

RITARDATO, and RITARDANDO, Ital. in *Music*, is relaxing the measure; better expressed now by *rallentando*, which see.

RITCHEL, in *Geography*, a branch of the river Indus, which separates a little above Tatta, and runs into the Arabian sea, N. lat. 24° 15′. E. long. 66° 43′.

RITE, RITUS, in *Theology*, denotes the particular manner or form of celebrating or performing the religious ceremonies, which obtains in this or that place.

The eastern people, Armenians, &c. celebrate divine service according to the Greek rite. The western world follow the Latin rite; or that of the Roman church.

The English observe the rite of the church of England, prescribed in the book of Common Prayer, &c.

RITHER, or RIDER, in *Mining*, is a stone or thin clift that lies in the vein; the ore sometimes runs on both sides it. Sometimes the rither is so thick, that it parts the vein, and makes one vein two.

RITIA, in *Ancient Geography*, *Sheebah*, a town of the interior of Africa, in Mauritania Cæsariensis, situated S. of Victoria. It is mentioned by Ptolemy; and still exhibits some fragments of Roman walls.

RITORNELLO, or REFRET, in *Music*, the burden of a song, or a repetition of the first or other verses of the song, at the end of each stanza or couplet.

The word is Italian, and signifies properly a *little return*, or a short repetition, such as that of an echo, or of the last words of a song; especially when the repetition is made after a voice, by one or more instruments.

But custom has extended the use of the word to all symphonies, played before the voices begin, and which serve by way of prelude or introduction to what follows.

In the partitions or score of the Italian music, we frequently find the ritornellos signified by the words *si suona*, to shew that the organ, harpsichord, piano-forte, or the like, are to repeat what the voice has been singing.

In accompanied recitatives, the ritornels, or interstitial symphonies, are not repetitions of vocal passages; but are often beautiful and picturesque periods of symphony, expressive of the sentiments and situation of the singer.

RITRO, in *Botany*, corrupted, as it seems, from the ῥυτρον of Theophrastus, as far as can be conjectured, appears to have been some plant of the thistle kind. The name is now used as the specific appellation of a kind of ECHINOPS; see that article.

RITROGRADO, Ital. in *Music*. See RETROGRADE.

RITSCHA, in *Geography*, a town of Bohemia, in the circle of Kaurzim; 12 miles S.E. of Prague.

RITSCHENHAUSEN, a town of Germany, in the county of Henneberg; 3 miles S.S.E. of Meinungen.

RITSCHIEN, a river of Stiria, which runs into the Laufnitz, 4 miles S.E. of Furstenfeld.

RITSON, TRISTRAM, in *Biography*, born about the year 1580, at Winscott, in Devon, was educated at Great Torrington, and by his rapid progress in learning he very soon became fitted for the higher improvements of the university of Oxford, of which he was admitted a member, being entered probably of Exeter or Pembroke college, about the latter end of the reign of queen Elizabeth. At Oxford he was much distinguished for his learning, and his accomplishments as a gentleman. He, however, appears to have left college without taking any scholastic degree, and retired into his own country, which, according to his biographer, was probably owing to the death of a sister, upon which he became possessed of the estate of Winscott. Here he drew up a large volume, entitled "The Chorographical Description or Survey of the County of Devon, with the City and County of Exeter, containing Matter of History, Antiquity, Chronology, the Nature of the Country," &c. It was begun in 1605, and finished in 1630.

The author did not print this Description, but a great many manuscript copies were long in circulation in the county. A mutilated edition of it was printed in two volumes 8vo. in 1714: it was afterwards printed from the original in one volume 4to. in 1735. But the most perfect and valuable edition was published in 1811, from a manuscript edition in the possession of John Coles, esq. of Stonehenge; to which the editors made some important additions, and prefixed, as an introduction, which renders the volume much more interesting, "Remarks on the present State of the County of Devon," the object of which was to compare the present and past conditions of the county in those particulars to which the author directed his attention, and to add a brief account of such subjects as either escaped his notice, or have acquired their existence or importance since his time.

Mr. Ritson lived to a great age, dying in the year 1640; he was interred at St. Giles Winscott, without tomb or monument. "He," says Prince in the Worthies of Devon, "that with great expence of money, time, and labour, sought to perpetuate the memory of many persons and families, hath no monument to continue his own; unless that lasting one his "Survey of the County of Devon."" See Chorographical Description, ed. 1811.

RITSON, JOSEPH, was born in 1752, at Stockton on Tees, in the county of Durham, and was brought up to the profession of the law. As a consulting barrister and conveyancer he was very much distinguished: but his literary enquiries were by no means confined within the limits of his profession; he very successfully investigated the old English literature, particularly of the seventeenth century. He died in the year 1803. His works are "Observations on Johnson's and Stevens's Edition of Shakspeare;" "Cursory Criticisms on Malone's Edition of Shakspeare;" "Observations on Warton's History of English Poetry;" "Descent of the Crown of England;" "Collection of English Songs, 3 vols. and of Scotch Songs, in 2 vols.;" "English Anthology;" "Metrical Romances," 3 vols.; "Bibliographia Poetica;" "A Treatise on Abstinence from Animal Food;" and other pieces. As an historian, he was rigidly accurate; as a critic, he was uncharitable and severe. The language of his writings is harsh, rugged, and barren; and all his publications are farther disfigured by the affected singularity of their orthography. Monthly Mag. Nov. and Dec. 1803, and Gent. Mag.

RITTANGEL, JOHN-JOSEPH, a learned professor of the Oriental languages, at Königsberg, in the 17th century. According to some writers he was born of Jewish parents, and educated in the religion of his fore-fathers, but afterwards became a convert to Christianity; others assume that he was a German by birth, and educated in the principles of Popery, and that he became a convert to the institutions of Moses, and received circumcision at Hamburgh, but that in more mature life he embraced the Protestant religion, becoming at first a Calvinist and afterwards a Lutheran. On the authority of a letter given by Bayle, he was a native of Forcheim in Franconia, in the diocese of Bamberg, and brought up to the Roman Catholic faith. Having become a proficient in classical learning, his attention was directed to the study of the oriental languages, and he went to Constantinople, where he remained twelve years, and during that time

time had much intercourſe with the learned Jews in that city. Upon his return into Germany he embraced the Lutheran religion, and went to Königſberg, where the elector of Brandenburg appointed him profeſſor extraordinary of the Hebrew tongue. He devoted himſelf now to the illuſtration of the antiquities of the Jews, and the production of evidence from their writings in ſupport of the truth of Chriſtianity, or of doctrines commonly reputed orthodox. His writings contain ſevere criticiſms on the productions of Kircher, Scaliger, Voſſius, the Buxtorfs, and other learned men, whoſe proficiency in the Hebrew tongue he affected to hold in low eſtimation. The time of his death is uncertain, but by a dedication to one of his pieces, it is known that he was living in the year 1652. He was author of the following works: "Liber Jezira, qui Abrahamo Patriarchæ adſcribitur, una cum Comment.;" "Liber Veritatis, &c." intended to prove that the ancient Jewiſh church believed the myſtery of the Trinity, and the eternal divinity of the Meſſiah; and ſeveral others.

RITTEBURG, in *Geography*, a town of the county of Mansfeld; 2 miles S.S.E. of Artern.

RITTENHOUSE, David, in *Biography*, a diſtinguiſhed American philoſopher and mathematician in the 18th century, was a native of Pennſylvania, and born in the year 1732. By the dint of genius and application, he was enabled to mingle the purſuits of ſcience with the active employments of a farmer and watch-maker. The latter of theſe occupations he filled with unrivalled eminence among his countrymen. Some of its nicer operations continued to be his favourite mode of relaxation during all the ſubſequent periods of his life. In the year 1769, he was invited by the American Philoſophical Society to join a number of gentlemen who undertook to obſerve the tranſit of Venus; when he particularly diſtinguiſhed himſelf by his obſervations and calculations. He afterwards conſtructed an obſervatory, where he made ſuch valuable obſervations and diſcoveries, as tended to the general diffuſion of ſcience in the weſtern world. During the American war, the philoſopher did not claim an exemption from the duties of patriotiſm; he thought, ſpoke, and acted like a free man. After the concluſion of it, he ſucceſſively filled the offices of treaſurer of the ſtate of Pennſylvania, and director of the national mint: in the firſt of which he manifeſted incorruptible integrity, and in the laſt, the rare talent of combining theories in ſuch a way as to produce correct practical effects. He ſucceeded the illuſtrious Franklin in the office of preſident of the American Philoſophical Society; but towards the cloſe of his days he withdrew from public life, and ſpent his time in retirement. "There," ſays one of his eulogiſts, "we behold him the object of love, admiration, and reverence. In his intercourſes of friendſhip, ſincerity and ſimplicity went hand in hand. A ſtranger to the too common arrogance of high pretenſions, he met every man on the ground of friendly reciprocity. Feeling a ſuperior attachment to thoſe who propagated ſcience, he did not conceal the eſtimation in which he held them. He was among the firſt to welcome to America the perſecuted philoſopher of England (Prieſtley), and formed with him an intimacy which only required time to be cemented into a laſting friendſhip." After a very ſevere illneſs of a few days' continuance, he died on the 10th of July 1796, about the age of 64. He had the degree of L.L.D. conferred upon him. To the "Tranſactions" of the American Philoſophical Society he contributed ſeveral excellent papers, chiefly on aſtronomical ſubjects. Gentleman's Mag. Sept. 1796. Monthly Mag. Oct. 1796.—M.

RITTERA, in *Botany*, named by Schreber in honour of Dr. John James Ritter, a native of Berne in Switzerland, who practiſed as a phyſician, in Sileſia, during the middle of the 18th century, and who was the author of various tracts upon Natural Hiſtory. Schreb. 364.—It is now referred to Swartzia; ſee that article.

RITTERSHUYS, Conrad, in *Biography*, a learned juriſt and philologiſt, was born at Brunſwick in 1560. After having made a great progreſs in the learned languages, he went to Helmſtadt for the ſtudy of theology, but his inclination led him to prefer juriſprudence. He removed to Altdorff for the further purſuit of this ſtudy, and thence to Ingolſtadt. He took the degree of doctor of law at Baſil in 1591, and was nominated profeſſor in that ſcience at Altdorff, where he died in 1613. He was the author of "Jus Juſtinianeum, ſive Novellarum Methodica explicatio," 1615, 4to. His philological labours were notes on "Petronius" and "Phædrus;" commentaries on "Salvianus;" on "Oppian de Venatione et Piſcatione," with a Latin verſion; "Guntheri Ligurinus;" "Sacrarum Lectionum, Lib. viii."

Rittershuys, Nicholas, ſon of Conrad, born at Altdorff in 1597, was alſo a man of learning and a juriſt, and particularly applied to hiſtorical and genealogical enquiries. He ſtudied at Helmſtadt, and afterwards travelled into various countries of Europe. On his return he took a doctor's degree in 1634, and was appointed profeſſor of feudal law at Altdorff. He died in 1670. Nicholas edited ſeveral of his father's works, and in 1638 publiſhed an oration on "Hanno's Periplus." He was the author of a large folio, entitled "Genealogiæ Imperatorum, Regum, Ducum, Comitum, &c. ab Anno 1400 ad Annum 1664." Several of his letters are printed in the "Epiſtolæ celebrium Virorum," 1705.

RITUAL, Rituale, a church-book, directing the order and manner of the ceremonies to be obſerved in celebrating divine ſervice in a particular church, dioceſe, religious order, or the like.

The ancient heathens had, likewiſe, their rituals, or *rituales libri;* thoſe of the Etrurians were much famed. See Aruspici *Libri.*

Theſe books contained the rites and ceremonies to be obſerved in the building of a city, in the conſecrating of a temple or an altar, in ſacrificing and deifying, in dividing the curiæ, tribes, centuries, and, in general, in all their religious ceremonies.

There are ſeveral paſſages in Cato's books, De Re Ruſtica, which may give us ſome idea of the rituals of the ancients.

"The principal difference (ſays biſhop Stillingfleet, Orig. Brit. p. 287.) between the Roman and Gallic ritual of St. Germanus, which the Britons had adopted before the arrival of St. Auſtin, was in the *church muſic*, in which the Romans were thought to excel other weſtern churches ſo far, that the goodneſs of their muſic was the principal incitement to the introduction of their offices."

RITZEBUTTEL, in *Geography*, a town of the duchy of Bremen, on a ſmall river, which runs into the German ocean, between the mouths of the Elbe and the Weſer; 38 miles N. of Bremen. N. lat. 53° 52′. E. long. 8° 37′.

RITZENBUTTEL, a town of the duchy of Bremen.

Ritzenbuttel, or *Ritzbuttle*, is a ſmall town, containing about 200 houſes, half a mile from Cuxhaven, with a caſtle garriſoned by Hanoverians. The road for foot-paſſengers, from Ritzbuttle to Cuxhaven, is on a cauſeway, raiſed about eight feet from the carriage-road; but being made of clay, it is, in wet weather, extremely dirty and ſlippery. The road for carriages is very bad. The port of

of Cuxhaven having only two or three ſmall hovels, and a wind-mill, the paſſengers by the packets reſide during their ſtay at Ritzbuttle.

RIVA, or RIFF, a town of the county of Tyrol, at the end of the Garda lake; 16 miles W.S.W. of Trent.—Alſo, a river of the Tyroleſe, which runs into lake Garda, near the town of the ſame name.—Alſo, a town of France, in the department of the Po, ſeated on an eminence, in the middle of a plain, which extends to the W. and S., and is nearly ſurrounded with water, over which are two bridges, one of wood, the other of ſtone. The adjacent hills are covered with vines and fruit-trees, and the plain produces abundance of grain; moſt of the houſes within the walls are furniſhed with gardens; two miles E. of Chieri.—Alſo, a town of Italy, in the bailiwick of Lugano; 8 miles S. of Lugano.—Alſo, a town of Italy, in the Valteline; 6 miles S. of Chiavenna.—Alſo, a town of Italy, in the department of the Mela; 14 miles N.N.W. of Breſcia.—Alſo, a town of the Ligurian republic; 6 miles N.N.E. of Savona.

RIVAGE, RIVAGIUM, a toll anciently paid to the king on ſome rivers, for the paſſage of boats or veſſels therein.

RIVAL, RIVALIS, a term of relation applied to two perſons who have the ſame pretenſion.

It is properly uſed for a competitor, in love; and figuratively, for an antagoniſt in any other purſuit. The intrigues of comedies and romances uſually turn on the jealouſies of rivals, who diſpute for the ſame miſtreſs.

The lawyers derive the word from the Latin *rivus, ſtream, quod ab eodem rivo aquam hauriant.*

Donatus ſuppoſes it to have been formed hence, that beaſts coming to drink at the ſame brook, or fountain, frequently quarrel.

Cælius ſays, that rivales were originally ſuch whoſe fields were parted by a brook or rivulet, the courſe of which being liable to be varied ſeveral ways, occaſioned frequent diſputes and law-ſuits.

RIVALTA, in *Geography*, a town of France, in the department of the Po, on the Sangon; 6 miles S.W. of Turin.—Alſo, a town of Italy, in the department of the Olona; 15 miles E. of Milan.

RIVANNA, a river of Virginia, which unites with the Fluvanna, to form James river, about two miles above Elk iſland. It is navigable for canoes and batteaux, to its interſection with the S.W. mountains, about 22 miles.

RIVAROLI *de Fuori*, a town of Italy, in the department of the Mincio; 20 miles S.W. of Mantua.

RIVAROLO, a town of France, in the department of the Po, on the Orco; 15 miles N. of Turin.

RIVAULT, DAVID, in *Biography*, a French man of letters and various writer, was born at Laval, in the province of Perche, about the year 1571. He was brought up in the family of the count de Laval, and for ſome time followed the military profeſſion, ſerving in Italy about the cloſe of the 16th century, and in Holland in the year 1602. During the following year, Henry IV. appointed him one of the gentlemen of his bed-chamber. In 1605 he accompanied the young count de Laval into Hungary, and entered into the ſervice of the emperor againſt the Turks. On his return to his native country, he devoted himſelf to literary and ſcientific ſtudies, in which he had before made conſiderable progreſs. In 1611 he was appointed ſub-preceptor to the young king Lewis XIII., and had a penſion of 3000 livres ſettled upon him. The office of principal preceptor becoming vacant during the next year, he received that appointment, and was honoured with the title of counſellor of ſtate. In 1614, the king conferred on him letters of nobility. He died at Tours, in 1616, about the age of 45. He is ſpoken of with high eſteem by ſeveral of the moſt celebrated writers of his time, particularly by Caſaubon, Scaliger, Voſſius, Erpenius, and Menage. His works conſiſt of "The States, or a Diſcourſe concerning the Privileges of the Prince, the Nobles, and the third Eſtate," &c.; "Elements of Gunnery," which is a curious and very ſcarce work; "Archimedis Opera quæ extant, Gr. et Lat. novis Demonſtrationibus illuſtrata;" &c. folio, and other pieces.

RIVE *de Gier*, in *Geography*, a town of France, in the department of the Loire, and chief place of a canton, in the diſtrict of St. Etienne; 4 miles N.E. of St. Etienne. The place contains 4263, and the canton 15,089 inhabitants, on a territory of 160 kiliometres, in 13 communes.

RIVEL *de les Semals*, a town of France, in the department of the Aube; 9 miles W.N.W. of Quillan.

RIVELLES, a town of Spain, in Catalonia; 12 miles N. of Cervera.

RIVELLO, a town of Naples, in the province of Baſilicata; 12 miles S.E. of Lauria.

RIVER, FLUVIUS, or *Flumen*, a ſtream or current of freſh water, flowing in a bed or channel, from a ſource or ſpring, into the ſea.

If the ſtream be not large enough to bear boats, or ſmall veſſels, loaden, it is properly called, in Engliſh, by the diminutive *rivulet*, or *brook*; by the Latins *rivus*; and by the French *rivière*. If it will only bear ſuch veſſels, the Latins call it *amnis*. If it be conſiderable enough to carry larger veſſels, it is called by the general name *river*; by the Latins *fluvius*, and *flumen*; and by the French *fleuve*; between all which the difference is only as to greater and leſs.

Some will have none to be properly rivers, except thoſe which bear the ſame name from their ſource to their mouth.

Others, none but thoſe which empty themſelves immediately into the ſea; and not into any other river.

Rivulets have their riſe, ſometimes from great rains, or great quantities of thawed ſnow; eſpecially in mountainous places; as in the long ridges of Africa, India, Sumatra, &c. But the generality of rivulets ariſe from ſprings.

Rivers themſelves all ariſe either from the confluence of ſeveral rivulets, or from lakes; nor is there any great river, ſuch as the Rhine, Elbe, &c. known to flow from a ſingle ſpring.

The Volga, *e. gr.* conſiſts of above two hundred rivulets, all flowing into it, before it reaches the Caſpian; and the Danube receives as many.

The Rhine and the Po receive each above a hundred others, great and ſmall; and the river of the Amazons receives into its large bed a prodigious number, ſome of which are five or ſix hundred leagues in length, and are of ſuch a depth and breadth as render them principal rivers.

Pliny, indeed, and Cardan, ſay, that the Nile receives none; but the later travellers into Abyſſinia aſſure us of the contrary.

The Rhine, Rhone, Danube, Boryſthenes, &c. ariſe originally from ſprings in the mountains; and the Nile, the Volga, the great river of St. Laurence, &c. from lakes.

It has been held by many, that all ſprings and rivers owe their origin to rains and dews; but there are ſome ſprings which cannot be accounted for on this principle, though others very well may. The intermitting ſprings, which flow

flow violently in rainy ſeaſons, and are dry in ſummer, are probably owing to rains; but there are ſome ſprings which diſcharge more water annually than all that falls in rains and dews in the neighbouring country. The great perennial ſpring, at Willowbrig, in Staffordſhire, is of this kind, and that of the Sorgne, in France, is much more eminently ſo; the river of that name being, according to Gaſſendus, navigable up to the very ſprings which are its ſource.

But if ſuch ſprings as theſe diſcharge too great a quantity of water for the ſupply of rains and dews, how is it poſſible, that ſuch ſmall ſupplies of water as theſe can afford the conſtant currents of the larger rivers? The Volga alone, according to Ricciolus, pours forth as much water in a year's time into the Caſpian ſea, as would ſuffice to drown the ſurface of the whole earth. The river of St. Laurence, in America, pours forth nearly as much as this. If either of theſe rivers alone do, as has been affirmed, from calculations, diſcharge annually as much water as falls in the ſame time in rains and miſts upon the ſurface of the whole earth; from whence are all the reſt to be ſupplied, according to the ſyſtem of their all being made by rains; and, particularly, where is left the ſupply for the Rio de la Plata, which Ricciolus affirms to be larger than the Nile, the Ganges, and the Euphrates, put together? its mouth being ninety miles wide, and running with that violence into the ſea, that it makes it freſh for two hundred miles together. Theſe, and the other rivers of the ſeveral parts of the globe, upon a very moderate calculation, diſcharge at leaſt five hundred times as much water into the ſea, as falls upon the whole ſurface of the earth, in rains, miſts, dews, ſnows, &c. in a like ſpace of time.

As it is evident, therefore, that theſe cannot be ſupplied by rains, ſo neither is it poſſible that the ſeveral hot ſprings and the ſalt ſprings can be ſupplied that way: the origin of ſprings alſo in places where there falls little or no rain, and where the conſervatories muſt needs be too ſmall to contain a ſupply, are great proofs that rain and miſts are not the origin of ſprings, at leaſt not in all places. The iſles of Mago, Rotunda, and the Strophades, and the rock on which the Maiden Tower ſtands in the Thracian Boſphorus, cannot be ſupplied with, or retain a ſufficiency of rain-water to ſupply conſtant ſprings, yet ſuch are always found running there.

It cannot be otherwiſe but that there are ſubterranean communications between the ſea and the ſources of fountains, rivers, and the larger ſprings, by which theſe are ſupplied; and there are certainly charybdes which ſwallow the ſea for theſe purpoſes; and when theſe happen to be ſtopped, the largeſt rivers have been dried up, and wholly ceaſed to run for a conſiderable time: this we have accounts in hiſtory has happened to the Thames, the Trent, and Medway, in England; the Elve, the Motala, and Gulſpang, in Sweden, and other rivers in other countries. If, on the other hand, theſe charybdes happen to be too open, freſh-water ſprings depending upon them will become ſalt. This we have inſtance of in hiſtory alſo; and even ſo old a writer as Pliny has ſaid that this once happened in Caria near Neptune's Temple. (Plot. de Origine Fontium.) See EVAPORATION and SPRING.

RIVERS, *Phenomena and Variations of.* Rivers are found ſubject to great alterations, at different ſeaſons of the year, day, &c. from frequent rains and melted ſnow. Thus in Peru and Chili many of the rivers are almoſt inſenſible in the night-time, and only flow by day, as being then augmented by the diſſolution of the ſnow on the mountains Andes. Thus the Volga abounds in water in May and June, ſo as to cover the ſand-banks, &c. which all the reſt of the year lie bare, ſo as ſcarcely to allow a paſſage to the loaded ſhips. Thus alſo the Nile, Ganges, Indus, &c. are frequently ſo increaſed, as to overflow; and that either in the winter, from rain, or in the ſummer, from the melting of the ſnow. Some rivers bury themſelves under ground in the middle of their courſe, and break out again in other places, like new rivers. Thus the Niger, which ſome coſmographers erroneouſly derive by a ſubterraneous channel from the Nile, becauſe it ſwells at the ſame time with the Nile, without any other apparent cauſe—the Niger itſelf has been ſuppoſed by ſome to be hidden under the mountains of Nubia, and to riſe again on the weſtern ſide of thoſe mountains; whereas, in reality, it is loſt in lakes or ſands. Thus, alſo, the Tigris is loſt in the mountain Taurus, &c.

Ariſtotle, and the poets, mention ſeveral ſuch rivers about Arcadia: Alpheus, a river of Arcadia, is particularly famed. This, being ſwallowed up in the ground, is ſuppoſed, by the Greek authors, to continue its progreſs under the earth, and under the bottom of the ſea, into Sicily; where, breaking up near Syracuſe, it forms the river Arethuſa. The great reaſon of this opinion was, that, every fifth ſummer, the river Arethuſa, in Sicily, caſt up the dung of cattle about the time of the celebration of the Olympic games in Achaia, when the dung of victims was uſed to be caſt into the Alpheus.

Some rivers empty themſelves into the ſea by one mouth, ſome by ſeveral. Thus, the Danube opens into the Euxine ſea by ſeven mouths; the Nile by ſeven; and the Volga by at leaſt ſeventy. The cauſe of this variety of mouths Varenius attributes principally to the banks of ſand, &c. accumulated in them; which, gradually increaſing, form iſlands, by which the channel is divided into ſeveral branches. Indeed, the ancients tell us, that the Nile formerly only emptied itſelf at one mouth, called the *oſtium Canopicum;* and add, that the other ſix are adventitious, or artificial.

The channels of rivers, except ſuch as were formed at the creation, Varenius endeavours to prove to be all artificial, and dug by men. His reaſons are, that, when a new ſpring breaks forth, the water does not make itſelf a channel, but ſpreads over the adjacent land; ſo that the people have been neceſſitated to cut it a channel, to ſecure their grounds; and that a great number of channels of rivers are certainly known, from hiſtory, to have been dug by men, &c.

As to the queſtion, whether thoſe rivers which run into others, have made themſelves that way by their own motion, or have been turned thither in canals cut by men? he takes the latter to be the more probable; and concludes the ſame of the arms, or branches, of rivers, and of the turns by which iſlands are formed in the Tanais, Volga, &c.

To the queſtion, why we have no ſalt rivers, when there are ſo many ſalt ſprings? he anſwers, that it is becauſe men, having no occaſion for ſalt water, have not dug channels to conduct the water of ſalt ſprings; ſalt being procurable at leſs expence.

The water of moſt rivers carries with it particles of metals, minerals, ſands, or oily and fat bodies, &c. Thus, ſome rivers bring ſands intermixed with grains of gold; of which kind is, 1. A river in Japan. 2. Another in the iſland of Lequeo, near Javon. 3. A rivulet in Africa, called Arroe, breaking out of the foundation of the mountains of the moon, in which there are golden mines. 4. A river in Guinea, where the negroes ſeparate the gold-duſt from the ſand, and ſell it to the Europeans, who traffic thither for that very purpoſe. 5. In ſome rivulets near the city of Mexico, there are grains of gold taken up, eſpecially after

after rain; which is alſo to be underſtood of all the other rivers, none of which yield any thing conſiderable, except in rainy ſeaſons. 6. In Peru, Sumatra, Cuba, Hiſpaniola, and Guinea. Laſtly, there are ſeveral brooks in the countries about the Alps, eſpecially Tyrol, out of the ſediment of whoſe waters gold has been drawn, though there be no grains conſpicuous in them. Add to this, that the Rhine alſo, in many places, has afforded a golden mud.

As to rivers that bring grains or particles of ſilver, iron, copper, lead, &c. we find no mention of them in authors, though, doubtleſs, there are great numbers of each; and many of the medicinal effects of mineral waters are, doubtleſs, owing to particles of theſe kinds.

We muſt not here omit a water in Germany, which is ordinarily ſuppoſed to change iron into copper. The truth is, there is no real converſion of the metal; all that is done is, that the cuprine and vitriolic particles in the water corrode the iron; and, detaching parts of them by means of the motion of the water, coppery particles ſucceed in their room.

From this variety in the mixture of river-water reſult various qualities, different ſpecific gravities, different colours, &c.

Some rivers, at certain ſeaſons of the year, ſwell ſo as to overflow their banks, and drown the neighbouring lands. Of theſe the moſt eminent is the Nile, which riſes ſo as to cover all Egypt, except the hills. The inundation begins about the ſeventeenth day of June, and increaſes for the ſpace of forty days, and decreaſes for as many; during which period, the cities of Egypt, which are all built on hills, appear as ſo many iſlands.

To theſe inundations Egypt owes all its fertility; the heavens there affording no rain, or at leaſt none in any reſpect conſiderable. Hence, as the inundation is great or ſmall, Egypt, for that year, is fruitful or barren.

The ancient Greeks, &c. were much perplexed in aſſigning the cauſe of this inundation. From the modern Engliſh and Portugueſe traders into Congo, Angola, Monomotapa, &c. we learn, that the ſource of the Nile is in a large lake called Zaire, round which are the mountains of the moon, which being about 10° to the ſouth of the equator, inſtead of being covered with ſnow in their winter, have rain every day, at leaſt two hours before, and two hours after noon. So that their tops are always covered with clouds; and the rains are, at the proper ſeaſon, almoſt continual. Hence torrents are conſtantly deſcending from the mountains into the lake of Zaire; whence they flow into the channel of the Nile, and other rivers ariſing from the ſame lake; and hence the inundation of the Nile. See NILE and NILOMETER.

Mr. Bruce is the firſt perſon who, in his "Travels to Diſcover the Source of the Nile," has deſcribed, from his own obſervations, the ſpot in which he apprehends that the Nile ſprings.

Tracing one of the ſtreams, that run into the lake Tzana, to a ſwamp in the 11th degree of N. lat. he there remarks the head of the Nile, as our modern map-makers had actually done before he viſited this dreary region. Whether his guide deſerved credit, and whether he could juſtly infer that this rivulet was the Nile from the reſpect paid to it by the barbarous natives, it is not neceſſary particularly to enquire. The moſt important object in inveſtigating the ſource of the Nile is to account for its extraordinary inundations.

In doing this, Mr. Bruce has ſelected from the various opinions enumerated by Diodorus Siculus (l. i. c. 24.) that of Democritus of Abdera, and Agatharcides of Cnidus, which agrees in the main with that of Herodotus (l. ii. c. 8.) and has well explained the manner in which the ſun, continuing nearly ſtationary for ſome days in the tropic of Capricorn, rarefies the air, and collects a quantity of vapours from the Atlantic on the weſt, and the Indian ocean on the eaſt; and then, in its progreſs north towards the tropic of Cancer, draws theſe vapours after him. So that as he advances, the rainy ſeaſon begins upon his arrival at the zenith of every place, and the rains continue and increaſe after he has paſſed it in his progreſs northward.

In April many rivers join the Nile, and enable it to force its way through the ſtagnant lake Tzana, without mixing with it. In the beginning of May many other ſtreams pour themſelves into the ſame lake, and furniſh the Nile with an additional ſupply of water. In the beginning of June, the ſun having paſſed over Abyſſinia, the rivers are there full, and the time of the greateſt rains in this country is during the ſun's being almoſt ſtationary in the tropic of Cancer. Theſe rains are collected by the four great rivers of Abyſſinia, of which the Nile is one, which derives alſo a very copious ſupply from the White river, that riſes in a country of almoſt perpetual rain.

As the vapours meet with no mountains to interrupt their progreſs in the flat country that lies between Gerri and Syene, the tropical rains extend no farther north of the line than 16°.

When the ſun declines towards the equator, he reverſes the effects which he produced in his paſſage northward; and after his arrival at the line in the autumnal equinox, his influence ceaſes on the ſide of Abyſſinia, and extends itſelf to the ſouthern hemiſphere. Thus on the 25th of September, three days after the equinox, the Nile is generally found at Cairo to be at the higheſt, and then begins to decreaſe. Mr. Bruce explains the inundations that take place ſouth of the equator. The ancients were not unacquainted with this cauſe of the inundations of the Nile. The tropical rains falling to the extent of 16° on each ſide of the line gave riſe to the Nile and to its tributary ſtreams which flowed northward, through the kingdom of Sennar, &c. as well as to the Zebee, and many large rivers which flow ſouthward into Ethiopia, and according to the deſcent of the countries into the Indian or Atlantic ocean. Homer gives to the Nile the epithet διεπετης *qui cælitus deſcendit, a river produced and fed by rains.* See NILE.

The other rivers which have any notable ſtated inundations, are the Gambia, and the Niger, which overflow at the ſame time with the Nile, and loſe themſelves in ſands or lakes. (See NIGER.) Leo Africanus ſays, it begins on the 15th day of June, increaſes for forty days, and decreaſes as long. The Zaire, a river of Congo, is affected in the ſame manner with the Nile. (See ZAIRE.) The Rio de la Plata, in Braſil, as Maffeus obſerves, overflows at the ſame time with the Nile. (See *Rio de la* PLATA.) Of the ſame kind of rivers is the Ganges (which ſee); and the Indus, both which laſt overflow in June, July, and Auguſt; at which times the natives ſave great quantities of the water in ponds to ſerve them the reſt of the year; ſeveral rivers flowing out of the lake Chiamay into the bay of Bengal, which overflows in September, October, and November: theſe all bring a very great fertility with them to the ground; the river Macoa, in Camboïa; the river Parana, or Paranguaſa, which ſome will have to be the ſame with the Silver river; ſeveral rivers in Coromandel, a part of India, which overflow in the rainy months, from the great quantity of water iſſuing from the mountain Gatis; the Euphrates, which overflows Meſopotamia certain days in the year; and, laſtly, the river Sus, in Numidia.

The

The rivers moſt celebrated for their length, breadth, ſwiftneſs of current, &c. are, the Nile, which runs almoſt in a ſtraight courſe two thouſand five hundred and twenty geographical miles; the Niger, which runs two thouſand four hundred miles; the Ganges, two thouſand miles; the Burrampooter, the ſame diſtance; the Ob, ſixteen hundred miles; the Jenniſſee, in Aſia, about the ſame length with the Ob; the river Orellana, in America, ſixty miles broad at its mouth, and five thouſand miles long; the Rio de la Plata, about ninety miles broad at the mouth; the Omarannan, another river of Braſil; and the great river of St. Laurence, near two thouſand five hundred miles long. See the account of each river under its reſpective name.

Major Rennell, in his "Memoir," has eſtimated the proportional lengths of courſe of ſome of the moſt noted rivers in the world by the following numbers:

European Rivers.	
Thames	1
Rhine	$5\frac{1}{4}$
Danube	7
Volga	$9\frac{1}{2}$
Aſiatic Rivers.	
Indus (probably)	$6\frac{3}{4}$
Euphrates	$8\frac{1}{2}$
Ganges	$9\frac{1}{2}$
Burrampooter	$9\frac{1}{2}$
Nou Kien, or Ava	$9\frac{1}{2}$
Jenniſſee	10
Oby	$10\frac{1}{2}$
Amoor	11
Lena	$11\frac{1}{2}$
Hoanho (of China)	$13\frac{1}{2}$
Kian Keu (of ditto)	$15\frac{1}{2}$
African River.	
Nile	$12\frac{1}{2}$
American Rivers.	
Miſſiſippi	8
Amazons	$15\frac{1}{2}$

By the ſtatute of Weſtm. 2. cap. 47, the king may grant commiſſions for perſons to take care of rivers, and the fiſhery in them; and the lord mayor of London is to have the conſervation in breaches and ground overflown as far as the water ebbs and flows in the river Thames. (4 Hen. VII. cap. 15.) Perſons annoying the river Thames, making ſhelves there, caſting dung in it, or taking away ſtakes, boards, timber-work, &c. of the banks, incur a forfeiture of 5*l.* by ſtat. 27 Hen. VIII. cap. 18. Commiſſioners were appointed to prevent exactions of the occupiers of locks, weirs, &c. upon the river Thames, weſtward from the city of London, to Cricklade, in the county of Wilts, and for aſcertaining the rates of water-carriages on the ſaid river, by ſtat. 6 & 7 W. III: and this ſtatute is revived, with authority from the commiſſioners to make orders and conſtitutions to be obſerved, under penalties, &c. by 3 Geo. II. cap. 11.

By ſtatutes 8 Geo. II. cap. 20, and 4 Geo. III. cap. 12, it is made felony, without benefit of clergy, maliciouſly to cut down any river or ſea-bank, by which lands may be deſtroyed, and to deſtroy ſluices or locks upon navigable rivers. See NUSANCE, and LARCENY.

RIVER, in *Phyſics*, denotes a ſtream of water running by its own gravity from the more elevated parts of the earth towards thoſe which are more depreſſed, in a natural bed or channel open above.

If this channel is artificial, it is called a canal; of which there are two kinds, *viz.* that whoſe channel is every where open without ſluices, called an artificial river, and that whoſe water is kept up or let off by means of ſluices, which is properly a canal.

RIVERS, *Hydraulic Theory of.*—The theory of moving waters is certainly one of great importance, and has therefore, for a long time, excited conſiderable intereſt, as well among practical engineers, as ſpeculative mathematicians; yet it muſt be acknowledged that it is but very lately any thing approaching to a well-founded theory has been eſtabliſhed. One of the firſt and moſt diſtinguiſhed of thoſe who attempted to reduce the motion and diſcharges of rivers to correct principles, was Guglielmini; and if his theory was falſe and hypothetical, yet he was the means of drawing the attention of philoſophers to theſe inquiries; and his deductions, though in many reſpects incorrect, are nevertheleſs entitled to a place in an article on this ſubject.

This author obſerves, that rivers have uſually their ſources in mountains or elevated lands, and that it is in their deſcent from theſe they acquire their velocity, or acceleration, which maintains their future current. In proportion as they advance farther, this velocity diminiſhes, on account of the continual friction of the water againſt the bottom and ſides of the channel, of the various obſtacles they meet with in their progreſs, and of their arriving, at length, in plains, where the deſcent is leſs; and their inclination to the horizon, of conſequence, greater. Thus the Reno, a river of Italy, which gave occaſion, in ſome meaſure, to theſe ſpeculations, is found, near its mouth, to have ſcarcely a deſcent of fifty-two ſeconds.

If the acquired velocity be quite ſpent, through the many obſtacles, ſo that the current becomes horizontal, nothing will then remain to propagate the motion, and continue the ſtream, but the depth, or the perpendicular preſſure of the water, which is always proportional to the depth. And happily for us, this reſource increaſes, as the occaſion for it increaſes; for, in proportion as the water loſes of the velocity acquired by the deſcent, it riſes and augments in depth.

It further appears, ſays he, from the laws of motion pertaining to bodies moved on inclined planes, that when water flows freely upon an inclined bed, it acquires a velocity, which is always as the ſquare root of the quantity or declivity of the bed. But in an horizontal bed, opened by ſluices or otherwiſe, at one or both ends, the water flows out by its gravity alone; and the flowing is quicker or ſlower in a direct ratio of the reſpective heights of the water, by reaſon of the weight of the ſuperior waters upon the inferior. Hence it follows, firſt, that as much as the declivity of the bed or channel of a river is greater, ſo much alſo will the velocity of the flowing waters be proportionably increaſed.

Secondly, as much as the water in an horizontal bed is deeper, ſo much will the velocity of the current be increaſed; and this velocity will diminiſh in proportion to the decreaſing depths of the water in the bed.

Thirdly, abſtracting from the reſiſtance cauſed by the bottom and ſides of the bed, as much nearer as the water is to the bottom, ſo much will its motion be accelerated; not only becauſe the inferior waters are more compreſſed by the ſuperior in proportion to their greater depth; but alſo becauſe the inferior ones have a greater declivity than the ſuperior, by reaſon of their greater depth in the bed, where

where they are more depreſſed with reſpect to the elevation of their common ſource or ſpring.

The upper parts of the water of a river, and thoſe at a diſtance from the banks, may continue to flow, from the ſingle cauſe, or principle of declivity, how ſmall ſoever it be; for, not being detained by any one obſtacle, the minuteſt difference of level will have its effect; but the lower parts, which roll along the bottom, will ſcarcely be ſenſible of ſo ſmall a declivity; and will only have what motion they receive from the preſſion of the ſuperincumbent waters.

The natural coheſion of the particles of water, and their implication, as it were, with one another, make the lower, which are moved by means of the depth, carry along with them the upper, which, in an horizontal channel, would have no motion at all: or, in a channel very little inclined, next to none; ſo that the lower, in this caſe, communicate to the upper a part of the motion they have received from the preſſure of it. Hence, from the preſſure, it frequently happens that the greateſt velocity of a river is about the middle of its depth, or that point, which is the fartheſt poſſible from the ſurface of the water, and from the bottom and ſides of the bed; ſuch middle parts having the advantage of being preſſed with half the depth of the river, and of being free, at the ſame time, from the friction of the bottom; whereas, on the contrary, the leaſt velocity of the water is at the bottom and ſides of the bed, becauſe there the reſiſtance reſulting from friction is the greateſt, which is communicated to the other parts of the ſection of the river, in an inverſe duplicate proportion of the diſtances from the bottom and ſides combined together.

To find whether the water of a river, almoſt horizontal, flows by means of the velocity acquired in its deſcent, or by the preſſure of its depth, ſet up an obſtacle perpendicular to it; if the water riſe and ſwell immediately againſt ſuch obſtacle, it runs in virtue of its fall; or, if it ſtop a little while firſt, in virtue of its preſſion.

Rivers, according to this author, almoſt always make their own beds. If the bottom have originally been a large declivity, the water, in conſequence of it, falling with a great deal of force, will have ſwept away the moſt elevated parts of the ſoil, and carrying them lower down, will gradually render the bottom horizontal; where the ſtream is ſwifteſt, there will the earth be moſt dug up; and, conſequently, there the greateſt cavity will be made.

The water having made its bed horizontal becomes ſo itſelf, and conſequently rakes with the leſs force againſt the bottom, till at length that force becomes only equal to the reſiſtance of the bottom. The bottom is now arrived at a ſtate of permanency, at leaſt for a conſiderable time; and the longer, according to the quality of the ſoil, clay and chalk reſiſting longer than ſand or mud.

On the other hand, the water is continually wearing away the brims of its channel, and this with the more force, as, by the direction of its ſtream, it impinges more perpendicularly againſt them. By this means it has a continual tendency to render them parallel to its own courſe; and when it has arrived as near that as poſſible, it ceaſes to have any effect that way. At the ſame time that it has thus rectified its edges, it has enlarged its own bed; that is, it has loſt of its depth, and conſequently of its force and preſſure: this it continues to do till there is an equilibrium between the force of the water and the reſiſtance of its banks, upon which they will remain without farther mutation. And it is evident, from experience, that theſe equilibriums are all real, inaſmuch as we find that rivers only dig and widen to a certain pitch.

The very reverſe of all theſe things happens on other occaſions. Rivers, whoſe waters are thick and muddy, raiſe their bed, by letting part of the heterogeneous matters contained in them fall to the bottom: they alſo contract their banks, by a continual appoſition of the ſame matter, in bruſhing over them. This matter, being thrown aſide far from the ſtream of water, might even ſerve, by reaſon of the obſcureneſs of the motion, to form new banks.

Now theſe oppoſite effects ſeem almoſt always to concur, and are differently combined, according to the circumſtances, whence it is very difficult to judge of the reſult; yet muſt this combination be known very accurately, before any meaſures can be taken about rivers, eſpecially as to the diverting of their courſes. The Lamona, which emptied itſelf into the Po, being turned another way, to make it diſcharge itſelf into the Adriatic, was ſo altered, and its force ſo far diminiſhed, after its waters were left to themſelves, that it raiſed its bed a great height, by continual depoſitions of mud, till it became much higher than the Po, in its utmoſt accretions, and needed very high banks, or dykes, to keep it from overflowing.

If various cauſes of reſiſtance to the motion of flowing waters did not exiſt, ſuch as the attraction and continual friction of the bottom and ſides, the inequalities in both, the windings and angles that occur in their courſe, and the diminution of their declivity the farther they recede from their ſprings, the velocities of their currents would be accelerated to twelve, fifteen, and, in ſome caſes, even to twenty times more than they are at preſent in the ſame rivers, by which they would become abſolutely unnavigable.

A little river may be received into a large one, without either augmenting its width or depth. This ſeeming paradox ariſes hence, that the addition of the little river may only go towards moving the waters, before at reſt near the banks of the large one, and thus augmenting the velocity of the ſtream, in the ſame proportion as it does that of the quantity of water. Thus the Venetian branch of the Po ſwallowed up the Ferrareſe branch, and that of Panaro, without any enlargement of its own dimenſions. And the ſame may be concluded proportionably of all other acceſſions to rivers, and, in the general, of all new augmentations of water.

A river offering to enter into another, either perpendicularly, or in an oppoſite direction, will be diverted by degrees from that direction, and obliged to make itſelf a new and more favourable bed towards the mouth.

The union of two rivers into one makes the whole flow the ſwifter, becauſe, in lieu of the friction of four ſhores, they have only two to ſurmount; and that the ſtream, being farther diſtant from the banks, goes on with the leſs interruption; beſides, that a greater quantity of water, moving with a greater velocity, digs deeper in the bed, and of courſe retrenches of its former width. Hence alſo it is that rivers, by being united, take up leſs ſpace on the ſurface of the earth, and are more advantageous to low grounds, which diſcharge their ſuperfluous moiſture into them, and have likewiſe leſs occaſion for dykes to prevent their overflowing.

Theſe advantages are ſo conſiderable, that S. Guglielmini thinks them worthy of nature's having had a view to them in her contriving to make the confluences of rivers ſo frequent as we find them.

Such were the views and deductions of this author, in which he has been followed by ſeveral mathematicians of the firſt eminence; but certainly without coming to any very accurate and eſtabliſhed principles, on which to found a computation of the quantity of water that would be diſcharged, in any new caſe that preſented itſelf for determination;

tion; or what ſlope, and what magnitude of current, was neceſſary for producing any required ſupply. Thus, a ſmall aqueduct, which was carried to Paris in the beginning of the laſt century, on a plan preſented to the academy, and, with ſome alteration, approved of by that learned body, was found, when completed, to yield very little more than half the quantity of water which they had computed. A ſimilar circumſtance happened at Edinburgh, when that city was ſupplied by water, under the direction of Deſaguliers; the quantity of water actually furniſhed being only about one-ſixth of the quantity which he had computed it would be, and but one-eleventh of what Maclaurin had eſtimated it at from the ſame plan.

Nothing can ſhew more clearly the inadequacy of the theory, as it exiſted at that time, than that the firſt mathematicians of their age, and we might almoſt add of any age, ſhould differ ſo widely from each other; the eſtimate of the one being but about one-half of the other, and the neareſt to the truth not agreeing with the actual ſupply by five parts out of ſix.

It required but a few inſtances of this kind to point out the neceſſity of a more preciſe and definite theory; and the ſubject was accordingly ſoon after undertaken by Michelotti at Turin, the abbé Boſſut at Paris, and by the chevalier du Buat; of whom the latter is generally admitted to have met with the moſt complete ſucceſs. Michelotti made a great number of experiments, both on the motion of water in pipes and in open canals. They were performed at the government expence, and nothing was ſpared to render them complete. A tower of fine maſonry was built, to ſerve as a veſſel from which the waters were to iſſue, through holes of various ſizes, and under various preſſures, from 5 feet to 22 feet. The water was received into baſons conſtructed of maſonry, and accurately lined with ſtucco, and of various forms and declivities. Theſe experiments on the expence of water through pipes are, of all that have yet been made, the moſt numerous and exact, and may be appealed to on every occaſion. Thoſe made on open canals are ſtill more numerous, and are no doubt equally accurate; but they have not been ſo contrived as to be ſo generally uſeful, being moſtly very unlike the important caſes which will occur in practice; and they ſeem to have been contrived chiefly with a view of overturning or eſtabliſhing certain received hydraulic principles of that time. The experiments of Boſſut are alſo very numerous, and of both kinds, *viz.* on pipes and canals; ſome particulars of which will be found under our article DISCHARGE *of Fluids*. But thoſe of the chevalier du Buat are the moſt concluſive, and his theory of rivers the moſt perfect of any with which we are yet acquainted. A few of the leading principles of this author's theory will be found in the ſubſequent part of this article.

It is certain that the motion of open ſtreams muſt, in ſome reſpects, reſemble that of bodies ſliding down inclined planes, perfectly poliſhed; and that they would accelerate continually, were they not obſtructed: but they are obſtructed, and frequently move uniformly. This can only ariſe from an equilibrium between the forces which promote their deſcent and thoſe which oppoſe it. Hence M. Buat aſſumes his leading propoſition, *viz.*

1. "When water flows uniformly in any channel or bed, the accelerating force, which obliges it to move, is equal to the ſum of all the reſiſtances which it meets with, whether ariſing from its own viſcidity, or from the friction of its bed."

From this propoſition, ingeniouſly combined with the reſult of his own and Boſſut's experiments, he then draws theſe fundamental propoſitions, *viz.*

2. "The motion of rivers depends entirely on the ſlope of their ſurfaces.

3. "Since the velocity of the water depends wholly upon the ſlope of the ſurface, or of the pipe through which it is conveyed, it follows that the ſame pipe will be ſuſceptible of different velocities, which it will preſerve uniform to any diſtance, according as it has different degrees of inclinations; and each inclination of a pipe, of given diameter, has a certain velocity peculiar to itſelf, which will be maintained uniform to any diſtance whatever. But this velocity changes continually, according to a certain function of its inclination for all degrees between its vertical and horizontal poſitions."

It is obvious that, conſidering the number of cauſes that may give riſe to inequalities in the motion of water, whether in pipes or canals, it would have been vain to attempt the determination of the function above-mentioned from theory only: the reſults of the ſeveral experiments were, therefore, examined with the moſt ſcrupulous attention, and penetrating ingenuity, and from which at length the author derived the following theorems, *viz.*

Let V be the velocity of the ſtream, meaſured by the inches it moves over in a ſecond; R a conſtant quantity, *viz.* the quotient obtained by dividing the area of the tranſverſe ſection of the ſtream, expreſſed in ſquare inches, by the boundary or periphery of that ſection, *minus* the breadth of the ſtream, expreſſed alſo in inches, *viz.* $R = \frac{wh}{b + 2h}$; where w is the mean width of the ſection, h the mean height or depth, and b the breadth at bottom.

The line R is called by du Buat the *radius*, and by Dr. Robiſon the *hydraulic mean depth*.

Laſtly, let S be the denominator of a fraction, which expreſſes the ſlope, the numerator being unity; that is, let it be the quotient obtained by dividing the length of the ſtream, ſuppoſing it extended in a ſtraight line, by the difference of level of its two extremities; or, which is nearly the ſame, let it be the co-tangent of the inclination or ſlope.

Then the general formula expreſſing the velocity V, ſuppoſed uniform, is,

$$V = \frac{307\sqrt{R - \frac{1}{10}}}{\sqrt{S - \frac{1}{2}h.\log.(S + \frac{16}{10})}} - \frac{3}{10}\sqrt{R - \frac{1}{10}}, \text{ or}$$

$$V = \sqrt{R - \tfrac{1}{10}} \times \left(\frac{307}{\sqrt{S - \frac{1}{2}h.\log.(S + \frac{16}{10})}} - \tfrac{3}{10}\right).$$

But when R and S are both very great, then,

$$V = \sqrt{R}\left(\frac{307}{\sqrt{S - \frac{1}{2}h.\log.S}} - \tfrac{3}{10}\right) \text{ nearly.}$$

Hence it follows, that the ſlope remaining the ſame, the velocities are as R, or as the area of the ſection divided by its perimeter, *minus* the breadth of the river at the ſurface, *very nearly*; for they are as $\sqrt{R - \frac{1}{10}}$; and when the river is large, the $\sqrt{R}$ may be uſed without any ſenſible error.

Again, if R is ſo ſmall, that $\sqrt{R - \frac{1}{10}} = 0$, or $R = \frac{1}{10}$, the velocity will be nothing, which agrees very well with experiments; for in a cylindric tube $R = \frac{1}{2}$ the radius: the radius, therefore, is only two-tenths, ſo that the tube is nearly capillary, and the fluid will not flow through it.

The velocity may alſo become nothing, by the ſlope becoming ſo ſmall, that

$$\frac{307}{\sqrt{S} - \frac{1}{2}h.\log.(S + \frac{9}{10})} - \frac{3}{10} = 0;$$

but if $\frac{1}{S}$ is leſs than $\frac{1}{300000}$, or than $\frac{1}{10}$th of an inch to an Engliſh mile, the water will have ſenſible motion.

In a river, the greateſt velocity is at the ſurface, and in the middle of the ſtream; from which it diminiſhes towards the bottom, and the ſides, where it is the leaſt. It has been found, from experiment, that if, from the ſquare root of the velocity in the middle of the ſtream, expreſſed in inches *per* ſecond, unity be ſubtracted, the ſquare of the remainder is the velocity of the bottom.

Hence, if v be the velocity in the middle of the ſtream, the velocity of the bottom will be expreſſed by $(\sqrt{v} - 1)^2 = v - 2\sqrt{v} + 1$.

The mean velocity, or that with which, were the whole ſtream to move, the diſcharge would be the ſame as the real diſcharge, is equal to half the ſum of the greateſt and leaſt velocities, as computed in the laſt propoſition. Therefore, if v repreſents the greateſt velocity, then will the mean velocity $= v - \sqrt{v} + \frac{1}{2}$.

Suppoſe that a river, having a rectangular bed, is increaſed by the junction of another river equal to itſelf, the declivity remaining the ſame; required the increaſe of depth and velocity. Let the breadth of the river $= b$, the depth before the junction d, and after it x; and, in like manner, v and v' the mean velocities before and after; then $\frac{b\,d}{b + 2\,d} = R$ *before*, and $\frac{b\,x}{b + 2\,x} = R'$ *after*, ſo $v = \frac{307\sqrt{R}}{\sqrt{S}}$, ſuppoſing the breadth of the river to be ſuch, that we may reject the ſmall quantity ſubtracted from R; and, in like manner, $v' = \frac{307\sqrt{R'}}{\sqrt{S}}$; then ſubſtituting for R and R', we have

$$v = \frac{307}{\sqrt{S}} \times \sqrt{\frac{b\,d}{2\,d + b}}, \text{ and}$$

$$v' = \frac{307}{\sqrt{S}} \times \sqrt{\frac{b\,x}{b + 2\,x}}.$$

Multiplying theſe into the area of the ſections $b\,d$, $b\,x$, we have the diſcharges, *viz.*

$$b\,d\,v = \frac{307}{\sqrt{S}} \times \frac{b\,d\sqrt{b\,d}}{\sqrt{(b + 2\,d)}}, \text{ and}$$

$$b\,x\,v' = \frac{307}{\sqrt{S}} \times \frac{b\,x\sqrt{b\,x}}{\sqrt{(b + 2\,x)}}.$$

And ſince the laſt of theſe is double the former, we obtain

$$\frac{b\,x\sqrt{b\,x}}{\sqrt{(b + 2\,x)}} = \frac{2\,b\,d\sqrt{b\,d}}{\sqrt{(b + 2\,d)}}, \text{ or } \frac{x^3}{b + 2\,x} = \frac{4\,d^3}{b + 2\,d},$$

whence $$x^3 - \left(\frac{8\,d^3}{b + 2\,d}\right)x = \frac{4\,b\,d^3}{b + 2\,d},$$

a cubic equation ſolvable by the formula of Cardan. As an example, let $b = 10$ feet, $d = 1$, then $x^3 - \frac{8}{3}x = \frac{10}{3}$, where $x = 1.4882$, which is the depth of the increaſed river. Hence we have $1.4882 \times v' = 2\,v$, and $1.4882 : 2 :: v : v'$; or v is to v' as 37 to 50 nearly.

When the water in a river receives a permanent increaſe, the depth and the velocity, as in the example above, are the firſt that are augmented. The increaſe of the velocity increaſes the action on the ſides and bottom, in conſequence of which the width is augmented, and ſometimes alſo, but more rarely, the depth. The velocity is thus diminiſhed, till the tenacity of the ſoil, or the hardneſs of the rock, affords a ſufficient reſiſtance to the force of the water; the bed of the river then changes only by inſenſible degrees, and, in the ordinary language of hydraulics, is ſaid to be permanent, though, in ſtrictneſs, this epithet is not applicable to the courſe of any river. For more on this ſubject, ſee Du Buat, "Principes d'Hydrauliques," in two vols. 8vo. Paris, 1806; Boſſut's "Hydrodynamiques;" the article *River* in the "Encyclopedia Britannica;" and Playfair's "Outlines of Natural Philoſophy."

The beſt and moſt ſimple method of meaſuring the velocity of the current of a river or canal, is the following. Take a cylindrical piece of dry, light wood, and of a length ſomething leſs than the depth of the water in the river; round one end of it, let there be ſuſpended as many ſmall weights as may be neceſſary to keep up the cylinder in a perpendicular ſituation in the water, and in ſuch a manner that the other end of it may juſt appear above the ſurface of the water. Fix to the centre of that end which appears above water, a ſmall and ſtraight rod, preciſely in the direction of the cylinder's axis; to the end, that when the inſtrument is ſuſpended in the water, the deviations of the rod from a perpendicularity to the ſurface of it, may indicate which end of the cylinder advances the faſteſt, by which may be diſcovered the different velocities of the water at different depths; for if the rod inclines forwards, according to the direction of the current, it is a proof that the ſurface of the water has the greateſt velocity; but if it inclines back, it ſhews that the ſwifteſt current is at the bottom; if it remains perpendicular, it is a ſign that the velocities at the ſurface and bottom are equal.

This inſtrument being placed in the current of a river or canal, receives all the percuſſions of the water throughout the whole depth, and will have an equal velocity with that of the whole current *from the ſurface to the bottom* at the place where it is put in, and by that means may be found, both with eaſe and exactneſs, the mean velocity of that part of the river for any determinate diſtance and time.

But to obtain the mean velocity of the whole ſection of the river, the inſtrument muſt be put ſucceſſively both in the middle and towards the ſides, becauſe the velocities at thoſe places are often very different from each other. Having by this means found the *difference of time required for the currents to run over an equal ſpace*; or, *the different diſtances run over in equal times, the mean proportional* of all theſe trials, which is found by dividing the common ſum of them all by the number of trials, *will be the mean velocity of the river or canal.*

If it be required to find the velocity of the current only at the ſurface, or at the middle, or at the bottom, a ſphere of wood, of ſuch a weight as will remain ſuſpended in equilibrium with the water, at the ſurface or depth which we want to meaſure, will be better for the purpoſe than a cylinder, becauſe it is only affected by the water of that ſole part of the current where it remains ſuſpended.

It is very eaſy to guide both the cylinder and the globe in that part which we want to meaſure, by means of two threads of ſmall cords, which two perſons muſt hold and direct, one on each ſide the river; taking care at the ſame time neither to retard nor accelerate the motion of the inſtrument.

Having

Having the mean or medium velocity of a river, if we multiply this medium, the breadth, depth, and ſpace run over in a certain time, the product will give the quantity of water that flows down in that time. Dr. Halley, in order to eſtimate the quantity of water that flows into the Mediterranean ſea by means of rivers, makes a compariſon of the great rivers of Italy, &c. with that of the Thames. (Philoſ. Tranſact. Abridg. vol. ii. page 110.) He aſſumes the breadth of the Thames at Kingſton bridge to be 100 yards, its depth three yards, and velocity two miles *per* hour. He profeſſedly overrates the dimenſions, in order to allow more than a ſufficiency for the ſtreams received below Kingſton. This aſſumption gives the area of a tranſverſe ſection of the river = 300 ſquare yards, and the quantity of water flowing down = 20,300,000 tons in a day. This muſt be overrated by at leaſt, it is ſuppoſed, one-third. If the breadth be aſſumed 100 yards, the depth three, and velocity two miles *per* hour, it will then give two-thirds of the reſult above-mentioned; or it will amount to the ſame thing if we take one-eighth part from all the three data aſſumed by Dr. Halley, the reſult being two-thirds of that above; amounting in the year to 166,624,128,000 cubic feet, which is a little more than one-twenty-fifth part of all the rain and dew in England and Wales in a year, as above deduced. Mr. Dalton has eſtimated "that the water of the Thames is drawn from an extent of country of about 600 ſquare miles, or one-eighth of the area of the whole, nearly. The Severn, including the Wye, ſpreads over an equal or greater extent of country; and that collection of rivers which conſtitutes the Humber is ſuperior to either of the other two in this reſpect. As far as my own obſervation goes, the Severn and Wye muſt diſembogue as much or more water than the Thames; the Humber I have not ſeen collectedly, but have noticed moſt of the branches conſtituting it, and ſhould apprehend it cannot be inferior to the Thames: all other circumſtances being the ſame, the quantity of water carried down by any river ſhould be as the area of the ground from which the water is derived, and on this account the Humber ought to exceed the Thames.

"The Severn, which is partly derived from the mountainous country of Wales, is certainly the moſt rapid of the three rivers, and probably carries down the moſt water; as the Thames, however, is generally conſidered to take the lead, we will ſuppoſe, upon the whole, that theſe three rivers are equal in this reſpect.

"The counties of Kent, Suſſex, Hampſhire, Dorſetſhire, Devonſhire, Cornwall, and Somerſetſhire, from the Medway to the Lower Avon incluſively, in an extent of 11,000 ſquare miles, do not preſent us with many large rivers. From their number and magnitude, we cannot form a high eſtimate of their produce. The quantity of rain for thoſe counties is indeed near the average for the kingdom, as far as the preceding obſervations determine; but the milder temperature of their winters and greater heat of their ſprings and ſummers, will cauſe a greater evaporation than in ſome other parts: it is probable the rivers in theſe counties may amount, when taken together, to $1\frac{1}{2}$ times the magnitude of the Thames. The rivers that diſembogue their waters on the coaſt of Lincolnſhire, Norfolk, Suffolk, and Eſſex, from the Humber to the Thames, though drawn from a country of 7000 ſquare miles, manifeſtly fall far ſhort of the Thames. The two places in this diſtrict, for which we have accounts of the rain, Norwich and Upminſter, give a mean of only $22\frac{1}{2}$ inches annually. This, with the flatneſs of the country, which prevents the water from running off in ſome degree, makes the rivers much leſs than what might otherwiſe be expected from the extent of ground. There are but three or four of any conſequence. Probably all the rivers may amount to half the ſize of the Thames. There remains above 6000 ſquare miles in Wales, from the Wye to the Dee, incluſive of the laſt, and the northern counties of Lancaſter, Weſtmoreland, Cumberland, Northumberland, and Durham, with part of Cheſhire, and a ſmall part of Yorkſhire, from the Merſey round by the Tweed to the Tees, amounting to 7000 or 8000 ſquare miles, to be eſtimated.

"Theſe two diviſions, though not larger than ſome others, abound in rivers, many of which are conſiderable in magnitude and of great rapidity. The rains at an average, it is probable, are double what they are in the S.E. counties of the kingdom. The rivers in theſe two diſtricts cannot fairly be eſtimated, I think, at leſs than four times the Thames. It appears, then, that by this eſtimation, the water carried off by all the rivers in England and Wales, may amount to nine times that carried off by the Thames = 13 inches of rain. There remains ſtill ſixteen times the water of the Thames, or 23 inches of rain to account for, before we have diſpoſed of all the rain and dew."

This ingenious philoſopher concludes, from a detail of facts and reaſoning, that "the rain and dew of this country are equivalent to the quantity of water carried off by evaporation and by the rivers. And as nature acts upon general laws, we ought to infer, that it muſt be the caſe in every other country, till the contrary is proved.

"This concluſion being admitted, we are enabled to deduce a general theorem for the quantity of water carried down into the ſea by any river in any country (on the ſuppoſition that all rivers are ramified alike) provided we have certain data; theſe data are the length of the river, and the exceſs of the rain above the evaporation in the country from which the water of the river is drawn; alſo, it ſhould be known by obſervation, how much water ſome one given river carries down.

"For, from the principles of geometry, the area of country from which any river is ſupplied, will be as the ſquare of the length of the river; and the quantity of water carried off, will be in the compound ratio of the area of the country, and the exceſs of the rain and dew above the evaporation.

"Thus, let L = the length of any river, E = the exceſs of rain and dew above the evaporation, and Q = the quantity of water diſembogued in any given time by that river; l = the length of any other river, e = the exceſs, &c. and q = the quantity of water; then we ſhall have $q = \frac{Q\,l\,e}{L\,E}$.

"*E. gr.* Suppoſe the length of the Thames = 200 miles, and the exceſs = 5 inches, eſtimating the rain and dew at 30 inches, and evaporation at 25; and ſuppoſe the river Kent, in Weſtmoreland, to be 20 miles in length, and the exceſs 35 inches, the rain and dew being ſuppoſed 65, and evaporation 30 inches. Then,

$$\frac{20^2 \times 35 \times Q}{200^2 \times 5} = \frac{7\,Q}{100} = q,$$

or $Q = 14\frac{2}{7}\,q$; which reſult, I believe, will be found to accord nearly with the meaſurement of the two rivers on the principle before-mentioned." Mancheſter Memoirs, vol. v. pt. 2.

RIVER, with regard to *Agriculture*, may be converted, in many ſituations, to various uſeful purpoſes, ſuch as thoſe of improving the meadow and other graſs-lands which lie below the ſources of them, by having their waters in particular ſeaſons turned over them. By proper attention in

theſe reſpects, vaſt benefits might, in a variety of caſes, where it has never been even ſo much as ſuſpected, be derived, and thereby immenſe ſavings in manure be made for the amelioration of the leſs favourably ſituated lands. But beſides this vaſt ſource of advantage, rivers may often be converted, with little trouble or expence, to other uſeful purpoſes, ſuch as the ſupplying of live-ſtock with water, the turning of different kinds of farming machinery, the conveying of cattle food, and manures of various deſcriptions, as well as different ſorts of farm produce, and a great number of other uſes, which can only be diſcovered by the particular circumſtances of them, and thoſe of their ſituations. But though in theſe views they may be juſtly conſidered as of much advantage, in others they are often dangerous, troubleſome, and highly detrimental to the farmer, as where they are much accuſtomed to overflow their banks, injure the crops, ſweep away the live-ſtock, and carry down much of the lands on their borders. Where they are apt to prove hurtful by thus overflowing their banks, the beſt modes of confining them in particular caſes have been pointed out in ſpeaking of the nature of embankments and haugh-land. See EMBANKMENT, and HAUGH-*Land*.

There are, however, other caſes that deſerve to be conſidered in this place, ſuch as the directing and altering the courſes of torrents coming from mountains, changing the courſes of rivers, ſecuring the banks of rivers in vallies, and ſtraightening the narrow, crooked windings of ſmall rivers in the ſame ſituations, and other hollow parts of lands. By the firſt of which much advantage may, in different circumſtances, be procured, and great ſecurity be attained for the valuable lands below. By the ſecond, extenſive tracts of the moſt valuable kinds of land may be obtained, while the whole is rendered more ſafe and proper for the purpoſes of paſturage or thoſe of tillage. By the third, much uſeful land may be ſecured, as well as much miſchief from the high floods be guarded againſt. And as by the laſt much ground is often loſt, or rendered of but trifling value to the farmer, by proper means theſe inconveniencies may be obviated, and the land rendered of much greater utility. Beſides theſe, the methods of ſecuring the banks, in other inſtances where they are liable to be carried away by large floods, may alſo prove a vaſt benefit and improvement.

In the former of theſe caſes, the remedies are, in general, thoſe of rendering their courſes more *free*, *open*, *ſtraight*, and *regular*, by which they muſt obviouſly ſuffer leſs obſtruction, and of courſe be leſs apt to overflow their banks, and prove injurious to the grounds below, or on the ſides of them. It is, however, remarked, that this is a ſort of work that ought to be maturely conſidered in all caſes before it is attempted; but that in ſuch upland ſituations the buſineſs may often be performed with facility by ſmall cuts made along the flat baſes of ſuch elevations, while it is very different in thoſe of ſtraightening vale rivers, as much larger openings are requiſite. Beſides, ſhallows for piers and ſtops are moſtly found there, while in theſe caſes they are in general wholly wanting. But in all caſes, and in every point of view, the buſineſs is evidently of the greateſt intereſt to the proprietors of land, as the deſtruction produced in this way is not only often committed on the moſt valuable ſorts of land, but is frequently the cauſe of diſputes between the neighbouring proprietors; this ſort of work has, however, been little attended to, and is in common very imperfectly underſtood. In many inſtances a great deal may be effected by proper accommodation between the different proprietors, whoſe intereſts are affected.

But in undertaking works of this nature, there are different circumſtances that require to be particularly conſidered. The peculiar ſcite or place of improvement ſhould, Mr. Marſhall ſays, be well ſtudied, in order to fix upon the beſt method of executing the work. And when this has been done, accurate plans and eſtimates of the expence that may be incurred, as well as of the groſs profits that may reſult from it, be made out with care. And it is adviſed that, where the buſineſs is extenſive, and the perſon who has the management not perfectly acquainted with the nature of it, to contract with proper experienced labourers, or a reſponſible undertaker, for the execution of the whole, binding the party who is to perform the work to uphold it for a certain number of years after it is finiſhed. It is remarked, that for want of theſe precautions, ſums of money are annually expended, and in great part thrown away, ſo as to become, in ſome inſtances, a heavy tax upon eſtates, and a ſerious defalcation of timber. It does not follow, it is contended, that, becauſe a few ſquare yards of land are annually carried away, an expenſive work ſhould be erected, and upheld at ten times the value of the ground it will protect; nor that, becauſe one ſide of a river is ſlightly injured, an over-ſized work ſhould be raiſed to the greater injury of the oppoſite banks. It will be found, it is obſerved, that in ordinary caſes, oppoſite proprietors have one and the ſame intereſt; and that ſmall injuries may generally be remedied by ſimple means, and at a ſmall coſt. What the writer is ſolicitous to inculcate is, that the remedy ought to be proportionate to the diſeaſe; and that it ſhould be applied in ſuch a manner as not to injure another: conſequently, that it behoves a proprietor to ſee that no one about him has an intereſt in erecting expenſive and abortive works, or any proſpect of advantage from the annoyance of his neighbour in any reſpect from ſuch works. It is added, that every perſon has an undoubted right to defend his property. It is often his duty, as well as his intereſt, to do it. And that there are caſes on which even large ſums of money may be prudently laid out, and ought to be expended in order to accompliſh the work; as by neglect great injury may be ſuſtained, which at firſt might have been remedied at a very trifling coſt.

Rivers, wherever they are properly ſituated, ſhould always be converted to the uſe of watering the graſs lands which lie below their levels. See WATERING *of Land*.

RIVER-*Banks*, *Securing of*, the means of guarding and protecting them from the encroachment and injury of the ſtreams when in flood or otherwiſe. It is a work of much difficulty and labour in many caſes, and that requires the careful management of an experienced director. It is indeed remarked by the author of the Treatiſe on Landed Property, in ſpeaking of the nature of this buſineſs, that ſuppoſing the uniform, and evenly-poiſed, current of a reach or ſtraight part of a river to be diſturbed by the body of a large root of a tree, or any other matter, brought down and lodged by a flood, on this ſide, which, in brooks and narrow rivers, is an ordinary cauſe of miſchief, it is found that through this apparently trifling incident the current may be ſaid to loſe its balance. For, when the flood falls to the level of the obſtruction, the water becomes confined in that part; its height, above the obſtruction, is conſequently increaſed; and its current oppoſite and below it not only accelerated, but gently turned from its direct courſe toward the oppoſite bank of its natural channel; which, if it be of an earthy crumbling nature, becomes undermined: the land, or upper part of the bank, conſequently ſhoots down, and is carried away by ſucceeding floods. And what tends to increaſe the evil is, the circumſtance of the channel, immediately below the obſtruction, becoming occupied, even in minor floods, with comparatively ſtagnant water. It is in conſequence

quence warped up with the ſediment there depoſited; and by this means an additional weight of water is thrown againſt the oppoſite bank; which, if the growing cauſe of miſchief be not ſpeedily removed, will in a ſhort time be much torn away, and, in a courſe of years, a bend or bay be formed in the adjoining ground of the proprietor, nearly oppoſite to the root or other body, with a correſponding bank of ſand or gravel, united with and becoming part of the lands on this ſide. But if the grounds, on this ſide, are equally vulnerable as thoſe of the oppoſite neighbour, there is no cauſe of exultation in the increaſe of territory. For while the current is leaving the proprietor on this ſide, perhaps a worthleſs ſand-bank near the obſtruction is, by a natural law of river-currents, ſcooping out a bay below, and giving to his oppoſite neighbour an increaſing territory in that part. And thus a natural loſs of valuable land is incurred on each ſide; and the evil (in this caſe) continually increaſing; until the banks are ſecurely defended, or the current is reſtrained, and directed into its former channel. The remedies in this caſe are two; firſt, to ſheath the injured banks of the bays on both ſides, with ſuch materials as will reſiſt the circuitous current, and let the river remain in its crooked ſtate; and, ſecondly, to erect a pier at the higher point of the bend on the oppoſite ſide of the river, to parry off the force of the current from the bank of it, and direct it forward; with the twofold intention of preventing further miſchief, and of bringing back the courſe of the river to its former ſtate of ſtraightneſs, as much as poſſible.

It is likewiſe ſtated, that the operation of guarding the immediate bank of a ſharp river-bend againſt a heavy current, meeting with great reſiſtance, is generally a work of much difficulty and expence, even where materials can be eaſily procured; while that of diverting the current may frequently be accompliſhed at a comparatively ſmall coſt; and its effect be rendered infinitely more ſalutary and permanent. As it is evident that, if the accidental obſtruction mentioned had been timely removed, no bad effect would have enſued, and the river would have continued its direct courſe. Or if, through neglect, it had been ſuffered to remain awhile, until its miſchief was diſcoverable, even then, if it had been moved from its ſtation to the oppoſite ſide of the river, and placed in the part affected, this ſmall counterpoiſe might have recovered the balance of the current, and directed it into its wonted channel. And in almoſt any caſe, he thinks, by judiciouſly placing, in a ſimilar manner, an obſtruction proportioned to the magnitude of the power to be counteracted, the like effect may be produced. As, for inſtance, if, in the caſe propoſed, the pier or river-guide above-mentioned were to be erected by the proprietor on the oppoſite ſide of the river, and to be inclined towards the ſtream, or direct courſe of the river, in a degree proportioned to the ſtrength of its current (a rapid current requiring leſs bias than a ſlow one), and of a ſize in like proportion, not only the banks of the bay or bend would be defended, in a great degree, from the action of floods, but the ſand-bed formed on this ſide would be worn away, and its materials depoſited in the bay on the other ſide; which alſo being rendered ſtagnant, comparatively, with the current of the river, would receive the depoſits of foul waters in times of floods; and thus, in a twofold manner, be refilled and brought back toward its former ſtate. And, further, that if, when the gravel bank on this ſide is ſufficiently removed, the proprietor on the ſame ſide were to erect a ſimilar pier at the higher point of the bend on the ſame ſide, the ſand or gravel bank on the other ſide would, in like manner, be worn away, the bay on this ſide be returned to its original proprietor, and the ſtraight courſe of the river be regained; then the piers ought to be removed, whether they belong to one or two proprietors; the latter having generally a mutual intereſt in directing the river, which ſeparates their properties, into a ſtraight courſe, as much as can be done.

It is ſtated, that in the conſtruction of a river-guide for this purpoſe, there are certan principles and particulars of practice to be obſerved. It is ſuggeſted that its poſition ſhould be ſuch as to produce the required effect, with the leaſt degree of reſiſtance. For the current of a river, as the waves of the ſea, ought to be ſubdued by ſtratagem rather than by force. Reſiſtance ſerves but to increaſe their fury. A wave falling on a flat ſhore, ſeems to die without a ſtruggle; while one that is ſtemmed by an abrupt rock ſtrikes with tenfold force. And, in like manner, a rapid river will glide ſmoothly along the ſide of an even bank, though it may ſomewhat deviate from the direct courſe; without perceptibly diſturbing the current, or injuring the bank that directs it, even though merely of turf. But when a ſtrong current meets with an abrupt projection, or a ſharp bend in its channel, its fury is rouſed. There, rock is ſometimes barely ſufficient to reſiſt its force. On theſe principles it is, therefore, conceived, that in erecting a pier with this intention, it ought to be made to unite evenly with the natural bank of the river above it, and, where the required deviation from a ſtraight line is conſiderable, the face of the pier ought to paſs off from the natural bank with a ſmooth hollow curve, that the force of the current may not be checked. But its outer or lower end ſhould be ſtraight, or nearly ſo, and be directed, as a piece of ordnance, to the object it is intended to deſtroy—to the obſtruction it is intended to remove; and it may be obſerved, that the nearer it approaches this, the greater will be the action of the current upon it, in times of flood; and the leſs liable the ſtream will be, at low water, to turn back into its former channel. For, in caſes of this kind, the current of a flood, and that of low water, (if not better directed,) take different courſes, according to their heights and ſtrengths. The one ruſhes forward in the direction deſired, the other, unable to ſurmount the obſtruction, and flagging for want of ſtrength at the point of the pier, doubles it; and falls back into the bay with an accelerated current; directed, perhaps, ſtraight to the injured bank; and may thus increaſe, perhaps, rather than prevent, the injury. But in order to remedy this evil effect, and to direct the current, at every height, into the ſame channel, it will generally be found right, where it can be done, and at a reaſonable expence, to cut a channel through the obſtructing bank, large enough to admit the ſtream at low water; depoſiting the materials which are raiſed in doing it at the point of the pier, and againſt the foot of the injured bank: by theſe means not only preventing further injury to the lands on the oppoſite ſide, but greatly aſſiſting the action of the flood-currents to force their way through the channel, and enlarge it; and, in a ſhort time, lay open the required courſe. For although, by this procedure, the bay on that ſide might not be ſo readily and completely filled up, as it would by ſuffering the current to throw back the obſtruction, by degrees, in the manner above repreſented; yet the advantage of putting an immediate ſtop to the ravages both of floods and of low water, might counterbalance that defect; even though the pier were thereby rendered neceſſary to be kept up in perpetuity. The expence of the cut may generally be ſaved in the required *length* of the pier; whoſe uſe, in this caſe, is, merely that of giving an eaſy bend to the current; ſo as to enable it to find its own way

to

to the channel prepared for it. And the *ſtrength* required, depends upon the weight of water, the force of the current, and the angle of deviation from the given direction of the current immediately above. If the required direction of the pier be nearly the ſame as that of the current above it, it has, it is contended, little more than the weight of water to ſuſtain. Whereas a jutment run out, abruptly, into the natural courſe of the current (as is commonly ſeen), has not only the weight, but the force, of the water to withſtand; and requires threefold, or tenfold, the ſtrength of ſtructure that is neceſſary in the other caſe. Another circumſtance to be particularly regarded in this ſort of buſineſs, is the height of the conductor. Where it is run out from the bank into the channel of the river, in rather a ſtraight manner, and if it be not raiſed high enough to prevent the waters of floods from making their way over it, its foundation may be endangered; eſpecially in a place where the general fall of the river is conſiderable. For an overfall of water, unleſs it have a firm baſis to act upon, naturally ſcoops out a pit at the foot of the fall; and undermines the precipice it tumbles over; ſeldom failing to let down ſuch as are conſtructed by art.

With reſpect to the means of obviating this effect, they are three, one of which is to raiſe the pier high enough to prevent the overfall; an expedient, however, which cannot always be practiſed with propriety. Another is to form the lower ſide, or back part of the pier, with a ſhelving or flatly inclining ſurface, to break or elude the fall. And the other, to prepare a convex floor behind the pier, for the waters to fall upon. This laſt has been found ſucceſsful in the writer's own practice. There is likewiſe another point that demands particular care in the operator, which is that of ſecuring the point or outer end of the pier, not only at the foundation, but in the ſuperſtructure. For although the main current cannot, if the pier is judiciouſly placed, exerciſe its ſtrength upon this part; yet, by reaſon of the weight of water there loſing its ſupport, and part of it, conſequently, ruſhing precipitately into the unguarded bay, the lower end of the pier is peculiarly expoſed to danger in that way. It is ſuppoſed ſcarcely neceſſary to add, that the *upper* end of the pier ought to be deeply inſerted in the firm bank of the river, to prevent the current from inſinuating itſelf behind the facing, or that the face of the pier ſhould be carried up with a ſufficient batter, to give it firmneſs; or that the *foundation* ought to be ſecurely laid, and to be kept ſeduloufly guarded in front, to prevent its being undermined by the current. Rough ſtones, thrown down looſe, and with a flat ſhelving ſurface, againſt the foot of the pier, are, in moſt caſes, the beſt guard, let its materials be of what ſort they may.

It is adviſed, that the materials for this uſe ſhould be ſuited to its occaſion, where a choice is to be had. If a low defence, only, is wanted, in a diſtrict where large rough ſtones are plentiful, a long pile of looſe ſtones, laid flatly ſloping againſt the bank of the river, or a flat ridge run out from it, may form a cheap and durable barrier. For ſhould they be diſturbed by an extraordinary flood, they may be readily replaced when the water ſubſides. Where a tall pier is required to direct a large and rapid river, in a place where ſtones and ſtrong cement may be procured at a moderate expence, maſonry may be eligible. But in expoſed ſituations, at leaſt, it ought to be guarded with timber, eſpecially at the top and the outer end (as the piers of ſea-ports, and the quays of navigable rivers, are guarded), to defend thoſe parts from injury by ice, timber, or other large floating bodies, driven againſt them in times of flood. And that where maſonry cannot be uſed, but at a great expence, a *caiſſoon*, formed with poſts and planks of adequate dimenſions, and filled with pebbles, gravel, or other indiſſoluble materials, to give ſtability to the fabric, may be found to laſt as long as its ſervices may be wanted; and, in ſome caſes, may be removed while its materials may yet be valuable.

But this, though the prevalent method, is merely palliative, and demands frequent repairs: it does not cure the evil, or bring back the loſt property to the owner who has a right to it. Nor is it in ſuch a caſe beneficial to a rival owner, for the current, as has been ſhewn, ſweeping circuitouſly along the banks of the bay, is thereby led to direct its force againſt the lands of the proprietor on this ſide, who cannot, under theſe circumſtances, defend them by the above means; but who muſt either ſecure them by a lengthened land-guard, or leave them at the mercy of a ſweeping current. It is therefore concluded, that, in a caſe of this kind, it is evidently the beſt intereſt of an oppoſite proprietor to ſuffer his ſand-bank, or gravel-bed, to be cut through, in the manner ſuggeſted, and that he ought to aſſiſt in the operation; as he will thereby not only get rid of the circuitous current, but, by the action of the floods, in the ſtraightened courſe, his bay will ſcarcely fail to be filled up with the ſcattered materials that may be removed.

There is another caſe in which this ſort of pier or river-guide may be made uſe of with ſucceſs; which is that where a ſtream of the above deſcription falls down a crooked valley, and neceſſarily takes, at certain points, a winding courſe.

In this caſe, where the quantity of water is conſiderable, its fall rapid, and eſpecially where it is conducted to the bend on the farther ſide down a ſtraight, unobſtructed reach, ſcarcely any thing but natural rock can reſiſt its force in that part. In ſuch ſituations it is not unuſual to ſee earth-banks ſcooped out and undermined, until a perpendicular cliff of twenty or thirty feet high be formed. But if a pier be erected at the upper part of the bend, with an eaſy curve from the natural courſe above, ſo as to *bend* the current without *breaking* it, and direct it into its natural channel, in the valley below, it will have nothing to contend with but the looſe gravel beds on the different ſides, which, if cut through, as in the former caſe, will preſently be torn away, and a principal part of their materials be depoſited in the bays on each ſide, but eſpecially in the latter, or that on this ſide: ſo that in this, as well as in that caſe, both ſides of the river may be benefited by the alteration which is thus produced. It is however ſtated, that there are caſes in which nothing but an immediate ſheath, or *land-guard* applied to the injured part, can be properly uſed to prevent further depredations. As, firſt, where the river is confined in the part where it is required to be bent, by rocks or otherwiſe, to an unaltered channel; as it frequently is in ſub-alpine ſituations. And, ſecondly, where a deep pool occurs in that part at low water, ſo as to render it difficult to get a proper foundation for a pier. It is obſerved that, in the former ſituation, ſtones are generally plentiful; and they require to be applied according to the circumſtances of the particular caſe. Where the foot of the injured bank is covered with a pool at low water, it is adviſed to ſhelve off the brink of the bank, and ſhoot down looſe ſtones from the top of it; ſuffering them to form their own ſlope in the action of falling, and by the operation of ſucceeding floods; continuing to pour them down until the bank be ſecured, at leaſt from minor floods; and then to

ſlope

ſlope back the upper part, to give freedom to floods of higher magnitude. But that where it is in the face of an impetuous torrent, and at ſome little diſtance from it, a gravel bed is thrown up, ſo as to lie dry during low water; yet where lands, behind, are liable to the ravages of floods, as is often the caſe, and eſpecially where ſtones are not plentiful, a more frugal arrangement of them may be made, by uſing them merely to caſe the expoſed bank, ſo as to prevent the currents of floods from laying eaſy hold of it, and tearing away the land. However, in this caſe much depends on the plan and conſtruction of a ſafeguard of this kind. It ought to be every way convex; ſo that the ſtrength of the current and the weight of the water may act upon it, as ſuperincumbent preſſure acts upon an arch. It ſhould bulge out, horizontally, towards the known current of floods, (without regard to the courſe of the ſtream at low water,) and the face of the wall ought to take the barrel form. A croſs ſection of the ſtone-work ſhould reſemble a ſemi-arch, or, in dangerous ſituations, it ought, it is conceived, to fall back flatter than the quadrant pitch. For, in general, the flatter it is made to lie, the more ſecure it will become; but the ſteeper it is carried up, the fewer materials, and the leſs labour, it will require. And in forming a work of this nature, the foundation ſhould be laid pretty deep, to guard againſt any accidental ſcoopings of the floods. The wall ought to be carried up dry, or without mortar, the ſtones being laid with their ends outwards, their inner ends pointing to the ſame centre, like thoſe of an arch, and to be backed with gravel or earth, rammed in firmly behind as the facing is carried up. The *coping*, or uppermoſt courſe of the ſtones, ſhould be ſecurely bound with thick tough ſods (eight or ten inches deep), whoſe ſurfaces, when beaten down, ought to lie even with that of the ſtone-work; and ſimilar ſods require to be laid, with a gentle riſing ſlope, until they unite ſmoothly with the natural turf of the land to be defended: ſo that the waters of floods, when they riſe above the ſtone-work, may have no abruptneſs to lay hold of, but may paſs away ſmoothly over the ſurface of the land, as they commonly do over ſmooth greenſward, without injury. And, laſtly, that the ſtones are to be beaten forcibly into the bank with a rammer, a mallet, or a ſmall battering-ram adapted to the purpoſe; thus rendering the whole compact and firm to reſiſt the current. Where vacancies or fiſſures ſtill appear, long ſplinters of ſtone are to be driven in, as wedges, to increaſe the firmneſs, and prevent the current from tearing out an unguarded ſtone. It follows, in courſe, that the largeſt and longeſt of the ſtones ought to be uſed where the greateſt reſiſtance is known to be neceſſary, in order that the greater ſecurity may be attained. It is remarked that this ſort of defence, like that of every other ſpecies of the river kind, requires to be attended to from time to time, eſpecially after great floods. If the foundation be laid bare, it requires to be recovered with rough gravel, or with ſtones thrown looſely againſt it. If any of the facing ſtones be diſplaced, or looſened, they are to be replaced with others, or to be wedged in afreſh. Or if the turf which binds them at the top be diſturbed, the torn part ſhould be cut out ſquare, and be firmly and completely filled up with freſh turves. It is added, that this method of defence againſt rapid rivers originated in the ingenious writer's own experience and practice; and that, when compared with a wooden guard, it is cheap, ſightly, and durable.

It is noticed further, that there are caſes of other kinds, as thoſe which are found in the ſkirts or margins in the vallies of mountainous ſituations, through the plains of which the rivers are found winding with devious courſes, or tracing the margins at the feet of the containing heights. In ſome inſtances, they are confined in deep-ſunk channels, whoſe banks they ſeldom overflow; but, much oftener, their channels are ſunk a few feet only beneath the general ſurfaces of the lands they paſs through. Hence, in high floods, they may be ſaid to be let looſe over the plains, to ravage them at pleaſure. Their immediate banks, however, are generally the victims of their rage. Theſe they tear away, and ranſack off their better parts; ſubſtituting beds of ſtones and gravel, or perhaps their own channels, in the ſtead of what were, a few hours before, valuable lands. And that there are inſtances of mountain torrents, on ruſhing out of their confined channels into flat vale diſtricts, ravaging many acres during a ſingle flood. And to confine or direct theſe, is, it is obſerved, often a buſineſs of vaſt difficulty and trouble.

In theſe caſes, the beſt endeavour of the artiſt is generally, according to Mr. Marſhall, to give the river a direct or ſtraight-forward courſe, on its quitting its reſtraining channel, at its firſt entrance into the area of the plain; and, if no obſtruction lies in the way, to continue the ſtraight line to another retaining channel, at the lower end of the area to be improved. But that where the area is winding, or ſome obſtruction riſes within it, ſo that a ſtraight line cannot be drawn from the entrance to the outfall, an inſuperable difficulty may ſeem to fruſtrate this mode of improvement; as the current requires to be bent, not only after it has entered the plain, but after it has acquired an increaſe of velocity by moving in a ſtraight courſe. By actual practice and experience, he was led by another circumſtance belonging to it, to what may, perhaps, be conſidered as a principle, in conducting improvements of this nature. A ſtraight cut into the middle was deſirable: but the point of riſing-ground rendered it impracticable. Near the centre of the flat, a large inſulated fragment or iſlet of rock roſe ten or more feet above the level of the area; and at the lower end of it, near the natural outlet of the river, a bank of rock had formerly been waſhed by it. It was eaſy to perceive that the inſulated rock, which commanded both the extreme points of the area, might be employed in uniting them; and that, by the uſe of that rock the work might be rendered complete. For, by opening a ſtraight courſe to the rock in the middle, and another from thence to the bank of rock at the outlet, the current would be directed, in another ſtraight line, to the outlet, and the ſcite of improvement be entirely freed from its injurious effects. He remarks, that it is in few inſtances that prominent rocks, firm enough to reſiſt the current of an impetuous river, riſe in the areas of river-worn plains. But that, on the ſides of mountain vallies, rocks are common; and may, doubtleſs, in many inſtances, be employed to throw the river from ſide to ſide of a crooked valley, in ſtraight reaches; as rays of light may be reflected in continuation by well-placed mirrors. Even where natural rock is not preſent, either in the area, or on the ſides of ſuch a plain, or flat-baſed valley, riſing grounds may frequently be found within the former, and are never wanting on the ſides of the latter. And, againſt theſe, artificial butments, of ſufficient ſtrength, may not unfrequently be formed in alpine ſituations, where ſtones are generally plentiful, without any very great expence.

It is obſerved, in reſpect to the *altering* the *courſe* of a river or brook, that the difficulties and expence depend on the particular circumſtances belonging to it. In a ſimple caſe, in which one ſtraight cut only is required, the principal difficulty, and that which requires the beſt ſkill of the artiſt, lies in directing the current of the firſt flood out of the old into the new channel. But if a bend of the old channel,

like that juſt noticed in the above caſe, can be made uſe of, this difficulty may be ſaid to vaniſh. The mouth of the new cut receives the current with a ſtraight courſe; conſequently, if it be made of ſufficient capacity, the river in a *flood* can have no propenſity left towards its old channel; and the looſe materials which riſe in forming the mouth of the new cut will generally be ſufficient to turn the ſtream at low water into it. But if a ſuitable bend cannot be approached by the new cut, a directing pier, like that in the above caſe, will be required to bend the flood-current, and give it a ſtraight-forward courſe into the new channel; a water-tight dam being formed between the point of the pier and the firm bank of the new channel, to prevent the water from regaining its former courſe or direction.

But in regard to the cutting of the new channel, it is merely a work of manual labour; being attended with no other difficulty than what may ariſe from the expence; which will depend on the ſize of the river, the nature of the ground to be cut through, and the value of labour in the given diſtrict. It is moſtly to be aſcertained with ſufficient accuracy, by previous calculations. And it is added that the required *ſize* of the *new cut* is ſmall compared with that of the old channel. For the currents of floods, by carrying off the earthy particles with which they come in contact, will ſoon enlarge it. It is nevertheleſs right to give ample room in the new channel, leſt the firſt flood ſhould prove high, and, by burſting its bounds, force its way back to its former courſe. Therefore, in order to give the required capacity to the new channel, and to allow for its widening, the materials which ariſe in making it ought to be formed into regular embankments on either ſide of it, and at ſufficient diſtances from its brink, to obtain the above purpoſes; and, moreover, to protect the adjacent lands from the injurious effects of unreſtrained floods. And it is further ſuggeſted, that a new river courſe requires to be carefully attended to, during a few years after it is opened, to ſee that its channel preſerves its ſtraightneſs, and that no breaches are made or threatened in its banks. And that, conſidering the uncertainty of extraordinary floods, it cannot be ſaid to be out of danger in leſs than three years. Of courſe, in contracts for theſe works, in theſe caſes they ſhould be upheld for that time, and then delivered up in the ſtate fixed upon in the agreement.

There are ſtill other caſes of rivers in lowland ſituations, where the currents of them are generally ſluggiſh, and their beds deep ſunk and narrow, with few ſhoals or firm baſes on which to found piers or bulwarks, and few ſtones with which to raiſe them; and even if erected, the ſluggiſhneſs of the current may render them ineffective. In theſe caſes the banks are ſteep, and often of the tendereſt earths, liable to the ſlighteſt attacks of agitated water, eſpecially near their feet, where they are naked of vegetable covering. Hence, it is from the frettings of the minor floods, or the waves of the dead water which occupies the channel of a river of this deſcription, that its banks are worn away; eſpecially at a bend which faces a length of reach, in which the waves have room to riſe. Theſe fretting againſt the foot of the bank undermine it. The face of the bank, in conſequence, ſhoots down; and the proſtrated ſoil is diſperſed by the next flood. It is conſequently obſerved, that the moſt eſſential work, in a caſe of this kind, is to guard the foot of the bank up to the level, and ſomewhat above the level of low water. And, this done, to ſlope back, ſmoothly, the upper part of the bank, to enable it the better to ſupport a vegetable covering, and withſtand the attacks of higher floods, as well as to render it leſs dangerous to paſturing ſtock, and enlarge their field of paſturage. And that when, with the increaſe of capacity, the channel is ſtill unable to contain the waters of great floods, lines of embankment may be raiſed on either ſide of it, with the ſoil removed in forming the ſlopes; and thus reſtrain them within due bounds. Likewiſe in particular parts, as at ſharp bends, when ordinary ſward, or paſturable turf, is not able to prevent the current, in this trying ſituation, from breaking up the ſoil, it ſhould be bound more ſecurely together by ſtronger rooted plants; of which the oſier is ſaid to be profitable to be planted upon the top of a rich river-bank; but it is altogether unfit to occupy its face for the purpoſe here required, though commonly uſed; as it tends to counteract one of the intentions propoſed in ſloping back the face of the bank; by filling up the ſpace thereby prepared for the waters of high floods to ſpread in; and thus increaſes the current at the foot of the bank. A much more eligible and effectual guard preſents itſelf, Mr. Marſhall ſays, in the furze, whoſe roots not only form a mat of ſtrong fibres in the ſoil, but bind it down to the ſubſtratum in a ſingular manner. Yet even the furze, if ſuffered to run up to its greateſt height, may fruſtrate the intention of propagating it. It ought, therefore, to be cut down from time to time as fuel; or to be kept cloſe mown, ſo as to form an invulnerable ſhield to the face of the ſlope. But it is obſerved that if we examine into nature's practice in guarding the ſoil of river-banks, we ſhall find it carried on with the beſt effect by the butter bur (*tuſſilago petaſites*).

But in theſe caſes of ſecuring the banks of rivers, Dr. Anderſon has long ſince given more full and ample directions. He remarks, that when a river runs in a bed of rich vegetable mould, the leaſt accident that may chance to direct the ſtream towards any particular part of the bank, cauſes it to ſweep away large tracts of fine ground, to the very great detriment of the proprietor, as well as the public; as this fine mould is uſually carried to the ſea, and the materials that the water leaves, to occupy the new bed that it thus forms for itſelf, is generally of a much worſe quality, conſiſting chiefly of ſtones, ſand, and gravel. And that where the whole force of the current is quite cloſe to the bank, and the materials neceſſary for fencing it are not to be there found, it may perhaps be impoſſible, or very difficult, totally to prevent this evil: but, for the moſt part, it admits of a cure, that can be obtained at a pretty moderate expence. For if you carefully obſerve the banks of rivers, you will readily remark that theſe ravages are always moſt conſiderable at thoſe places where the banks riſe perpendicularly to a pretty conſiderable height above the ordinary ſurface of the water, and never at thoſe places where the banks ſhelve down gradually towards the water's edge: for when the river is ſwelled to a great height by rains, and runs with a greater force and rapidity than uſual, it ſtrikes violently againſt theſe perpendicular banks that directly oppoſe its courſe; and as they are compoſed of earth, quite bare and uncovered, they are eaſily ſoftened by the water, and quickly waſhed away; ſo that the upper part of the bank, being thus undermined, falls by its own weight into the river, and is carried off in prodigious quantities. But when the river riſes to any conſiderable height, it generally glides along the ſurface of thoſe parts of the bank which ſhelve gradually downwards to the water's edge, which being defended by the matted roots of the graſs, with which it is covered, ſcarcely ſuſtains any damage at all, and is nearly the ſame after the water has retired within its banks, as before the inundation took place. He thinks that theſe are facts, which no one, who has beſtowed the leaſt attention to this ſubject, can fail to have obſerved; and that they

clearly point out, that the firſt and moſt neceſſary ſtep towards a cure is to level down the edge of the bank that is next the water, ſo as to make it ſlope gradually down towards the river. And that where the bank is very high, and you have no other particular uſe for the earth that muſt be taken from it, the eaſieſt method of diſpoſing of it will be to throw it into the river. But in whatever manner you diſpoſe of the earth, the ſlope of the bank muſt be continued until the inner edge of it is as low as the ſurface of the water, at the drieſt time of the year, and be made to aſcend gradually upward from the water with an eaſy ſlope, till it comes to the level of the ground, or at leaſt riſes to ſuch a height as the water never exceeds. And the work ought to be performed as early in the ſummer as poſſible; and the ſlope ſhould be either immediately covered with turf, pared from the ſurface of ſome field that has a very ſtrong ſward upon it, taking care to lay their ends in ſuch a manner as to be in as little danger as poſſible of being waſhed away by any accidental flood that might happen, before they are grown together; or, if turf of this kind cannot be had, it ſhould be ſown very thick with the ſeeds of ſome ſmall mat-rooted graſs, that ſhould be kept in readineſs for that purpoſe, ſuch as the creeping meadow-graſs. If the ſtream has not been extremely rapid at the foot of the bank, ſome of the earth that was thrown into the water will be allowed to ſubſide to the bottom, and will there form a bed of looſe ſoft earth, which will be of very great uſe afterward in preventing the face of the bank under water from being waſhed away. But in order to ſecure this bulwark effectually for the future, the ſurface of this ſoft earth ought to be inſtantly ſtuck full of the roots of bog-reeds, flags, water-ſpiderwort, ruſhes, and other mat-rooted aquatic plants; which, if allowed to remain till they have once ſtruck root, will afterward form a barrier that nothing will ever be able to deſtroy. It is added, however, that if the ſtream be too rapid to admit of this, and the bank of ſoft earth much deeper than the ſurface of the water, it will be of great uſe to fill up the breaſt of the bank with ſmall looſe ſtones, with a little earth intermixed among them, careleſsly thrown in till they riſe near the ſurface of the water, which would moſt effectually ſecure it againſt any future encroachments, if the bank is ſloped away above. It is further ſtated, that in caſe it ſhould ſo happen that ſtones cannot be eaſily got for this purpoſe, the only recourſe is to dig the bank ſo low, as that at the undermoſt edge it may be always below the ſurface of the water, and carry it out in this way for a conſiderable diſtance; and then ſtick the whole ſurface, that is below the water, full of mat-rooted aquatic plants, ſtrewing it over, if poſſible, with a thin bed of ſmall gravel or ſand, as convenient, which will in a great meaſure, if not entirely, defend it from future encroachments. And this bank ought to continue to ſhelve downwards, even where it is below water; and thoſe aquatics that will grow in the greateſt depth of water be planted on the innermoſt bank, and the others behind them. The water-ſpiderwort will grow in four feet depth of water; and the roots of the common yellow-flowered water iris forms ſuch a ſtrong and compact covering, upon the ſurface of the ſoil on which it grows, as would defend that ſoil from being affected by the water almoſt as well as if it were a rock. It is likewiſe an advantage attending this plant, that it grows upon a firm bottom, and chiefly delights in running water. But where the ſtratum of ſoft earth is not ſo deep as to reach to the ſurface of the water, and lies upon a ſtratum of rock or hard gravel, there will be no occaſion for throwing in ſtones of any kind. But as it is difficult to unite the vegetable mould to any of theſe ſtrata, there will always be ſome danger of its ſeparating from them, in violent inundations; and if the water once gets an entry, the breach will not fail to grow larger and larger by every inundation. To prevent this inconvenience, it will be neceſſary, after you have ſloped the earth away till you reach the gravel or rock, to cover the place where the edge of the earth joins the inferior ſtratum with a good many ſmall ſtones, if they can be found, ſowing between them the ſeeds of any kind of plants that you think are moſt likely to thrive, which have ſtrong matted roots, with as ſmall and flexible tops as poſſible. But where the object is of great importance, it will be ſtill more effectually ſecured, if the face of the rock be dug entirely away for ſome diſtance backward, and the place which that rock originally occupied be then filled up with earth, and ſloped back in the ſame manner as if it had been an earthen bank, in which no rock was to be found. In all operations of this ſort, great care ſhould be taken that no ſtones ſhould be mixed with the mould; for every thing that makes an inequality on the ſurface, or a difference in the firmneſs of particular parts, is extremely pernicious. It is evident, that from the impoſſibility of ever making earth adhere firmly to ſtone of any kind, it muſt always be an improper practice to face the banks of a river to a certain height with ſtone, which is capped at top with earth; as it muſt always be liable to be removed. This method has been ſince found to anſwer perfectly in actual trials in ſuch caſes.

There is, the ſame author obſerves, another miſchief produced by the ſwelling of rivers, from the water overflowing the rich flat ground, that is frequently met with on the ſides of them, which ſometimes prevents them from being got laboured at the proper ſeaſon, ſometimes ſweeps off at once the whole crop, and ſometimes deſtroys it by covering the whole ſurface with ſtones and gravel, to the unſpeakable detriment of the poſſeſſors of ſuch ground. And as theſe lands, ſometimes termed *haughs*, are generally very rich and fertile, and ſometimes of great extent, the damage that is done by not getting them properly cultivated is very conſiderable. In reſpect to the mode of removing this ſort of inconvenience, it is remarked that theſe haughs are ſeldom of great extent, excepting on level tracks, where the water runs with no impetuous current; and, therefore, they may in general be preſerved by means of a ſloping bank, raiſed all along the ſide of the river, as far as the haugh extends, which, if formed by the ſame plan as thoſe deſcribed above, will eaſily confine the water within their boundaries, till it riſes ſo high as to overflow the top of the bank; ſo that if theſe are raiſed to a ſufficient height towards the back part, in ſuch a manner as to be capable of containing the whole of the water that at any time flows down the river, the fields on each ſide will be effectually ſecured. And that where the ſurface of the ground in the haugh is at any conſiderable height above the water in the river, the bank may perhaps be raiſed to the neceſſary height, by throwing the earth that is taken from the brink of the river to the other ſide of the bank, ſo as to form the new ſurface of the bank on that direction, inſtead of the old ſurface. But if the ſurface of the ground is level on the oppoſite ſide of the river, the earth that is taken from the triangle in the whole will not, in that caſe, be ſufficient to fill up the whole of the other triangle, and raiſe the bank to a proper height; to make up which deficiency, it will be neceſſary to dig a ditch at the back of the bank, throwing the earth into the higher part of the bank, and facing up the line with ſtones or turf, ſo as to make it become a fence to one ſide of the field that it preſerves from inundations. However, where the ſurface of the ground is extremely low, ſo as to be but

little above the level of the water, then, instead of raising the bank on each side to the proper height, it will be more adviseable to raise them only to the height of a particular line; as, in that case, it would be very difficult to find as much earth as would form both the banks, although there will be no difficulty in forming the smaller one; and as the areas of the two are equal, these lower banks will contain an equal quantity of water within them, as the higher ones would have done; the greater width between them making up for their want of height. And it is conceived, that in this way it will be in the power of any man so to proportion his banks to the circumstances in which he finds himself placed, as in the easiest manner to accomplish his design: for if he has plenty of materials at hand, he may rear his banks to a greater height, and confine the river to a narrower course; and if he finds a deficiency in that respect, he may make them of a smaller height, and allow the river to spread to a greater breadth. It is added, in concluding this account, that this method has been found to answer very well in actual practice; but that, in some cases, it was found that while the bank was new raised, and before the surface was grown together, some parts of that surface were broke a little, when the water rose to a great height. In this case, the bank consisted entirely of loose sand, which is the worst material it could be formed of; but this was easily repaired, at a very small expence, when the water subsided. If these small breaches, however, had been neglected, there is no doubt but the whole would quickly have been destroyed. It was found that a few small stones, laid upon the surface of the sward, near the edge of the water, proved in this case a very useful addition. In cases where the sward is firm, this caution would have been unnecessary. Whoever attempts this mode of fencing, should take care to provide themselves with a sufficient quantity of the seed of the plant, usually called *sprots* in Scotland, to sow near the edges of the water; for these other kinds of grasses are shelled, and without this precaution, the surface remains bare, and is therefore liable to be washed away with the water, during the time of floods.

There are other cases in which attention is sometimes necessary to rivers, which are in those of the vale kinds, which run in very serpentine or crooked directions. In these cases it is sometimes proper to straighten them, though it is but in few instances, Mr. Marshall thinks, that this can be done with propriety and advantage, in respect to profit. And though the principles and management are the same in the execution, there is much difference from the want of suitable materials, &c.

The instances in which the courses of rivers that have their beds greatly sunk below the general level of the surface of the lands, as five or six yards, may be straightened in a profitable manner, are, it is observed, where two reaches, or straight parts, run in a line with each other; but are separated by a narrow neck of an extensive tract.

In this case nothing more is required than that the earth which is taken out of the new cut, should be thrown into the ends of the old bed, by which the stream, both at low water and in time of flood must possess a straight unimpeded course. And by this means the proprietor on this side not only obtains an acquisition of ground in the old river bed for different purposes, but on his own side of the river gains a length of straight ground for the plough or scythe. But at the time this proprietor is thus benefited, the property on the other side may be injured; as by shortening the length, and that of straightening the direction of the river, the force of its stream or current at the upper bend may be considerably increased, and the land there greatly endangered. Hence Mr. Marshall thinks, that this obvious alteration should not be undertaken, except under the sanction of a commission of drainage, or till the proprietor below be indemnified for the injury that may be sustained. It is suggested, that in the above instance, half of the bed of the old river might be a sufficient indemnification. There is, however, a great variety of small streams and rivulets in the bottoms of steep declivities, that have such winding and serpentine courses, that they might be straightened with not only profit, but vast advantages to the lands on the different sides. In many situations it is disgraceful to see the destruction and injury that is caused by these little winding streams in the time of floods, and when they are in high water.

The proper protection and management of river-banks is unquestionably a work of great interest and importance in many instances; as they are very liable to be extensively destroyed by the streams, and much loss of valuable land to be thereby produced, as well as to be the cause of frequent disputes and litigations between neighbouring landholders. Rivers for the most part form the most tedious, troublesome, and indifferent boundaries of any betwixt landed properties.

The subject of guarding and securing their banks has hitherto been but little understood, either in theory or practice, though it obviously requires equal, if not more attention, than any other rural practice, as being very serious in its consequences, both as to the mischiefs, and the ineffectual, though expensive, modes of preventing them. The practical directions that have been given above should therefore be well considered, as they may save much labour and expence, when well applied; as well as prevent a variety of disputes, and the frequent loss of much useful land. Plans of the methods of accomplishing the work in different cases, may be seen in the second volume of the Farmer's Dictionary.

Before undertakings of this nature are begun, proper plans and estimates of expence and profits should constantly, as has been seen, be prepared, and contracts, where possible, entered into for their execution with persons of experience, always binding them to uphold the works for a certain number of years afterwards; as by these means much money, timber, labour, and unnecessary trouble, will be saved, which would otherwise be thrown away, and the works be improperly managed. Besides, the means will be properly proportioned to the ends which are designed, in all cases. The interest of opposite proprietors will likewise often be shewn to be one and the same, which will greatly promote such works in different instances. See EMBANKMENT.

RIVER *Guards*, terms applied to such piers, mounds, or other solid embankments, as are carried out for the purpose of altering, directing, or confining, the courses of rivers. They are distinguished into common, and what are termed *dwarf* guards; the former being those employed for large rivers, and the latter, such as are made use of where the force of the currents are less violent and less heavy.

With regard to the substances that are most commonly made use of in this intention, they are all sorts of hard weighty materials, such as rough coarse stones of different kinds, large pebbles, heavy pieces of timber secured by piles firmly driven into the ground, and supported behind by coarse gravel stones, or other similar materials, the roots of trees with the earth about them, posts firmly driven in with planks nailed to them, and well banked with strong substances, piles driven in and wattled with sods, being well banked with the same substances. Besides these, various other materials are presented to the attention of the work-

men in different ſituations and circumſtances where theſe ſorts of guards are wanting.

River *Guide*, a ſtrong work of the pier kind, carried out on them for the purpoſe of diſpoſing their ſtreams to take more ſuitable directions or courſes for preventing their miſchievous effects on the banks or lands on their ſides. See River-*Banks*, *Securing*.

River *Weeds*, in *Farming*, are ſuch ſorts of plants as grow on the ſides, and other parts, of rivers. When collected in large quantities, they are highly valuable for the purpoſe of manure. And in compoſt with other ſubſtances they have been found of much utility in the practice of ſeveral writers in the Tranſactions of the Bath ſociety. And Mr. Crowe, of Lakenham, in Norfolk, according to Mr. Young's agricultural ſurvey of that diſtrict, manures four acres annually for turnips, with the weeds of a river that runs by his farm; the plants are chiefly the philandrium aquaticum, and ſium nodiflorum, the water hemlock and water parſnip. It is ſtated that he lays twenty loads of thirty buſhels *per* acre, and ploughs in directly; which are as good on ſand and mixed loam as the beſt dung; but not equal on ſtiff ſoils; and it is added, that Mr. Bloomfield, of Billingfold, has been in the habit of manuring his turnip lands with weeds freſh from the river, and ploughed in quickly; they have anſwered as well as yard muck.

But where theſe ſorts of materials are made uſe of for the purpoſe of manure, the plants ſhould be removed while in their moſt ſucculent green ſtate, and be turned into the ſoil as quickly as poſſible afterwards. In the making of them up into compoſts, a great loſs is probably ſuſtained in the extrication and diſſipation of the more fluid parts. And it is obvious, that as manure they muſt be the moſt uſeful when applied to the light friable deſcriptions of ſoils, as in theſe they run more rapidly into a ſtate of putrefaction. It is probable they cannot be uſed with advantage on the ſtiff heavy ſoils in their green ſtate. See Manure and Weeds.

River, *Fordable*, in *Military Language*, a river which may be paſſed without the aſſiſtance of any floating machines. In order to ſound the ford, and to aſcertain the ſtate of it, men on horſeback are firſt ordered to croſs. By that means you will be able to know whether any obſtacles have been thrown in the way by the enemy; for nothing is more eaſily effected. The paſſage of a ford may be rendered impracticable by throwing whole trees in, by tables or platforms covered with nails, and by ſtakes. The two latter impediments are the moſt dangerous. But ſtakes are not eaſily fixed, and are conſequently ſeldom uſed. When fords are embarraſſed by them, it requires ſome time and trouble to clear the river; and it is equally difficult to get rid of the inconvenience that ariſes when wells have been ſunk. Whenever there is reaſon to apprehend ſuch obſtacles, it is always beſt to reach the ford at duſk.

When the prince of Condé, in 1567, reſolved to croſs the river Seine, the Royaliſts, who were on the oppoſite ſide, endeavoured to prevent his paſſage by throwing quantities of madriers or thick planks that were nailed together, iron hoops and water-cats into the ford. The Huguenots or Proteſtants, however, were not diverted from their purpoſe. Aubigné, a French writer, ſays, that on that occaſion they placed 400 arquebuſiers upon the bank to protect the men that raked the ford.

This was certainly a ſingular method which was uſed to clear a ford, nor could it be done without much difficulty, and no inconſiderable ſhare of danger. The chevalier Folard has propoſed a much ſafer, and a much eaſier way, by means of grappling hooks, tied to long ropes, which might be thrown into the ford. Yet even in this caſe, obſerves the writer, the object could not be accompliſhed if the river were broad, unleſs the perſons employed in the undertaking be under the cover of ſo heavy a diſcharge of ordnance and muſquetry, that the enemy would not be able to interrupt them, even from an intrenched poſition on the oppoſite bank.

With reſpect to caltrops, the removal of them, when properly diſtributed at the bottom of a ford, muſt be attended with great difficulty; for they muſt render the paſſage abſolutely impracticable, unleſs they were to ſink very deep into the mud and ſand, and thus become uſeleſs. The men that firſt enter are in this caſe the only perſons incommoded, but the reſt may follow without much hazard.

It ſometimes happens, that the bottom of a ſtream or rivulet is firm and gravelly; when this occurs, the greateſt precautions muſt be taken to eſcape the effects of caltrops, which would be extremely hurtful to any perſons that might attempt to croſs. In order to obviate their miſchievous conſequences, and to render them in a manner uſeleſs, a good ſtock of hurdles muſt be provided. The ſoldiers will hand theſe to one another, force them into the water, and then cover them with ſtones.

When one or two fords in a river are ſo ſituated, that ſeveral battalions cannot croſs them upon one front, it is then highly prudent to throw a bridge over, either above or below the ford; for a ſwell may intervene and render it otherwiſe impaſſable; add to which, you have the advantage of getting a greater number of troops over at once.

In order to effect a paſſage for his army over the river Segre, Cæſar gave directions that ditches, thirty feet broad, ſhould be dug in ſuch parts of the banks as might, with eaſe, receive the water out of the ſtream, and render it fordable. Having accompliſhed this object, he found no difficulty in reaching Petréius, who, being in the daily fear of wanting proviſions and forage for his men, was on the eve of quitting his poſition and marching forwards.

The paſſage of the Granicus by Alexander the Great, is likewiſe mentioned in hiſtory, as an inſtance of bold enterpriſe. But however celebrated that act may be in ancient records, we ſhall not be thought partial to the moderns when we ſtate, that the paſſage of the river Holowitz by Ch. XII. of Sweden, was equally bold and well managed.

The paſſage of the Teglimenti by Bonaparte during his campaign in Italy, is the moſt celebrated of the preſent day.

River *Bay*, in *Geography*, a bay on the N.E. coaſt of Barbadoes; two miles N.W. of Cuckold's Point.

River's *Canal*, an inlet on the N.W. coaſt of North America, diſcovered by Capt. Vancouver in the year 1792. This canal extends from S. to N. about 16 miles, and terminates in N. lat. 51° 42′. E. long. 232° 22′.

River *of the Weſt*, a river of North America, which runs into the Pacific ocean, N. lat. 43° 18′. W. long. 122° 30′.

River *Horſe*, in *Zoology*. See Hippopotamus.

River *Navigations*, in *Hydrology*, denote thoſe which are wholly or in a great part reſtricted to the ancient channel or bed of a river. See Canal.

River, *New*. See Canal and Company.

RIVERHEAD, in *Geography*, a townſhip of New York, in Suffolk county, Long iſland; it was taken from the townſhip of Southold, incorporated in 1792, and contains 1501 inhabitants.

RIVERIUS, Lazarus, in *Biography*, a diſtinguiſhed phyſician of the 17th century, was born at Montpellier in the year 1589. He ſtudied in his native univerſity, but was very ſlow in his attainments, inſomuch that he failed in his firſt

first examinations for his degree. This failure, however, occasioned him to redouble his exertions, and he gave sufficient proofs of his acquirements in the following spring, 1611, when he was admitted to the degree of doctor. His attachment to study became very great; and in 1622 he was appointed to the professorship of medicine in the university, an office which he continued to fill with great honour during the remainder of his life. He died in the year 1655. Riverius published "The Institutes of Medicine," in five books, in Latin, of which there are many editions, and which must be deemed a very respectable work for the time. But his principal work, and that which has gained him considerable reputation, is a course of medicine, entitled "Praxis Medica." The first publication of this work consisted of a mere practical treatise, without any pathological discussion, as a sort of text-book, used in his lectures. But finding that many editions of it were printed in France and Holland, he enlarged and improved it, and it was printed in this state at Paris in 1640, and a great number of editions have subsequently appeared, as well as translations into French and English. It treats of most of the diseases to which the body is subject, in seventeen books, in a clear style; but in many places he appears to have borrowed copiously from Sennertus. He published also a work, entitled "Observationes Medicæ et Curationes insignes," which has been frequently reprinted, and is not now without its value. These works have been collected, and published together, under the title of "Opera Medica Universa." Eloy observes, that a friar, Bernardin Christin, who had been a pupil of Riverius, compiled some secrets of chemistry, which he published with the name of Riverius; and although it has been clearly proved that he was not the author of these papers, yet they have been frequently printed, in the collections of his works, and separately, under the title of "Arcana Riverii." Eloy Dict. Hist. de la Med.

RIVERS, Cape, in *Geography*, the N.W. point of the island of Celebes. N. lat. 1° 25′. E. long. 120° 30′.

RIVES, a town of France, in the department of the Isere, and chief place of a canton, in the district of St. Marcellin; 14 miles N.W. of Grenoble. The place contains 1530, and the canton 12,019 inhabitants, on a territory of 115 kiliometres, in 12 communes.

RIVESALTES, a town of France, in the department of the Eastern Pyrenées, and chief place of a canton, in the district of Perpignan; six miles N.N.W. of Perpignan. The place contains 1986, and the canton 10,036 inhabitants, on a territory of 422½ kiliometres, in 14 communes.

RIVET de la Grange, Anthony, in *Biography*, a French Benedictine monk, was born at Confolens, a small town belonging to the diocese of Poictiers, in the year 1683. Afterwards he was sent to study philosophy under the Jacobins, or Dominican monks at Poictiers, where he gave the greatest satisfaction by his application and proficiency. At the age of 21, he became a noviciate in the abbey of Marmoutier, and took the vows in the year 1705. After completing his courses of philosophy and divinity, he was transferred to the abbey of St. Florence, at Saumur, where his order was establishing a kind of academy, consisting of such members as were most distinguished by their talents and literature, for the purpose of studying the scriptures in their original languages, the councils, the fathers, and the historians of the church, without being shackled by the trammels of the schools. He undertook to write "A Literary History of France," the plan of which he had already conceived. However, before he became wholly occupied on this work, he gave to the public, through the medium of the Dutch press, another favourite production, entitled "The Necrology of Port-Royal in the Fields, &c. containing historical Eulogies; with the Epitaphs of the Founders and Benefactors of that Monastery, &c." 1723, 4to., preceded by an historical preface. In the year 1733 he published the first volume of his work under the title of "The Literary History of France; treating of the Origin and Progress, of the Decline and the Revival, of Learning among the Gauls and among the French; of their respective Taste and Genius for Literature in each Age; of their ancient Schools, and the Establishment of Universities in France; of the principal Colleges; of the Academies of Sciences and Belles-Lettres, &c." in 4to. This was followed, at different periods, by other volumes, till the author had printed the ninth, which includes the first years of the twelfth century, when he died, towards the beginning of 1749, in the 66th year of his age. This work was afterwards extended to twelve volumes. It has been compared, and not undeservedly, with the "Memoirs" of the learned Tillemont, for accuracy of citation, and depth of research, and it will be found to furnish the reader with much interesting matter, not only on the subjects mentioned in the title, but also relating to the lives of the learned men who flourished in the ages of which it treats.

Rivet, in the *Manege*, is the extremity of the nail that rests or leans upon the horn when you shoe a horse.

Rivets, in *Agriculture*, a term sometimes applied to a sort of bearded wheat. See Wheat.

In Essex, throughout all the district of the Roodings, this sort of wheat is found very general, and to yield much better crops on these heavy lands, than any common sort; but on the more light soils the Kentish red is superior.

RIVIERA, or Palese, in *Geography*, a town of Italy; five miles N. of Bellinzona.

Riviera *di Levante*, a name given to that part of Genoa which extends from the city of Genoa, included in it, to Etruria.

Riviera *di Ponente*, that part of the Genoese territory which extends westward from the city of Genoa to France.

Riviera, *La*, a town of France, in the department of the Doubs; 10 miles S. of Ornans.

RIVIERE, Grande. See Grand *River*.

Riviere *Pelote*, a town on the S. coast of the island of Martinico.

Riviere *Salée*, a town on the S. coast of the island of Martinico.

Riviere *Mahaut*, *La*, a town of the island of Guadaloupe, situated in a bay to which it gives name. N. lat. 16° 27′. W. long. 61° 46′.

Riviere *de Theyrargues*, a town of France, in the department of the Gard; 14 miles N.N.W. of Uzés.

Riviere *de Thibouville*, a town of France, in the department of the Eure, 18 miles N.W. of Eure.

RIVINA, in *Botany*, was so named by Plumier, in honour of the great German systematic botanist; see Rivinus. Linnæus at first called the genus *Rivinia*, which would have been more correct, but he did not persist in the amendment, nor has it prevailed.—Linn. Gen. 63. Schreb. 87. Willd. Sp. Pl. v. 1. 694. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 273. Juss. 84. Plum. Gen. 47. t. 39. Lamarck Illustr. t. 81. Gærtn. t. 77.—Class and order, *Tetrandria Monogynia*. Nat. Ord. *Holeraceæ*, Linn. *Atriplices*, Juss. See Piercea.

Gen. Ch. *Cal.* Perianth inferior, coloured, permanent; of four obovate, obtuse leaves. *Cor.* none, except the calyx be so called. *Stam.* Filaments four or eight, shorter than the calyx, approaching each other in pairs, permanent;

nent; anthers ſmall. *Piſt.* Germen ſuperior, large, roundiſh; ſtyle very ſhort: ſtigma ſimple, obtuſe. *Peric.* Berry globoſe, ſtanding on the reflexed calyx, (which is hardened and become green,) of one cell, and crowned with a little incurved point. *Seed* ſolitary, roundiſh, lenticular, rough.

Eſſ. Ch. Calyx coloured, in four deep ſegments, permanent. Corolla none. Berry with one lenticular ſeed.

Obſ. The error of Linnæus in ſubſequently terming *corolla*, what he had, with indubitable propriety, called *calyx*, is difficult to be accounted for. He is followed by Willdenow, who has miſled Dryander and Aiton. The natural order of the plant, as ſettled by Linnæus himſelf, determines the queſtion without appeal.

1. R. *humilis*. Downy Rivina, Linn. Sp. Pl. 177. Willd. n. 1. Ait. n. 1. (Amaranthus baccifer, circææ foliis; Comm. Hort. v. 1. 127. t. 66.)—Stamens four. Leaves downy.—Native of the Weſt Indies. Common in our ſtoves for above a century paſt, flowering at moſt parts of the year, and always decorated with drooping cluſters of little berries, of a peculiarly bright ſcarlet, which make the chief beauty of the plant. The *ſtem* is buſhy, ſhrubby, three or four feet high. *Leaves* alternate, ſtalked, ovate, acute, entire, thin, flaccid, light green, downy, about three inches long. *Cluſters* from the forks of the branches, ſolitary, downy, of many ſmall, greeniſh-white, drooping *flowers*.

2. R. *lævis*. Smooth Rivina. Linn. Mant. 41. Willd. n. 2. Ait. n. 2.—Stamens four. Leaves ovate, pointed, even, ſmooth. Stem round.—Native of the Weſt Indies. Flowers in the ſtove, moſt part of the year. Cultivated by Miller in 1733. *Aiton*. Like the foregoing, but ſmooth. Margins of the *leaves* purpliſh. *Flowers* reddiſh at the outſide.

3. R. *braſilienſis*. Wave-leaved Rivina. Nocca in Uſteri Annal. faſc. 6. 63. Willd. n. 3. Ait. n. 3.—"Stamens four. Leaves ovate, undulated and rugged. Stem furrowed."—Native of Brazil. Introduced at Kew by ſir Joſeph Banks, in 1790. It bloſſoms in the ſtove in June and July. *Stem* ſhrubby. *Leaves* ovate, or heart-ſhaped, wavy, ſmooth. *Flowers* white or reddiſh. *Berry* round, of a ſhining red.

4. R. *octandra*. Climbing Rivina. Linn. Sp. Pl. 177. Willd. n. 4. Ait. n. 4. (R. dodecandra; Jacq. Obſ. faſc. 1. 6. t. 2. R. ſarmentoſa, &c.; Browne Jam. 149. t. 23. f. 2.)—Stamens eight or twelve. Leaves elliptic-oblong, ſmooth.—Native of the Weſt Indies. Cultivated by Miller, before 1752. It flowers in the ſtove in May and June. *Aiton*. The *ſtem* is deſcribed by Jacquin as very tall, though ſlender, throwing out long ſlender ſhoots, amongſt other ſhrubs and buſhes. *Leaves* entire, acute at each end. *Calyx* white, turning to a purpliſh-red. *Berry* dark purple, the ſize of a pea, eagerly devoured by birds. *Jacquin*.

R. *paniculata*, Linn. Syſt. Nat. ed. 10. v. 2. 899, though retained as ſuch by Murray, in Syſt. Veg. ed. 14. 165, is no other than *Salvadora perſica*, as cited in Linn. Sp. Pl. 178. This being removed from *Rivina*, the character of "ſimple cluſters" for the remaining ſpecies, being common to all, becomes ſuperfluous.

Rivina, in *Gardening*, contains plants of the ſhrubby evergreen kind, of which the ſpecies cultivated are; the downy rivina (R. humilis); the ſmooth rivina (R. lævis); and the climbing rivina (R. octandra).

Method of Culture.—All theſe plants may be increaſed by ſeeds procured from the places where they are natives, ſowing them, as ſoon as they are obtained, in pots filled with freſh light earth, plunging them in a hot-bed when in ſummer, but in the tan-bed of the ſtove, in the autumn or winter. The earth ſhould be well moiſtened during the ſummer ſeaſon, but very ſparingly in the winter. They ſhould be carefully preſerved in theſe ſituations till the ſeeds vegetate, which is often a great length of time, of courſe the pots ſhould not be diſturbed. When the plants have attained about two inches in growth, they may be removed into ſeparate ſmall pots, filled with light loamy mould, plunging them into a hot-bed, ſhading them till freſh rooted.

They afterwards require the management of other ſtove exotic plants.

They may likewiſe ſometimes be raiſed by layers and cuttings, aſſiſted by the heat of the bark hot-bed.

After theſe plants have been preſerved in the ſtove of the hot-houſe till they have attained a good growth and ſtrength, they are capable of being preſerved in moderate warmth in winter, and in the warmeſt part of ſummer in the open air, in a warm ſheltered place.

They afford variety among other potted evergreen ſtove plants.

RIVINI Foramen, in *Anatomy*, a ſuppoſed opening in the membrana tympani of the ear. See Ear.

RIVINUS, Augustus Quirinus, in *Biography*, an eminent phyſician, but much better known as a botaniſt, formed, with Ray and Tournefort, the triumvirate of ſyſtematical teachers, who, in the latter part of the 17th century, and the beginning of the 18th, divided the homage of the ſtudents of botany between them. Their importance aroſe from the neceſſity, which nobody could overlook, of a methodical arrangement of plants; but even the memory of their labours has now almoſt paſſed away, becauſe thoſe labours proved, all nearly alike, inſufficient for the deſired purpoſe. The ſervices they have rendered to practical ſcience ſtill indeed remain; and the laurels which ſpring from that ſoil are unfading. Of theſe Rivinus may claim a ſhare, though by no means an equal portion, with his Engliſh, or his French, contemporary. He endeavoured in vain to bring his German ſquadrons, with any great force, into the botanical field; while the pupils of Ray, as well as of Tournefort, poured forth in abundance; and by their own proficiency diſplayed the merits of their reſpective leaders.

Rivinus was the ſon of a learned phyſician and critic, Andrew Bachmann, whoſe name, according to the faſhion of the time amongſt literary people, being tranſlated into Latin, became *Rivinus*. The ſubject of our memoir was born at Leipſic in 1652. He graduated at the age of twenty-four, and fifteen years afterwards obtained the profeſſorſhips of Phyſiology and of Botany in his native univerſity. He became a foreign member of the Royal Society of London, and was aſſociated with many other learned bodies, filling his different appointments with honour to himſelf, till his death in 1723, at the age of ſeventy-one. His publications ſhew him in the light of an elegant ſcholar and a gentleman; and if he betrayed a little impatience in his controverſies with Ray, and ſomewhat of diſdainful ſeverity towards Dillenius, who, when a young man, had attacked him; the latter fault, at leaſt, may be pardoned, in one who had attained ſo conſiderable a rank in ſcience, and who perhaps had ſagacity enough to feel that Dillenius had no ſyſtematical talents at all commenſurate with his own. Having propoſed to himſelf three great objects; a commodious claſſification of plants; a compendious nomenclature; and an univerſal delineation of ſpecies, as far as they came under his own obſervation, he might perhaps not be very patient of contradiction from thoſe whom he thought more able to hinder than to aſſiſt him. The ſame apology may be made for many philoſophers, who unjuſtly incur the charge of petulance, or of pride.

The

The botanical ſyſtem of Rivinus is founded on the moſt elegant and attractive, if not the moſt ſolid and important, parts of plants. His claſſes are marked by the number, the regularity, or irregularity, of the petals. He could not proceed far in this path without perceiving that he made moſt unnatural, and, as Haller juſtly terms them, paradoxical, combinations. He therefore aſſerted, and doubtleſs believed, the inutility and impracticability of a really natural claſſification. This principle brought him to one right concluſion, which even the philoſophical Ray did not attain, or was afraid to admit, that the old primary diſtribution of vegetables into trees, ſhrubs, and herbs, is unſcientific and erroneous.

Rivinus publiſhed, at his own expence, in 1690, his ſplendid illuſtration of the firſt claſs of his ſyſtem, compriſing ſuch plants as have a monopetalous irregular flower. Theſe are the ringent flowers of Linnæus, accompanied by the *Scitamineæ*, and even by *Arum*. This part conſiſts of one hundred and twenty-five plates; but though each plate often contains more than one plant, the intelligent reader will perceive how imperfect the catalogue of ſpecies muſt be. A learned *Introductio generalis in rem herbariam* is prefixed; and this introductory part was, at different times, republiſhed in a ſmaller form. The ſecond part of the ſumptuous work of which we are ſpeaking, came forth in 1691. This conſiſts of one hundred and twenty-one plates, of plants with four irregular petals; into which claſs, by means of ſome contrivance, and many grains of allowance, are admitted all the papilionaceous tribe, the cruciform genus *Iberis*, the *Euphorbia*, and a few things beſides. The genus laſt named is referred rather arbitrarily to this claſs, merely becauſe its ſtalked pendulous germen muſt be turned to one ſide, and therefore, in the author's opinion, the flower is rendered irregular. In 1699 the third part, containing flowers with five irregular petals, was given to the world. Even more liberty is taken in the aſſemblage of genera here than in the former claſs. The natural order of *umbelliferæ* is admitted entire; very juſtly indeed as to practical or philoſophical propriety; but with great laxity of artificial principle, many of the plants having regular or equal petals. Next to theſe follow *Tropæolum*; the irregular *Gerania* (which now conſtitute the genera of *Pelargonium* and *Erodium*); ſome leguminous plants not papilionaceous; *Viola*; *Aeſculus*; *Delphinium*; *Aconitum*; *Dictamnus*; and the whole concludes with *Pyrola*, whoſe ſlight and partial irregularity of flower has gained it admittance here. This third part of the work of Rivinus conſiſts of one hundred and thirty-nine plates. A fourth part, the *hexapetalæ irregulares*, conſiſting of the *Orchideæ*, was finiſhed, but not publiſhed, before the author's death; nor indeed have any more than a very few copies of this ever got abroad into the world, ſo that it conſtitutes one of the greateſt bibliothecal rarities. With reſpect to utility or beauty, thoſe who are poſſeſſed of the tranſcendent engravings of this favourite tribe in Haller's Hiſtory of Swiſs Plants, may diſpenſe with the figures of Rivinus. The author had prepared ſeveral ſupplementary plates to his work, which never came forth, and of which perhaps the only ſpecimens are to be ſeen in ſir Joſeph Banks's fine copy of the whole work, except two duplicate plates beſtowed by his bounty on the writer of this article. There is every reaſon to believe that the copy in queſtion belonged to the author himſelf, or to his ſon, as may be gathered from its manuſcript additions and corrections. A complete copy, of even the three firſt parts of Rivinus's book is, indeed, difficult to be met with; for ſeveral of the plates having from time to time received additions of ſeed-veſſels, or of entire plants; the earlier impreſſions of ſuch plates are conſequently imperfect. The beſt copies are required, by faſtidious collectors, to have every plate with and without the additions. Haller truly remarks, that the author evidently derived his materials chiefly from garden plants, and having ſyſtem in view, was more ſolicitous to exhibit flowers than roots, or the lower part of the herbage; a great defect as to the *Orchideæ* and *Umbellatæ*. We ought, at the ſame time, to recollect, that the tribes he has ſelected are among the moſt intereſting, attractive, or difficult, that could have been wiſhed. His ſcheme of nomenclature deſerves high commendation as ſuch, though it proves totally inadequate to the author's purpoſe, which was to comprehend, in a ſingle word accompanying the generic name, the eſſential character or idea of each particular ſpecies.

As a medical writer, Rivinus has the merit of faithful obſervation and deſcription, in his treatiſe *de Peſte Lipſienſi*, publiſhed in 1680. He wrote alſo on Dyſpepſia, on Intermittent Fevers, and various other ſubjects. He did not ſcruple to attack whatever practice or opinion he found ever ſo ſtrongly eſtabliſhed on the baſis of prejudice and ignorance. In this reſpect his *Cenſura Medicamentorum officinalium* ranks very high. His commendable aim, in this work, was to clear the Materia Medica of its various diſgraceful incumbrances; ſo many of which originated in error, impoſition, or ſuperſtition. His attempts have been followed up by various men of ability and authority; and it is to the united labour and good ſenſe of ſuch, that the world is indebted for the purified and improved ſtate of our modern Pharmacopeias.

Though not a great practical anatomiſt, or diſſector, Rivinus is ſaid to have diſcovered a new ſalivary duct. He left a ſon, John Auguſtus Rivinus, who ſucceeded him as profeſſor, and under whoſe preſidency was publiſhed a diſſertation, in 1723, on Medicinal Earths. This gentleman died in 1725, aged thirty-three, having ſurvived his father but two years. His premature death ſeems to have prevented the publication of the fourth part of his father's great botanical work, at leaſt for ſome time. Haller ſays, Ludwig afterwards edited the plates of the *Orchideæ*, without any letter preſs; but this publication has never come under our inſpection. Rivini Opera. Hall. Bibl. Bot. Aikin's Gen. Biogr. Dryand. Bibl. Banks.

RIVISONDOLI, in *Geography*, a town of Naples, in Abruzzo Citra; 9 miles S.E. of Sulmona.

RIULI, a town of Naples, in Calabria Citra; 16 miles N.N.E. of Caſſano.

RIVOGLIOMENTO, Ital. in *Muſic*, changing the place of the parts of a compoſition. It is placing the treble or other upper part in the tenor or baſe, and *vice verſâ*. This frequently happens in double counterpoint, when the treble ſerves for the baſe, or the baſe for the treble; and in ſuch a manner, as that the harmony, though different, ſhall remain equally correct and pleaſing as in the firſt arrangement of the parts.

RIVOLGIMENTO, Ital. inverſion.

RIVOLI, in *Geography*, a town of France, in the department of the Po, ſituated at the declivity of a hill on the road from France into Italy by the Cottian Alps, in a fertile country and climate more ſalubrious, as it is ſaid, than that of Turin. It contains three pariſh churches and three monaſteries. The king of Sardinia had a palace here. The inhabitants are ſuppoſed to be about 800; 6 miles W. of Turin.—Alſo, a town of Italy, in the Veroneſe; 12 miles N.W. of Verona.

RIVOLTA, a town of Italy, in the department of the Mincio; 4 miles W. of Mantua.—Alſo, a town of

of Italy, in the department of the Adda; 2 miles S. of Crema.

RIVOLTA *Secca*, a town of Italy, in the department of the Adda; 10 miles W. of Crema.

RIVOLTARE, Ital. in *Music*, to reverse; whence

RIVOLTATO, reversed. See ROVERSCIO.

RIVOLTELLA, in *Geography*, a town of Italy; 17 miles E. of Brescia.

RIUT, a Russian settlement on the W. coast of America. N. lat. 65° 25′. E. long. 209° 36′.

RIVULARIA, in *Botany*, so called by Dr. Roth from its growing generally in rivulets, is a cryptogamic genus, separated, by that able botanist, from *Ulva* and *Conferva*; to each of which genera some or other of its species had been, by preceding writers, referred.—Roth Catal. v. 1. 212. Sims and Konig's Ann. of Bot. v. 1. 247. Smith Engl. Bot. v. 25. 1797.—Class and order, *Cryptogamia Algæ*. Nat. Ord. *Algæ submersæ*.

Ess. Ch. Frond gelatinous, firm, destitute of an external cuticle. Fructification among jointed filaments, lodged in the substance of the frond.

Roth describes eleven species of this genus, in his Beyträge, v. 1. 239, translated in Ann. of Bot. above cited. He there also adopts a genus from Micheli, by the name of *Linckia*, whose character is as follows. Frond gelatinous, pellucid, enclosed in a membranous pellucid integument, and stuffed with granules of fructification, disposed in curved beaded lines. Of this he defines four species.

Of his *Rivulariæ*; *elegans*, n. 5, Engl. Bot. t. 1797, and *tuberculosa*, n. 11, Engl. Bot. t. 2366, are acknowledged natives of Britain; as are two of his *Linckiæ*; *pruniformis*, n. 2, which is *Ulva pruniformis* of Linnæus, and of Engl. Bot. t. 968; and *Nostoc*, n. 3, which is *Tremella Nostoc* of Linnæus, and of Engl. Bot. t. 461. The *pruniformis* just mentioned, is in the index to Engl. Bot. referred to *Rivularia*; how justly we dare not positively say. In the same work the following species are added to those of Roth. Respecting the marine ones, there may possibly be some difference of opinion as to their genus; but they can scarcely be referred to any other at present established.

R. *Opuntia*. Indian-fig Rivularia. Engl. Bot. t. 1868. (Fucus Opuntia; Gooden. and Woodw. Tr. of Linn. Soc. v. 3. 219. Tremella marina cæspitosa, fomentis tenuibus; Dill. Musc. 50. t. 10. f. 9.)—Compressed, branched, red, jointed; joints elliptical, confluent. Internal filaments repeatedly forked; their ultimate joints shortened, filled with seeds.—Found on rocks, on the British coast, forming small, creeping, purplish tufts, between high and low-water marks. The *fronds* are entangled, much branched, compressed, of a spongy texture, but not hollow, composed of elliptical joints. These, when cut transversely, prove full of innumerable forked, beaded filaments, whose joints, near the surface of the *frond*, are shortest, and full of red grains, presumed to be *seeds*. We do not pretend that this species answers well to the character of a *Rivularia*. It will probably hereafter constitute a new genus, along with several more, now dispersed in *Fucus*, *Conferva* or *Ulva*, but whose fructification and economy are not sufficiently known, for any decisive measure to be taken concerning them. Among them perhaps is *Fucus Wigghii*, Engl. Bot. t. 1165; for we are not yet persuaded of its being a real *Rivularia*; nor have we examined it minutely ourselves.

R. *vermiculata*. Worm-shaped Rivularia. Engl. Bot. t. 1818.—Cylindrical, much branched, brown; branches scattered, subdivided, crooked. Internal filaments compound and divaricated; their ultimate branches clustered, beaded, thickened upwards. Fruit obovate, sessile at the base of the beaded branches.—Found on the coasts of Ireland and the south of England, in summer. A very curious submarine plant, four or five inches high, olive brown, much and irregularly branched, solid, gelatinous, invested with a pale slimy mass, of minute, jointed, branched fibres, some of which are darker, and beaded, and accompanied by a dark, oval, solitary *seed* at their base.

R. *verticillata*. Whorled Pink Rivularia. Engl. Bot. t. 2466. (Ulva verticillata; With. v. 4. 127.)—Cylindrical, much branched, very gelatinous, pale pink; branches alternate; the ultimate ones very numerous, of equal thickness. Internal filaments whorled, repeatedly forked. Fruit obovate, lateral.—Found on the sea beach of Ireland and Sussex, in summer. Highly gelatinous and tender, of a delicate flesh-colour. Its generic characters nearly accord with the last.

R. *incrassata*. Thick Green Rivularia. (Ulva incrassata; Hudf. 572. Engl. Bot. t. 967. Tremella palustris gelatinosa, damæ cornuum facie; Dill. Musc. 51. t. 10. f. 10.)—Compressed, much branched, gelatinous, sinuated and toothed, green; thickened at the margin. External filaments loosely tufted, forked, with pale pellucid tips.—Grows on mosses, in pools of fresh water. Whole plant gelatinous and slippery, of a grass green. It seems very near *R. Cornu damæ* of Roth, if not the same.

R. *tuberiformis*. Potatoe Rivularia. Engl. Bot. t. 1956.—Irregularly globose, inflated, pale brown; white within. Seeds vertically disposed in rows at the summits of the filaments.—Grows on rocks and submarine plants, on the south coast of England. When floating it looks like a group of young potatoes. Each plant is hollow, consisting of a thick tender coat. The outside is not, as in the last, covered with pellucid filaments, beyond the seed-bearing part.

R. *atra*. Small Black Rivularia. Roth Catal. v. 3. 340. Engl. Bot. t. 1798.—Hemispherical, solitary, sessile, hard, black. Internal filaments straight, compact, branched, concentric, green; their joints cylindrical.—This is found on mud, or on wooden piles, in salt marshes, or about the mouths of rivers; consisting of black granules the size of mustard-seed. These, when highly magnified, and cut perpendicularly, are found to consist of concentric rows, of more or less pale, green, dense filaments.

R. *calcarea*. Calcareous Rivularia. Engl. Bot. t. 1799.—Hemispherical, sessile, clustered, hard, green. Internal filaments straight, compact, entangled, simple, with scarcely any appearance of joints.—This is found in the beds of rivers, and mountain torrents, in Ireland, Wales, &c. in masses, either separate, the size of a large pea, or aggregate and confluent. Their colour a glaucous green; their substance firm, of simple parallel fibres, or tubes, all conglutinated, as it were, with calcareous earth.

R. *echinulata*. Little Hedgehog Rivularia. (Conferva echinulata; Engl. Bot. t. 1378.)—Floating, glaucous, globose, muricated with the points of its concentric, simple, jointed, short filaments.—Found by the Rev. H. Davies, in a lake, in Anglesea, covering the surface in June and July, with a floating mass of little separate prickly globules, each the size of a pin's head.

RIVULET, a diminutive of river.

RIXAS, in *Geography*, a mine-town of Brazil, in the government of Goyas; 80 miles N. of Villa Boa.

RIXDOLLAR, in *Commerce*, a money of account and silver coin in Holland, Germany, Denmark, and Sweden. In Holland, a rixdollar is worth 2½ gilders, 50 stivers, or 800 pennings. A pound Flemish is equal to 6 gilders, or 2⅔ rixdollars, and is divided into 20 shillings, 120 stivers, or 240 pence Flemish, called also groots: hence a rixdollar is equal

equal to 8*s.* 4*d.* Flemiſh, and a gilder = 3*s.* 4*d.* Flemiſh. A gold gilder, with which accounts are kept in the corn trade, is worth 28 ſtivers. At Copenhagen accounts are kept in rykſdalers or rixdollars of 6 marks, or 96 ſhillings Daniſh. In the duchies of Holſtein and Sleſwig accounts are kept in rixdollars of 3 marks, or 48 ſhillings Lubs, and at Elſineur on the Sound, accounts are kept in rixdollars of 4 orts, or 96 ſkillings Daniſh. The baſe rixdollar (ſletdaler), which is an imaginary coin, is reckoned at 4 marks, or 64 ſkillings Daniſh. A mark is divided into 16 ſkillings or ſhillings; and a ſkilling into 2 fyrkes, 3 wittens, or 12 pfenings Daniſh. The Daniſh denominations of marks and ſhillings bear only half the value of the ſame denominations in Lubs or Hamburgh money: thus, 2 marks Daniſh are worth 1 mark Hamburgh, &c. In ſilver, ſpecie rixdollars, which paſs for 7 marks 6 ſkillings Daniſh currency, are commonly reckoned at 6 marks 12 ſkillings crown money, at the toll on the Sound. There is alſo the new Holſtein currency, coined ſince the year 1788, conſiſting of ſpecie rixdollars, at 48 ſhillings ſpecie, or 60 ſhillings Holſtein currency; and pieces of 32, 16, 8, 4 and 2 ſhillings ſpecie, or 40, 20, 10, 5 and $2\frac{1}{2}$ ſhillings Holſtein currency. In this money, the Cologne mark of fine ſilver is coined into $9\frac{1}{4}$ rixdollars ſpecie, or $11\frac{9}{16}$ rixdollars currency.

Any perſon, whether a native or a foreigner, may open an account at the bank of Copenhagen, on paying 4 rixdollars a year for each folio, and whenever he wiſhes to have his account ſettled. Beſides, this bank charges a commiſſion of 1 *per* 1000 for all the money inſcribed or transferred in the books. Bank notes are iſſued of the value of 80, 40, 20, 8, and 4 rixdollars ſpecie; or 100, 50, 25, 10, and 5 rixdollars currency. Theſe are current through the Daniſh dominions, and they are to be paid off on demand at the bank.

By a royal edict of 1776, ſettling the rate of coinage, $9\frac{1}{2}$ rixdollars ſpecie are to contain a mark of fine ſilver; each piece weighing 537.69 eſchen, Cologne weight, or 447.9 Engliſh grains, and being 14 lods or $\frac{13}{16}$ths fine; ſo that it contains 391.9 Engliſh grains of fine ſilver. The rixdollar Daniſh currency, in current ducats or 12 markpieces, is equivalent to 28.48 German aſes, or $21\frac{1}{8}$ Engliſh grains of fine gold; and the ſame rixdollar, in ſilver currency, contains 429 aſes, or 318 grains of fine ſilver. The rixdollar in crowns may be valued at 467 aſes, or $346\frac{2}{8}$ grains of fine ſilver. Thus the proportion of gold to ſilver is as $15\frac{9}{189}$ to 1. One hundred rixdollars Hamburgh banco anſwer to $113\frac{1}{8}$ rixdollars in crowns, or $123\frac{1}{13}$ rixdollars Daniſh currency: the latter may be conſidered at par with Hamburgh currency. The rixdollar currency is = 3*s.* $8\frac{1}{2}$*d.* ſterling; and the rixdollar in crowns = 4*s.* $0\frac{1}{2}$*d.* ſterling; or a ſingle crown piece = 16*d.* ſterling; a current ducat = 7*s.* $5\frac{1}{2}$*d.* ſterling; and 1*l.* ſterling = 5 rixdollars 2 marks 6 ſkillings currency, or 4 rixdollars 5 marks 12 ſkillings crown money.

The moſt common way of keeping accounts in Germany is in rixdollars of 90 creutzers, or in guldens or florins of 60 creutzers; the rixdollar of account, or (as it is generally called) rixdollar current, is reckoned at $1\frac{1}{3}$ florin, and the rixdollar ſpecie or effective at 2 florins, or 120 creutzers. In Pruſſia, Saxony, Hanover, Brunſwick, and Luneburg, accounts are kept in rixdollars of 24 good groſchen, each good groſche being divided into 12 pfenings; or in rixdollars of 36 marien groſchen, each marien groſche being divided into 8 pfenings. At Hamburgh, Altona, Lubeck, Holſtein, and Mecklenburg, accounts are kept in marks of 16 ſhillings lubs, each ſhilling being divided into 12 pfenings; and the rixdollar reckoned at 3 marks. Each independent ſtate or city of Germany has its own coins, moſt of which may be referred to, or compared with, the following, *viz.*; in gold, the ducat, the piſtole, and the gold florin or gulden; and in ſilver, the rixdollar ſpecie, and its ſubdiviſions. The piſtoles are all reckoned at 5 rixdollars current. The gold florins, chiefly current in countries on the banks of the Rhine, paſs generally for 2 rixdollars current, and are to contain $18\frac{1}{3}$ carats of fine gold, $3\frac{2}{3}$ carats of fine ſilver, and $1\frac{5}{6}$ carat of copper: 72 gold florins are to weigh a Cologne mark. Since the eſtabliſhment of the convention in 1763, the Cologne mark of fine ſilver is valued at $13\frac{1}{3}$ rixdollars of account, or 10 rixdollars effective, or 20 florins. In ſmall payments, the Cologne mark of fine ſilver being reckoned at 16 rixdollars of account, or 24 florins, each of the coins is rated 20 *per cent.* higher than its value in convention money; the ſpecie rixdollar paſſes for $2\frac{2}{3}$ florins, the convention florin for $1\frac{1}{3}$ florin, and the copſtuck for 24 creutzers. According to the Leipſic rate of coinage, the Cologne mark of fine ſilver was valued at 12 rixdollars of account, 9 effective rixdollars, or 18 florins; 8 ſpecie rixdollars were to weigh a Cologne mark of ſilver, 14 loths 4 grains fine: in the ſmalleſt coins, ſuch as double and ſingle marien groſchen, the mark of fine ſilver was coined at the rate of $12\frac{3}{8}$ rixdollars. Theſe coins are known by the name of "conſtitution coins:" 100 rixdollars, coined after the Liepſic rate, are worth $111\frac{1}{9}$ convention rixdollars. The fineneſs of gold is valued all over Germany by dividing the mark fine into 24 carats, and the carat into 12 grains; the fineneſs of ſilver, by dividing the mark fine into 16 loths, and the loth into 18 grains. At Hamburgh, the reichſthaller, or rixdollar, is 3 marks, 48 ſhillings, or 576 pfenings; the rixdollar of exchange is 2 marks, 32 ſhillings, or 384 pfenings. The ſilver coins of this city are rixdollars reckoned at 3 marks ſpecie, which commonly paſs for $\frac{1}{2}$ *per cent.* better than banco, or for 3 marks 12 ſhillings 5 pence Hamburgh currency. All ſorts of ſpecie rixdollars, when they are full banco weight, are reckoned at 3 marks, with about $\frac{1}{2}$ *per cent.* premium againſt banco, or at 4 marks light money, with about 33 *per cent.* diſcount below banco. But the value of a common ſpecie rixdollar, in current money, is 3 marks 12 ſhillings, and the halves and quarters in proportion.

Accounts are kept in Sweden in rikſdaler of 48 ſkilling, the ſkilling being ſubdivided into 12 runſtycken or ore. By the regulations of 1777, the ſpecie rikſdaler was to paſs for the ſame value that 6 ſilver dahler, or 18 kopper dahler, formerly did; and there were coined whole rikſdaler, and pieces of $\frac{2}{3}$ds, $\frac{1}{3}$d, $\frac{1}{6}$th, $\frac{1}{12}$th, and $\frac{1}{24}$th of a rikſdaler. According to the mint regulations, the Swediſh ſpecie rikſdaler ſhould weigh 609 Swediſh aſs, or $451\frac{2}{3}$ Engliſh grains, and contains 535 aſs, or $396\frac{1}{3}$ grains of fine ſilver; it is therefore worth 4*s.* $7\frac{1}{2}$*d.* ſterling, and the ſkilling $1\frac{1}{6}$*d.* nearly. For the value of rixdollars, current in various places, according to the mint price of ſilver in England, ſee MONEY.

The rixdollar (conſtitution) of the Auſtrian dominions has on it the head of the reigning emperor, with name and titles, thus: CAR. VI. D. G. R. I. S. A. G. HI. H. BOH. REX; that is, *Carolus ſextus, Dei gratia, Romanus imperator ſemper auguſtus, Germaniæ, Hieroſolymæ, Hungariæ, Bohemiæ rex* (Charles VI. by the grace of God, emperor of Rome, ever auguſt, king of Germany, Jeruſalem, Hungary, and Bohemia); reverſe, a two-headed eagle crowned, bearing on his breaſt the arms of Auſtria, and in his talons a ſword and ſceptre; legend, ARCHID. AUST. D. BU. M. MOR. COM. TY. (archduke of Auſtria, duke of Burgundy, marquis of Moravia, count of Tyrol), with the date; and on the edge of the piece, CONSTANTER CONTINET ORBEM, (he guides the globe ſteadily).

The

The rixdollar (convention) has the head of the reigning ſovereign, with name and title, thus: M. THERESIA, D. GR. IMP. GE. HU. BO. REG. (Maria Thereſa, by the grace of God, empreſs of Germany, queen of Hungary and Bohemia); reverſe, as on the rixdollar conſtitution; the legend on the edge of the piece of Francis I. is, PRO DEO ET IMPERIO (for God and the empire). On that of Maria Thereſa, JUSTITIA ET CLEMENTIA (juſtice and clemency). On that of Joſeph II., VIRTUTE ET EXEMPLO (by virtue and example).

The rixdollar of Hungary has the head, name, titles, and legend, on the edge as above; reverſe, the Virgin and Child, and the letters K. B.; legend, S. MARIA, MATER DEI, PATRONA HUNG. (Holy Mary, mother of God, patron of Hungary).

The florin, or half rixdollar, bears the ſame impreſſions as the rixdollar; as alſo the half florin.

The copfſtuck, or copſtick, (the 20 creutzer piece,) bears the ſame impreſſions as the rixdollar, except that there is no legend round the edge, and it is marked 20 on the reverſe; the half copfſtuck is marked 10.

The rixdollar of Baden has the head of the reigning prince, with name and title, thus: CAROLUS FRID. MARCHIO BAD. ET H. (Charles Frederick, marquis of Baden, &c.); reverſe, arms of Baden; legend, AD NORMAM CONVENTIONIS (according to the rule of the convention); and at the bottom, the date, and X EINE F MARCK (10 pieces to a mark fine).

The thaler or rixdollar of Baſil has the griffin, arms, and legend, as on the patagon; reverſe, a wreath of laurels, incloſing the value, 1 THALER; legend, MONETA REIPUB. BASILEENSIS (money of the republic of Baſil). The half piece is marked ½ THALER; and the third is marked ⅓.

The rixdollar of Bavaria has the head of the reigning prince, with name and titles, as in the gold coins; reverſe, arms of Bavaria, and the date; and on other pieces, the Virgin and Child, with the legend, PATRONA BAVARIÆ (patroneſs of Bavaria); but the new rixdollar coined in 1800, bears the arms of Bavaria, and the legend, PRO DEO ET POPULO.

The rixdollar of Brunſwick (old) has the head, name, and title of the reigning prince, as in the gold coins; reverſe, the horſe and legend as on the Carl d'or; but at the bottom there are X EINE FEINE MARCK CONVENTION M. (ten pieces to a mark fine, convention money).

The rixdollar of 1795 has on one ſide the words 1 SPECIES THALER, and the date; legend, X EINE FEINE MARCK, &c. as above; reverſe, arms of Brunſwick, with the name and title of the reigning prince.

The rixdollar of Cologne has the head of the reigning emperor of Germany, with his name and titles; reverſe, arms of the city; legend, MONETA NOVA LIB. ET IMP. CIVIT. COLON.; that is, *Moneta nova liberæ et imperialis civitatis Coloniensis* (new coin of the free and imperial city of Cologne); and on ſome rixdollars, MON. NOVA LIB. REIPUB. COLONIENSIS (new coin of the free republic of Cologne).

In Denmark the rykſdaler (old), coined for Norway, has the head of the reigning king, with name and title, thus: FRIDERICUS V. D. G. REX DAN. NOR. V. G. or D. G. DAN. NORV. VAND. GOTH. REX (Frederick V. by the grace of God, king of Denmark, Norway, the Vandals, and the Goths); reverſe, a lion and battle-axe, with 6 M. (6 marks), and the following legend in the Norwegian language, in two concentric circles, MOD TROSKAB DAPPERHED. OGH VAD DER GIVER ÆRE DEN HEELEN VERDENBAND BLANT NORSKE KLIPPER LAERE, which is thus tranſlated: ſpirit, loyalty, valour, and whatever is honourable, let the whole world learn among the rocks of Norway. On the ſame coin, of a later date, the legend is TROE JOVE MOD OGH VAD DAN KONGENS GUNST KAND VINDE, MENS NORGE KLIPPE HAR MAN SKAL HOS NORDMAND FINDE; that is, true lion's heart and whatever can win a Daniſh monarch's love, whilſt Norway has rocks, ſhall be found among Norwegians.

The rykſdaler of 1777 has the king's cypher and a crown; legend, D. G. DAN. NOR. VAND. GOTH. REX, as before; reverſe, arms of Denmark; legend, GLORIA EX AMORE PATRIÆ (glory from the love of our country), and the date.

The rykſdaler of 1795 has the head, name, and titles of the reigning king; reverſe, arms of Denmark; legend, 1 RIGSDALER SPECIE, with the date.

The rykſdaler of Holſtein has the head, name, and title, as above; reverſe, arms of Denmark, and 1 SP.; legend, 60 SCHILLING. SCHLESW. HOLST. COURANT (60 ſchillings Sleſwig and Holſtein currency), with the date. The pieces of ⅔ds and ⅓d are marked ⅔ SP. and ⅓ SP., and the number of ſchillings is alſo expreſſed: SP. means ſpecie.

The rixdollar of Francfort has varied much in the impreſſions: moſt of them bear an eagle; but the reverſes and legends are very different in coins of different dates; they may be eaſily diſtinguiſhed by the word FRANCKFURT or FRANCOFURT, which is to be found on ſome part of the piece, as alſo the words AD NORMAM CONVENTIONIS (according to the rate of convention money), and X E. F. MARK, or X EINE FEINE MARK (10 to a mark of fine ſilver): theſe laſt words, within a circle or wreath, form the reverſe of the more modern pieces; and coins of 1796 bear likewiſe the following German legend, AUS DEN GEFŒSEN DER KIRCHEN UND BURGER (out of the plate of the churches, and of the citizens); and on the other ſide, DER STADT FRANCKFURT (of the city of Francfort).

The rixdollar ſpecie or banco of Hamburgh has on the front the arms of Hamburgh; legend, MONETA NOVA HAMBURGENSIS (new coin of Hamburgh), and at the bottom, 48 SCHIL. SPEC.; reverſe, a two-headed eagle crowned, with the name of the reigning emperor of Germany, thus: JOSEPHUS II. D. G. ROM. IMP. SEMP. AUGUST. (Joſeph II. emperor of Rome, ever auguſt).

The rixdollar of Hanover has the arms of the reigning king, with his name and title; reverſe, a horſe running over rough ground; legend, NEC ASPERA TERRENT (neither do rough places deter him), and the date. Some rixdollars bear a figure of St. Andrew on the croſs; legend, the king's German titles.

The rixdollar convention of Heſſe has the head of the reigning prince, with name and titles, thus: WILHELMUS IX. D. G. HASS. LANDO. HAN. COM. (William IX. by the grace of God, landgrave of Heſſe, count of Hanau); reverſe, arms of Heſſe Caſſel; legend, X ST. EINE FEINE MARCK (10 pieces to a mark fine), and at the bottom the word JUSTIRT (adjuſted or verified). In pieces of more modern date, 1796, &c. this laſt word is not to be found, but under the above legend the words BIBERER SILBER (ſilver of the mine of Biber); and in ſome pieces of 1770, the words EX VISCERIBUS FODINÆ BIEBER (from the bowels of the mine of Biber). The half and quarter rixdollars are marked XX ST, &c. and 40 ST, &c. and under the coat of arms ⅔ or ⅓.

The thaler or rixdollar of account has the head, name, and title, as above; reverſe, a ſtar with a lion in the centre, and the words VIRTUTE ET FIDELITATE, as before; or the arms of Heſſe; the legend, in both caſes, is EIN THALER (one thaler): and on the half piece, EIN HALBER THALER.

The rixdollar or 3 markpiece of Lubec has a two-headed eagle crowned, with 48 on its breast; legend, MON. NOV. IMP. CIVITAT. LUBECÆ (new coin of the imperial city of Lubec); reverse, arms of the city; legend, 48 SCHILLING COURANT GELDT ANNO, &c. (48 schillings currency; the year, &c.)

The rixdollar (fine) of Manheim has the head of the reigning prince, with name and title, thus: CAR. THE. C. P. S. R. I. A. T. & EL.; that is, *Carolus Theodorus, comes palatinus, sancti Romani imperii archi thesaurarius et elector* (Charles Theodore, count palatine, high steward and elector of the holy Roman empire); reverse, arms of the prince; legend, EX VISCERIBUS FODINÆ WILDBERG (from the bowels of the mine of Wildberg), and FEIN SILB. (fine silver) at the bottom.

The piece of $\frac{2}{3}$ bears the same impressions as the rixdollar, except that it is marked ($\frac{2}{3}$) under the arms. Some pieces of an ancient date bear no head but $\frac{2}{3}$ in large figures, and under this, FEIN SILBER; legend, DEUS SERVET METALLI FODINAS MONTENSES (may God preserve the mines of Wildberg); the names and titles are on the reverse, round the arms.

The rixdollar (convention) has the head, name, and titles, as above; reverse, arms of the prince; legend, AD NORMAM CONVENTIONIS (according to the rule of the convention); or 10 EINE FEINE MARCK (10 to a fine mark).

N. B. The coins of Manheim and the Palatinate now bear the same impressions as those of Bavaria, both countries being united under one sovereign.

The rixdollar of Mentz has the head of the reigning prince, with name and titles, thus: FRID. CAR. JOS. D. G. A. EP. MOG. S. R. I. P. G. A. C. ET EL. E. W.; that is, *Fredericus Carolus Joseph Dei gratia archiepiscopus Moguntiæ, sancti Romani imperii pro Germania archi cancellarius et elector, episcopus Wormensis* (Frederick Charles Joseph, archbishop of Mentz, high chancellor for Germany and elector of the holy Roman empire, bishop of Worms); but the pieces of 1796, &c. have their legend in German, thus: FRIED. CAR. JOS. ERZB. U. KURF. Z. MAINZ. B. Z. W.; that is, *Erzbischoff und Kurfurst zu Mainz Bischoff zu Worms* (archbishop and elector of Mentz, bishop of Worms); reverse, arms of the bishop; legend, ZEHEN EINE FEINE MARCK (ten to a mark fine).

The rixdollar (constitution) of Nuremberg has the head of the reigning emperor, with name and title, thus: CAROLUS VI. D. G. ROM. IMP. SEMP. AUG. (Charles VI. by the grace of God, emperor of Rome, ever august); reverse, a view of the city, with an eagle flying over it; legend, AUGUSTO DOMINO TUTA ET SECURA PARENTE EST (it is safe and secure under its august lord and father), and at the bottom, NORIMBERGA.

The rixdollar (convention) varies in the impressions, some bearing the head, name, and title of the reigning emperor, as above; and others a view of the city, with a sun over it; reverse, a two-headed eagle crowned, bearing the arms of the city on its breast; or a single-headed eagle carrying two escutcheons in his talons. The pieces are marked with the letter N, or the word NURNBERG, or the legend, MONETA NOVA REIPUBL. NORIMBERGENSIS (new coin of the republic of Nuremberg); and the words, X EINE FEINE MARCK (ten to a mark fine), are also to be found in some part of the piece.

The rixdollar of Prussia (coined before 1791) has the head of the reigning king, with name and title, thus: FRIDERICUS BORUSSORUM REX (Frederick king of Prussia); reverse, an eagle and military trophies; legend, EIN REICHS THALER (one rixdollar). The half rixdollar bears the same impressions; and its value is marked thus, 2 EINB R. THALER (two to a rixdollar).

The rixdollar current (coined since 1791) has the head of the reigning king, and the legend in German, as before; reverse, arms of Prussia, with EIN THALER at the bottom; but the rixdollar convention money bears the legend, ZEHN EINE FEINE MARCK (ten to a mark fine).

The florin of Silesia has the same impressions as on the rixdollar of 1791; but on the reverse it is marked XXI EINE FEINE MARK.

The rixdollar of Anspach and Bareuth has the head of the reigning prince, with name and title, thus: ALEXANDER D. G. MARCH. BRAND. (Alexander, by the grace of God, marquis or margrave of Brandenburg); reverse, arms of Anspach, &c. with ZEHEN EINE FEINE MARK (ten to a mark fine); but those of modern date, 1790, &c. bear the impressions of the Prussian coins, Anspach having been at that period ceded to Prussia.

The rixdollar of Ratisbon has the head, name, and title of the reigning emperor, as on the coins of Hamburgh and Nuremberg; reverse, a view of the city; legend, MONETA REIP. RATISPON (coin of the republic of Ratisbon), and at the bottom, X ST. EINE F. C. M.; that is, *X stuck eine feine Collnisch marck* (ten pieces to a mark fine, Cologne weight). The half and quarter rixdollars are marked 20 ST. EINE F. C. M. and 40 ST. EINE F. C. M.

The rixdollar of Saltzburg, and its divisions, has the head of the reigning prince, with name and titles, thus: HIERONYMUS D. G. A. & P. S. A. S. L. N. G. PRIM.; that is, *Hieronymus Dei gratia archiepiscopus et princeps Salisburgensis, Germaniæ primas* (Jerome, by the grace of God, archbishop and prince of Saltzburg, primate of Germany); reverse, arms of the reigning prince, without a legend; and the copfstuck or 20 creutzer piece differs only in being marked (20) on the reverse.

The rixdollar (convention) of Saxony has the head of the reigning prince, with name and titles, thus: FRID. AUGUST. D. G. DUX SAX. ELECTOR (Frederick Augustus, duke and elector of Saxony); reverse, arms of Saxony, with the inscription, X EINE FEINE MARCK (ten to a mark fine).

The florin or piece of $\frac{2}{3}$ bears the same impressions as the rixdollar; but the inscription on the reverse is XX EINE FEINE MARCK, and it is marked $\frac{2}{3}$ at the bottom; the half florin is marked XL EINE, &c. and $\frac{1}{3}$ at the bottom; and the quarter florin is marked LXXX or ACHZIG EINE, &c. and $\frac{1}{6}$.

The rixdollar of Saxe Gotha has the head, name, and title, of the reigning prince, thus: ERNESTUS D. G. GOTHAN. SAXONUM DUX (Ernest, by the grace of God, duke of Saxe Gotha); reverse, arms of Saxe Gotha, with X EINE FEINE MARCK, as above.

The rixdollar of Sweden of 1752 has the head of the reigning king, with name and title in Latin, thus: GUSTAVUS III. D. G. REX SUECIÆ (Gustavus III. by the grace of God, king of Sweden); reverse, arms of Sweden; legend, SALUS PUBLICA SALUS MEA (the public safety is my safety); and on the edge, MANIBUS NE LÆDAR AVARIS (that I may not be hurt by rapacious hands). The half rixdollar bears the same impressions.

The rixdollar of 1779 has the head, name, and title, as before; reverse, arms of Sweden, with 1 RD.; legend, FADERNES LANDET (the land of our fathers). The divisions of the rixdollar bear the same impressions, but have their value marked on them, thus: $\frac{2}{3}$ RD., $\frac{1}{3}$ RD., $\frac{1}{6}$ RD. The rixdollar, and other pieces coined since 1795, have the legends on both sides in the Swedish language. The inscription

tion on the edge of the piece is MANIBUS, &c. as on the old rixdollar.

The rixdollar of Friburg, and its divisions, have the arms of the canton; legend, RESPUBLICA FRIBURGENS (republic of Friburg); reverse, a cross formed by eight F's, and four crowns; legend, AUXILIUM NOSTR. DEUS (God is our help). The quarter rixdollar has, on a square in the centre of the cross, the number 56; and the inferior divisions are marked 28, 14, and 7.

The rixdollar of Treves has the head of the reigning prince, with name and titles, thus; CLEM. WENC. D. G. A. EP. TREV. S. R. I. A. C. ET EL.; that is, *Clemens Wenceslaus Dei gratia archi episcopus Trevirensis sancti Romani imperii archi cancellarius et elector* (Clement Wenceslas, by the grace of God, archbishop of Treves, arch chancellor and elector of the holy Roman empire); reverse, arms of the prince; legend, EPISC. AUG. APP. COAD. ELEC. (bishop of Augsburg, and other titles), besides the words, 10 EINE MARC F. or 10 EINE FEINE MARK (ten to a mark fine).

The rixdollar of Wirtemburg has the head of the reigning prince, with name and title, thus: CAROL. ALEX. D. G. DUX WUR. ET T. (Charles Alexander, by the grace of God, duke of Wurtemburg, &c.); reverse, arms of Wurtemburg; legend, PROVIDE ET CONSTANTER (providently and constantly), besides the words, 10 EINE FEINE MARK (ten to a mark fine).

The rixdollar of Wurtzburg (coined before 1795) has the head of the reigning prince, with name and titles, thus: FRANC. LUD. D. G. EP. BAM. ET WIR. S. R. I. P. F. O. DUX; that is, *Franciscus Ludovicus Dei gratia episcopus Bambergii et Wirtsburgii, sancti Romani imperii princeps, Francorum Orientalium dux* (Francis Louis, by the grace of God, bishop of Bamburg and Wurtzburg, prince of the holy Roman empire, duke of East Franconia); reverse, arms of the bishop, legend, 10 EIN FEINE MARCK (ten to a mark fine). But the rixdollar of 1795, &c. bears on the front the head of the bishop, with names and titles as above; and on the reverse only the words, 10 EINE FEINE MARCK, encircled by two sprigs of laurel; and above it the legend, PRO PATRIA (for the country). See Kelly's Cambist, vols. i. and ii.

RIXI, in *Geography*, a town of Hindoostan, in Bahar; 23 miles S. of Palamow.

RIXOUSE, LA, a town of France, in the department of the Jura; six miles N. of St. Cloude.

RIXTOWN, a town of the duchy of Holstein; seven miles S.W. of Lutkenberg.

RIZAH, a town of Asiatic Turkey, in the government of Trebisond, near the Black sea; 45 miles E.N.E. of Trebisond. N. lat. 48° 9′. E. long. 40° 20′.

RIZEA, in *Ancient Geography*, a town of Asia, in that part of the Colchide, which lay to the left of the Phasis. Procopius says, that it was situated on the frontiers of the empire, and that it was very populous.

RIZIUM, in *Botany*, a name given by the ancients to a peculiar kind of red root brought from Syria, and used by the Grecian women to paint their cheeks red.

The Latin writers, who have mentioned this, have called it *radicula*; and Pliny, who has more than once mentioned it, calls it *herba lanaria*, or *radix lanaria*. This, however, is a very great error, confounding it with the *struthium* of the Greeks. It is probable, that the rizium was no other than the anchusa, or alkanet root, which grows very plentifully in the countries from whence the Greeks had their rizium, and which will answer all the purposes for which they used it.

RIZOA, so named by Cavanilles, Ic. v. 6. 56. t. 578, after Salvator Rizo, a botanical artist employed by Mutis, is a genus of the *Didynamia Gymnospermia*, whose distinctive characters are scarcely sufficiently marked, for us, without a specimen, to decide concerning it.

The species is *R. ovatifolia*, an herbaceous plant of Chili, flowering there in February. *Corolla* pale rose coloured.

RIZSKOI, in *Geography*, a province of Russia, formerly Livonia, so called from Riga, its capital; bounded on the N. by Revelskoi, on the E. by the government of Petersburg and Pskov, on the S.E. by Polotzkoi, on the S. by Semigallia, and on the W. by the gulf of Riga; about 160 miles long, and 100 broad. N. lat. 56° 30′ to 59° 15′. E. long. 24° to 27° 34′.

RIZZIO, DAVID, in *Biography*, born at Turin, but brought up in France, was a good musician, and sung agreeably. His father was a dancing-master. The count de Merezzo took him to Scotland, when he went thither ambassador from Savoy. Rizzio charmed the queen by his talents, which were not confined to music, and there were rumours that she favoured him too much. Henry Stuart Darnley, the queen's husband, had him arrested in the music room of this princess. But it is said, in some accounts, that he was actually at supper with her majesty and the countess of Argyle in her cabinet. Some say that he was massacred in her presence; others assert, that the duke of Rothsay dragged him out of the room and murdered him at the door. There is no doubt but that the queen made useless efforts to save his life; (but to save the life of a cat, a dog, or a squirrel, common humanity would naturally have done as much). However, it is added, that she revenged his death afterwards on several of his assassins. Laborde.

We wished to know what foreigners say of this transaction, as party concerning Mary, queen of Scotland, ran so high at the time, and it still runs, that there is no great credit to be given to either side.

His instrument seems to have been the lute, the general favourite at that time all over Europe.

At Turin, some years ago, among many other musical enquiries, David Rizzio was not forgotten. Imagining, as he was a native of that city, and his father a musician as well as a dancing-master there, if we could find any music composed by either of them or by their Italian contemporaries, it might determine the long disputed question, whether David Rizzio was author of the Scots Melodies ascribed to him. The result of this enquiry is related in the article JAMES I. king of Scotland; which see.

Sir John Melvil, in his Memoirs, tells us that "the queen had three valets of her chamber, who sung in three parts, and wanted a base to sing the fourth part; therefore, telling her majesty of this man, Rizzio, as one fit to make the fourth in concert, he was drawn in sometimes to sing with the rest." This was about the year 1564.

He quickly crept into the queen's favour; and her French secretary happening at that time to return to his own country, he (Rizzio) was preferred by her majesty to that office. He began to make a figure at court, and to appear as a man of weight and consequence. Nor was he careful to abate that envy which always attends such an extraordinary and rapid change of fortune. On the contrary, he seems to have done every thing to increase it; yet it was not his exorbitant power alone which exasperated the Scots; they considered him as a dangerous enemy to the Protestant religion, and held for this purpose a constant correspondence with the court of Rome. His prevalence,

prevalence, however, was very ſhort lived; for, in 1566, certain nobles, with lord Darnly at their head, conſpired againſt him, and diſpatched him in the queen's preſence with fifty-ſix wounds. Biog. Dict. vol. xi. p. 94.

RIZZUTO, Cape, in *Geography*, a cape on the coaſt of Calabria. N. lat. 38° 57′. E. long. 17° 25′.

ROA, a town of Spain, in Old Caſtile, on the Duero; 25 miles N. of Segovia.

ROACH, in *Ichthyology*, the Engliſh name of a well-known fiſh, called by the generality of authors the *rutilus* and *rubiculus*, by ſome the *rubellio*. It is a ſpecies of the cyprinus according to the new ſyſtem of Artedi, and the cyprinus rutilus of Linnæus. It has been deemed, though without much reaſon, remarkable for its livelineſs and vivacity; whence the proverb, *ſound as a roach*.

In ſome parts of the world this fiſh will only live in ſtanding waters; with us it equally thrives in ponds and in deep ſtill rivers, and is remarkable for its numerous progeny; a pond being much ſooner ſtocked with this than with any other fiſh.

Roach *Fiſhing*. See Fishing.

Roach-*Leech*, in *Sail-making*, the maſt-leech of ſails cut with a curve, or roach.

ROACHING *of Alum*, one of the laſt proceſſes uſed in the alum making, and is what renders it fit for the market.

After the alum liquor has been left four days in the cooler, and is ſufficiently ſhot, they drain it out; and taking out the alum, they waſh it in a ciſtern of alum water ſo ſtrong, that it can ſcarcely take up any more of that ſalt, but only cleanſes it of its accidental foulneſſes. After this waſhing the alum is put into large pans, and a quantity of water added to it. It is ſet over the fire to melt in this water and boil a little; then it is ſcooped into a great caſk, where it is ſuffered to ſtand about ten days; and it is then fit for the market under the name of *roach alum*, or *roached alum*; the liquor let out of the cooler is boiled up again, and ſhoots more alum. See Alum.

ROAD, Via, an open way or paſſage, forming a commodious communication between one place and another.

The Romans, of all people, took the moſt pains in their roads; the labour and expence they were at to render them ſpacious, ſtraight, ſmooth, and agreeable, to the very extremities of their empire, are incredible.

Uſually, they ſtrengthened the ground by ramming it, laying it with flints, pebbles, or ſand; ſometimes by a lining of maſonry, rubbiſh, bricks, potſhreds, &c. bound together with mortar.

F. Meneſtrier obſerves, that in ſome places in the Lyonnois he has found huge cluſters of flints cemented with lime, reaching ten or twelve feet deep, and making a maſs as hard and compact as marble itſelf; and which, after reſiſting the injuries of time for ſixteen hundred years, is ſtill ſcarcely penetrable by all the force of hammers, mattocks, &c. and yet the flints it conſiſts of are not bigger than eggs.

Sometimes they even paved their roads, regularly, with large ſquare free-ſtones; ſuch are the Appian and Flaminian ways, &c.

The roads paved of very hard ſtones, they uſually called *viæ ferreæ*, either becauſe they reſembled iron, or becauſe they reſiſted the iron of the horſes feet, chariots, &c.

Roads are either *natural* or *artificial*, *terreſtrial* or *aquatic*, *public* or *private*.

Road, *Natural*, is that which has been frequented for a long ſucceſſion of time, and ſubſiſts with little expence by reaſon of its diſpoſition, &c.

Road, *Artificial*, is that made by labour of the hand, either of earth or maſonry; and in the making of which, ſeveral difficulties were to be ſurmounted; ſuch are moſt of thoſe along the banks of rivers, and through marſhes, lakes, &c.

Roads, *Terreſtrial* or *Land*, are not only thoſe made upon the ground, but alſo thoſe formed of earth heaped up in manner of a bank, and ſuſtained by ſpurs, buttreſſes, and counterforts.

Road, *Aquatic*, is a road made in the waters, whether current, as thoſe of rivers, &c. or ſtagnant, as banks and cauſeways, or over moraſſes, &c.

Under this denomination are alſo comprehended navigable rivers, and artificial canals. See Canal.

Road, *Public*, or *grand road*, is any common road, whether ſtraight or acroſs, military or royal, &c. *Private* road is that made for the convenience of ſome particular houſe, &c. See Highway.

Roads, *Military*, ſo called among the Romans, were grand roads appointed for the marching of their armies into the provinces of the empire, for the aſſiſtance of their allies, &c.

The principal of theſe roads, in England, are Watling-ſtreet, Ikenild-ſtreet, Foſs-way, and Erminage-ſtreet. See Way.

Roads, *Double*, among the Romans, were roads for carriages, having two pavements or cauſeways, the one for thoſe going one way; the other for thoſe returning the other, to prevent claſhing, ſtopping, and confuſion.

Theſe two ways were ſeparated from each other by a bank raiſed in the middle, paved with bricks, for the convenience of foot people, with borders and mounting ſtones from ſpace to ſpace, and military columns to mark the diſtance. Such was the road from Rome to Oſtia, called *Via Portuenſis*.

Road, *Subterraneous*, is that dug in a rock with a chiſſel, and left vaulted. Such is that of Puzzuoli, near Naples, which is near half a league long; and is fifteen feet broad, and as many high.

Strabo ſays, it was made by one Cocceius, a relation probably of Nerva; but it has ſince been widened by Alphonſus, king of Arragon and Naples, and made ſtraight by the viceroys. There is another of the ſame kind in the ſame kingdom, between Baiæ and Cumæ, called the Grotto of Virgil, becauſe mentioned by that poet in the ſixth book of his Æneid.

Road, in *Rural Economy*, a track or way conſtructed with ſome ſort of hard materials for the purpoſe of travelling upon, with carriages, horſes, and other animals. Roads are of different kinds, as public and private, or parochial. The firſt ſort may be ſubdivided into toll and free-roads, and the latter into lanes or bye-roads: there are likewiſe other ſorts of roads, as carriage and horſe tracks, &c. It has been remarked by a writer, in the firſt volume of "Communications to the Board of Agriculture," that the conveniencies and beneficial conſequences which reſult from a free and eaſy communication between different parts of a county and diſtrict are ſo various, and the advantages of them ſo generally and extenſively felt by every deſcription of individuals, from the higheſt to the loweſt; that no labour or expence ſhould be ſpared in providing them; as, without ſuch ready means of intercourſe, all ſorts of internal commerce and improvement are either much embarraſſed, or wholly at a ſtand. And it is, indeed, well added, that roads and canals, or navigable rivers, may juſtly be conſidered as the veins and arteries through which all improvements flow. To internal commerce and agriculture,

culture, they are as the veins and arteries to the human body. Through these the blood circulates in every direction, and thus keeps alive the animal system; but, if this circulation is by any means checked or obstructed, even in the remotest part, that part soon becomes useless, and sinks into decay, and in some degree is felt throughout the whole body. So it is with respect to the commercial and agricultural systems. Without a free and uninterrupted intercourse, it is impossible they can exist, or at least produce, to the community at large, so many important benefits as they otherwise might have done. How many, for example, are the places, in almost every country, that might be rendered doubly valuable, if the access were practicable and easy. How immense the quantities of the finest timber, perhaps growing in inaccessible woods, which, on that account alone, are lost to society. How many the valuable strata of the richest metals and minerals, which, from the same cause, lie buried and undisturbed in the bowels of the earth; and how many thousands of acres of the most fertile soil, that might be improved and cultivated to the highest degree of perfection, and thus very largely contribute to increase the food and the comforts of man, were the ingress and egress rendered practicable and free. And the value of a farm, consequently the riches, perhaps the strength of a country, greatly depend on an easy and uninterrupted communication by good roads.

And the able author of the "Wealth of Nations" has well suggested, that good roads, canals, and navigable rivers, by diminishing the expence of carriage, put the remote parts of the country more nearly upon a level with those in the neighbourhood of the town. They are, upon that account, the greatest of all improvements. They encourage the cultivation of the remote, which must always be the most extensive circle of the country. Though they introduce some rival commodities into the old markets, they open many new markets to its produce. It is even further observed, that the Romans were so sensible of this, that we are told, the first writer says, they did not think it beneath the dignity of the commonwealth to attend to the conveniencies from good roads. That great and wise people, it is said, carried on, at an immense expence, roads, whose remains are to this day the admiration of the curious, from the centre of the empire to many of the remoter provinces. The readier march of their armies was, perhaps, he thinks, their first motive; but the easier intercourse of the several parts of the great empire was another, which they had too much prudence and too much wisdom to overlook. We are also told by Diodorus, Strabo, and other historians, he says, that the famous Semiramis, being so fully convinced of the importance of an easy and general intercourse, applied herself to render the roads practicable throughout the whole extent of her empire.

Mr. Donaldson also states, that, in an agricultural view, the benefits derived from good roads are incalculable. Before the establishment of turnpike roads in England, many parts of that kingdom, like the highlands of Scotland, were scarcely accessible. Coal, manure, grain, &c. as is still the case in many parts of Cornwall, were carried on horses' backs. Where waggons were used, seven or eight horses were necessary to draw about two tons, and seldom were able to proceed above twenty miles in a day. Now, where turnpikes are established, or other means used for keeping the roads in a proper state of repair, the same number of horses will draw at least five tons, and travel nearly double the distance, with much more ease. How absurd, then, continues he, for any person to scruple the payment of an inconsiderable toll, when the saving is so great and so evident; where the tear and wear in one case are not one-twentieth part of what they are in the other!

It is likewise contended by Mr. Beatson, in respect to the turnpike laws in this country, that they are liable to many exceptions; for although immense sums of money are annually levied for the purpose of making and repairing the highways, yet, either from bad management, from party influence, or from the chicanery and ignorance of surveyors and contractors, the roads in many places are not only laid out in the most absurd direction, but are so badly constructed, and kept in so wretched a state of repair, that they are almost impassable. It is surprising that in so enlightened a country, and where the turnpike laws have so much engaged the attention of many very ingenious men, those laws should still remain so very defective; more especially as there is hardly a country gentleman who attends a turnpike meeting, but considers himself completely master of the whole business and management, as well as of the making of roads; at least, if we may judge from the violent disputations and bickerings that frequently happen at these meetings, where a proposed new line of road, or perhaps the repair of an old one, will sometimes be contested with as great keenness and vehemence, as if the parties were contending whether Great Britain shall be a monarchy or a republic. And it is contended, that it too often happens party influence rules the proceedings at such meetings, and that those who are entrusted with the management of this business, delegate their powers, and trust the inspection and whole management and direction of the roads to some ignorant or pretended surveyor; who, almost to a certainty, will impose upon them, especially if he is empowered to settle with contractors; and thus the business of the public, in one of its most important concerns, is either altogether neglected, or terminated according to the convenience of the strongest party, without any regard to the interests of the community at large. In support of this assertion, he has only to refer to many parts of the principal thoroughfares in Britain. In some, it will be observed, the roads are directed in the most irregular zigzag manner, through a level part of the country, where they ought evidently to have gone straight forward. In other places, the traveller and the public, and the poor overloaded horse, are obliged to submit to all the inconvenience, the labour, and the fatigue of ascending and descending the steepest hills, when they might have gone, with the greatest ease and comfort, on a level road, by proper attention in the first making and laying them out. He is, however, far from thinking it would either be just or proper to force a road unnecessarily through any part of a gentleman's property without his consent, unless for very powerful reasons indeed.

If to avoid a deep ascent, or to shorten the distance considerably, and that there is no other way to do so, in that case there should be no hesitation; but if the advantages to the public are not very material, and that another line can be adopted, nearly as good, which will do less injury to an individual, the latter line should unquestionably be preferred in all such cases of laying out roads.

It should be a general maxim, he thinks, that private considerations ought, in all cases, to give way to public convenience and advantage. Society, says he, is formed for the mutual and general benefit of the whole, and it would be a very unjust measure to incommode the whole, merely for the convenience, or perhaps to gratify the whim or caprice of an individual. However, the property of an individual ought by no means to be taken to serve the

public, without allowing him, not only the full value, but more than the value proportioned to the inconvenience or injury he may ſuſtain by the meaſure.

But he contends, farther, that while the preſent turnpike laws remain in force, and the common mode is practiſed of chooſing ſurveyors annually, or by rotation, without the ſmalleſt regard to abilities or experience, it cannot be expected the public convenience will be ſo much attended to as it ought to be; neither is it to be expected, that the generality of ſurveyors, ſo choſen, can know the proper directions to give in making or repairing roads, nor the proper manner of making eſtimates, ſo as either to conclude an agreement with an artful contractor, or to form a correct judgment of ſuch propoſals as may be made. From theſe diſadvantages, it is inconceivable the loſs that may be occaſioned, or the miſchief that may be done by an ignorant and inexperienced ſurveyor. For he is decidedly of opinion that a ſurveyor of roads ſhould be a man of conſiderable abilities, and of the ſtricteſt honour and integrity. A man not apt to be ſwayed by party influence, or by private or perſonal conſiderations; for if he once allows himſelf to be led away or biaſſed by thoſe, or to act in any manner inconſiſtent with the public intereſts, he is unfit for that office. He ought not to be a man, who has all his life-time been confined to the narrow limits of a ſingle diſtrict or county, or who has ſuddenly, or by a ſlender recommendation, been brought forward as a perſon qualified for ſo arduous an undertaking. He ought to have ſeen, in various places, the different ſyſtems adopted in the management and conſtruction of roads, and to have made it a particular object of his attention, the judging of the beſt and moſt advantageous practices, under the particular circumſtances of different caſes. And beſides theſe, there is another probable reaſon why, under the preſent ſyſtem, the public roads cannot be ſo impartially managed and conducted as they ought ro be, in the unlimited power given to country gentlemen over the roads in the county or diſtrict in which they live. Many of thoſe gentlemen, for their benevolence and liberality, are truly deſerving of every praiſe that can be beſtowed upon them; but, however honourable and reſpectable they may be, and however deſirous to promote the public good, it would be doing an injuſtice to human nature to ſuppoſe they can view, with impartial eyes, the fine plantations, the beautiful incloſures, and other improvements, they have made on their eſtates. We may as well imagine, that a doting mother can coolly and deliberately ſee an inciſion made in the ſkin of her darling child, however much it may be benefited by the operation, as that a country gentleman can with indifference behold a turnpike road carried through an incloſure, which he himſelf has been at the pains and the expence of adorning. He adds, that ſo ſituated, it is natural to believe this gentleman would wiſh that road to go in any other direction, even though it ſhould not be quite ſo convenient to the public. He will not only uſe his own perſuaſion and endeavours to point out arguments againſt its coming that way, but he will even endeavour to prevail on his friends to exert themſelves alſo, and thus a party is often formed in oppoſition to the public intereſt; and if he is a man of opulence and power, and generally reſpected, it is more than probable his influence will prevail in this buſineſs.

It conſequently appears to him neceſſary, in order to obviate theſe abuſes and inconveniencies, that there ſhould be a controlling power over the meaſures propoſed by country gentlemen reſpecting turnpike roads: for to allow thoſe gentlemen to decide ultimately on the laying out a new road through their own lands, or even on the diſtribution of the money to be expended in repairing old roads, is, in fact, making them judges in their own cauſe. In ſhort, it is an object ſo truly important to the intereſts of the community at large, and of the kingdom in general, to procure the moſt eaſy, ſafe, and expeditious, and the leaſt expenſive intercourſe with every part, by means of the beſt roads, that it is a meaſure, he preſumes, highly deſerving the attention of the legiſlature; and which, from the great extent of buſineſs, would probably require a board, with proper ſurveyors appointed by it, for the purpoſe. If ſome plan of this nature were adopted, we ſhould then hear no more of thoſe numerous complaints that are ſo often made reſpecting the abuſes committed in the management of turnpike roads, and of the money levied at the toll-bars, at many of which, it is ſaid, by the author of the "Wealth of Nations," the money levied is more than double of what is neceſſary for executing, in the completeſt manner, the work which is often executed in a very ſlovenly manner, and ſometimes not executed at all.

But in reſpect to the improvement of both the public and private roads, the following hints have been thrown out in the able Agricultural Survey of Shropſhire. In lieu of ſurveyors in each pariſh (who are generally choſen in turn, and conſequently have neither time nor experience ſufficient to act properly, and are generally not inclined to exert themſelves by enforcing the duty, &c.), the writer would propoſe for the magiſtrates to have power to appoint a proper ſurveyor with a ſalary, who ſhould act under their direction, and be amenable to them for his conduct; ſuch ſurveyor to undertake the arrangement of a certain diſtrict (ſay ten miles ſquare), whoſe duty it ſhould be to employ deputies, to call in and ſee the ſtatute duty done under his direction: by this means the forming of the roads, which is the firſt principle, would be done in the moſt approved method, and the ſtatute duty regularly called out. There may be an inſpector, an inhabitant in each pariſh, appointed, and choſen yearly, whoſe intereſt it would be, as well as his duty, to act as a check upon the general ſurveyor and his deputy: this office, being eaſy, might be filled by one of the moſt liberal perſons in the pariſh. He apprehends that an arrangement of this ſort would very ſoon inſure good private roads. And ſomething like the following would, he thinks, procure good turnpike roads alſo; namely, the truſtees of all the turnpike roads throughout England, to be obliged to erect weighing engines at all their gates or bars, at which tolls are received, on or before the 24th day of June next, the expence of ſuch erections to be repaid to them, by their being empowered to add to their preſent reſpective tolls any ſum to be paid by ſuch carriage to be weighed, not exceeding ſo much as has been heretofore paid within one year laſt for the tolls; ſuch ſums to be paid, until all expence of erecting the ſaid engines ſhall be fully repaid. The account of ſuch repayment to be made out and ſettled by the clerks and gate-keepers belonging to the reſpective roads, and to be atteſted upon oath before two juſtices of the peace. And from and after the ſaid 24th day of June next, it may be lawful for all carriages to be drawn with any number of horſes along any turnpike road. But to prevent the injuries done to roads, by the great burdens too frequently drawn along them, it ſhould be enacted, that from and after the ſaid 24th day of June, it ſhould be lawful for all truſtees appointed by any act or acts of parliament, for the repair of any turnpike road, or any five or more of them, and they ſhould be required at a public meeting, to be held for

for that purpose on or before the 24th day of April next, to order to be erected at all the gates and bars which they have erected, or shall erect, for the receiving of tolls, or upon any part of the road within their respective jurisdictions, and at such a distance from any turnpike, bar, or toll-gate, as they shall think requisite and expedient to order and cause to be erected, a crane, machine, or engine, proper for the weighing of carts, waggons, or carriages conveying any goods or merchandize whatever; and by a writing signed by them, or any five or more of them, to order all and every such carriage or carriages which shall pass loaded through any such gate or bar, to be weighed, together with the loading thereof; and for them, or any five or more of them, or for any person or persons empowered by any five or more of them, to receive and take, over and above the tolls already granted, or hereafter to be granted, the sum of 10*s.* for every hundred weight, 112lbs. to the hundred, which every waggon or cart hereafter described, together with the loading thereof, shall weigh over and above the weights hereafter allowed to them respectively; that is to say, to every waggon or four-wheel carriage, having the fellies or rollers of the wheels of the breadth of sixteen inches, eight tons in summer, and seven in winter: to every waggon or wain, having the axle-trees thereof of such different lengths, that the distance from wheel to wheel of the nearer pair of the said wheels be not more than four feet two inches, to be measured at the ground, and that the distance from wheel to wheel of the other pair thereof be such, that the fore and hind wheels of such waggons and wains shall roll only one single surface or path of sixteen inches wide at the least, on each side of the said waggons or wains, and having the fellies thereof of the breadth of nine inches from side to side at the bottom or sole thereof, six tons ten cwt. in summer, and six tons in winter: to every waggon or four-wheel carriage, having the sole or bottom of the fellies of the wheels of the breadth of nine inches, six tons in summer, and five tons ten cwt. in winter: to every cart, having the fellies of the same dimensions, three tons in summer, and two tons fifteen cwt. in winter: to every waggon, having the sole or bottom of the fellies of the wheels of the breadth of six inches, four tons five cwt. in summer, and three tons fifteen cwt. in winter: and to every such waggon, so constructed as to roll, and actually rolling a surface of eleven inches by the wheels thereof, five tons ten cwt. in summer, and five tons in winter: to every cart having the fellies of the same dimensions, two tons twelve cwt. in summer, and two tons seven cwt. in winter: to every waggon, having the sole or bottom of the fellies of the wheels of less breadth than six inches, three tons fifteen cwt. in summer, and three tons twelve cwt. in winter: and to every cart, having the fellies of the same dimensions, one ton fifteen cwt. in summer, and one ton to twelve cwt. in winter. And if such trustees as aforesaid shall neglect to erect such engine at their respective gates by the said 24th day of June, then it shall and may be lawful for any mortgagee or mortgagees of the said gate or gates to erect such engine or engines, and to take upon them the same power as the said trustees were by the act invested with, and under the same regulations, on or before the 29th day of September next; and if the said trustees and mortgagees shall neglect to erect such engine or engines by the respective times hereinbefore stipulated for erecting the same, then it shall and may be lawful for all horses, carts, and other carriages, from and after the said 29th day of September next, to go through and pass along such road or roads, without any obstruction or payment for tolls whatsoever, until such trustees or mortgagees shall erect such weighing engine or engines as aforesaid, and occasion the same to be regularly used; any thing contained within the respective acts for turnpike roads to the contrary notwithstanding.

And it is usefully remarked, in respect to the effects of these regulations, that, first, the weighing engines will sufficiently prevent carriages of all sorts being overloaded, which will be a preservation of the road, whereas, the restraint upon the number of horses does not answer the purpose; for a short and overpowered team does more damage to the roads, than a greater number of horses, which draw easy, and consequently pass along much quicker. That disagreeable restraint will be thereby made unnecessary, which empowers and encourages some poor indolent wretches to wander about the country with their ready printed notices, to catch a prey, which, when got, is lavished away in drunkenness, debauchery, and disorder; and if they fail in their lawful attempt, which is often the case, and perhaps distressed to the greatest degree, being despised by persons of all denominations, pursue poaching and fowl-stealing, which lead to greater acts of thievery, of which there are many instances; for all the convictions are grounded upon the poor wretches as above described, being by the law allowed to be credible witnesses, who obtain the reward to the amount of 5*l.* or more, when the team-owner's servant or servants are all deemed prejudiced; so that, as the act now stands, no one is safe from these convictions.

Besides, the occupiers of farms in general, particularly those upon the middling-sized ones, find themselves, it is said, very much oppressed and injured by the law now subsisting for regulating the turnpike roads, by their being restrained from drawing more than four horses in waggons, the fellies of the wheels thereof being under six inches broad. Were farmers permitted to draw any number of horses, it would be of great public utility in lowering the price of those animals, which is now enormously high; the farmer would find it his interest, as formerly, to keep breeding mares, which, with the colts they breed, may be made useful great part of the year, provided they may be worked easy. The law, as it now stands, acts nearly as a prohibition to farmers breeding horses; for a breeding mare, or a colt under five years old, is not fit to draw one of four in a waggon, with no more than sixty bushels of barley or wheat; which is the common load of the Shropshire or Staffordshire farmers, neither of which bring more than two tons, which is considerably under the weight the present act allows to be drawn on the turnpike roads in winter. Before the said turnpike laws were in force, the farmer's team, to draw his sixty bushels of wheat or barley, consisted of six in number, two of which at least were mares, either in foal or sucklers, two colts, one of them two, the other three years old, which were never oppressed or hurt by their work; consequently a succession came on, and the owner had one or two good sound colts to sell off every year to the harness or draft, as they best suited. Good waggon horses were then bought at from 10*l.* to 15*l.* each, which are now, by their scarcity, from 25*l.* to 35*l.*; and those for the coach, that is, the light active half-blood horses, are from 40*l.* to 60*l.*

And another evil occasioned by this law is, that such farmers are obliged to keep horses of the largest size, which consume the produce of much land, by eating a large quantity of corn, when the smaller horses, working easy, seldom eat any. It is conceived by the same writer, that upon this principle, a law for regulating roads may be enacted, so as to answer every good design of the present, and at the same

ſame time relieve thoſe individuals who are exceedingly injured, and alſo be of general utility.

It is likewiſe remarked in regard to private roads, that they are by no means properly attended to; and which may be attributed to the general highway act being ſo eaſy of evaſion, that every farmer is able to avoid doing ſtatute duty, or at leaſt next to none. Nothing is more valuable than *time*, eſpecially to a man of buſineſs; and a farmer who executes the office of ſurveyor of the highway, *impartially and effectually*, will find he muſt neglect no ſmall part of his own buſineſs; and after all he might, perhaps, have been as little out of pocket had he done the whole work with his own team and labourers. It is ſtated, that there is no trick, evaſion, or idleneſs, that ſhall be deemed too mean to avoid working on the road; ſometimes the worſt horſes are ſent, at others a broken cart, and a boy, or an old man paſt labour, to fill; they are ſometimes ſent an hour or two too late in the morning, or they leave off much ſooner than the proper time, unleſs the ſurveyor watch the whole day. It is true, that redreſs may be had by application to a magiſtrate; but then how often cauſes of complaint occur; and how many days muſt be loſt to bring each home to the offender; who, *from cuſtom*, thinks he is doing no harm; beſides the conſtant breach of good neighbourhood that muſt be occaſioned by theſe petty litigations. It is ſuggeſted that a remedy might eaſily be had in the following manner. Aboliſh all perſonal ſervice upon the highways. Let ſurveyors be appointed, as at preſent, who ſhould have power, under the authority of two magiſtrates, to raiſe, by rate, certain ſums that may be neceſſary for the repair of the roads within the reſpective pariſhes and townſhips, and to account for the ſame at going out of office at the year's end. The farmer, who acts as ſurveyor, might then be able to repair the highways when moſt convenient to himſelf, and when he could give attention to them without any interruption or impediment, whereas at preſent ſome duty is given up, or nearly ſo, from the difficulties ariſing in collecting it. On the ſame principles, the author of the Preſent State of Huſbandry in Great Britain contends, that an act of parliament ſhould be introduced, for the purpoſe of reſcinding the ancient laws reſpecting ſtatute labour; which have in every inſtance been found ineffectual, and to eſtabliſh other general rules and regulations more likely to anſwer the purpoſe in the new improved ſtate of the country. He adds, that the exiſting acts of parliament reſpecting the making and repairing roads, where the juſtices of the peace cannot commute the ſtatute labour, are not ſufficient for the purpoſe of raiſing a fund ſufficient for keeping the roads in repair. Where the juſtices of peace have it in their power to aſſeſs the inhabitants in a ſum of money in lieu of the ſtatute labour, it is in general not the want of means, but the miſapplication of that means, or negligence in the general management, that is the cauſe why the pariſh roads are almoſt every where a diſgrace to the country. The imperfect and indifferent modes of executing the ſtatute work, as ſtated above, render it neceſſary, it is ſuppoſed, that thoſe ſtatutes enforcing the performance of this neceſſary duty ſhould therefore be aboliſhed; and in every county the juſtices of the peace ought to be inveſted with the power to aſſeſs the inhabitants of the diſtrict by ſome equitable *ratio*, whereby they would pay only in proportion to the benefit they received. Were this generally done, as is the caſe in ſeveral parts of Scotland, the counties divided into diſtricts of ſuch ſize, that the proprietors could conveniently meet as occaſion required; the money ariſing from the commutation act collected by one perſon, who ſhould be allowed a certain *percentage* on the ſum collected, be continued during good behaviour, and be reſponſible for his conduct to the gentlemen of the diſtrict; the money ſo collected be afterwards expended under the direction of theſe gentlemen, and the whole be ſubject to the review of the quarter-ſeſſions; the pariſh roads would, it is ſuppoſed, ſoon be materially improved. If to theſe regulations a power were added to mortgage the ſum ariſing from the commutation of the ſtatute labour for ſuch a number of years, and to ſuch an extent, as was found neceſſary to put the uſeful private roads in a perfect ſtate of repair, they might, it is ſuppoſed, in a few years, be made the reverſe of what they are at preſent. The laſt meaſure would be found the moſt effectual of any that could be adopted, and is probably the only one that can be reſorted to for the purpoſe of effecting an immediate and general improvement.

It has likewiſe been remarked by the author of the "Landed Property of England," in reſpect to the improvement of farm-lands by theſe means, that the art of planning, forming, and repairing roads, is a ſubject with which, for various reaſons, every manager of a large eſtate ought to be familiarly converſant. It is not enough for him to know the theory, or general principles, of the art. It is neceſſary that he ſhould ſtudy it practically in the particular diſtrict in which he is placed; and with the given materials that it happens to afford; as by theſe means he can only be capable of executing the buſineſs with the greateſt poſſible advantage. In this buſineſs a moſt material point, whether in the *laying* out of *new* roads, or *improving* ſuch as have been long eſtabliſhed, is that of giving them all the advantage in direction and other circumſtances that the peculiarity of their nature and ſituation admit of. It has been ſtated by the above writer, that moſt of all the old roads of the kingdom (the remains of the Roman ways excepted) owe their preſent lines to fortuitous circumſtances. Many of them were, no doubt, he thinks, originally foot-paths; ſome of them, perhaps, the tracks of the aboriginal inhabitants, the patriarchal ſavages, who lived by hunting; or of the paſtoral tribes, who travelled with their flocks and herds from paſture to paſture, as herbage and browze invited; or of the firſt ſettlers, between biding places which may not now exiſt. And that theſe incidental foot-tracks, eſpecially when they led through woods, became, as the condition of ſociety advanced, the moſt convenient horſe-paths; as we not unfrequently find at the preſent day. Conſequently, that in this ſtate of ſociety, before wheel-carriages were in uſe, many of the lands of the kingdom were appropriated, by which circumſtance thoſe fortuitous lines of roads became fixed and unalterable; there being no other legal lines left for carriage roads, than thoſe incidental horſe-ways, or ſmall tracks. He ſuppoſes, that in this account of the probable origin of roads, we have, at leaſt in part, the cauſe of the crookedneſs, as well as the ſteepneſs, of carriage roads, between the places which are now inhabited: for true it is, that the traveller is not unfrequently led down one ſteep to make an angle, and aſcend another; while the hang of the hill would conduct him nearly on a level, and by a more direct line. But, admitting that a cluſter of habitations heretofore ſtood at the angle, the ſeeming abſurdity ceaſes. He adds, that formerly, it is probable, the zigzag direction of roads, between towns and villages, was much more obſervable than at preſent. In more modern times, and ſince the legiſlature wiſely interfered with reſpect to appropriated lands, many improvements of lines have been made. And, by the general laws which have more recently been paſſed, magiſtrates are inveſted with authority to alter eſtabliſhed lines. So that

that now, the expence of alteration may be ſaid to be the only obſtacle, in ordinary caſes, to the perfection of the lines of roads in this country. And which is, of courſe, a circumſtance that has had much effect in improving the convenience of travelling.

And it is ſuggeſted, in reſpect to the direction of roads, that the moſt perfect line is that which is ſtraight and level. But this is to be drawn in a country only which is perfectly flat, and where no obſtructions lie in the way :—joint circumſtances that rarely happen. Where the face of the country, between two points or places to be connected by a road, is nearly but not quite level, by reaſon of gentle ſwells that riſe between them, a ſtraight line may be perfect ;—may be the moſt eligible under theſe circumſtances. But where the intervening country is broken into hill and dale, or if one ridge of hill only intervenes, a ſtraight line of carriage road is ſeldom compatible with perfection. And that in this caſe, which is nearly general, the beſt ſkill of the ſurveyor lies in tracing the midway between the ſtraight and the level line. Here the level line of perfection, for agricultural purpoſes, is to be calculated, by the *time* and *exertion* jointly conſidered, which are required to convey a given burden with a given power of draft from ſtation to ſtation. On great public roads, where *expedition* is a principal object, time alone may be taken as a good criterion. It is likewiſe added, that the moſt regular method of finding out the true line of road, between two ſtations, where a blank is given,—where there is no other obſtruction than what the ſurface of the ground to be got over preſents,—is to aſcertain and mark, at proper diſtances, the *ſtraight line ;* which is the only certain guide to the ſurveyor. And that where the ſtraight line is found to be ineligible, each mark becomes a rallying point, in ſearching on either ſide of it for a better. If two lines of equal facility, and nearly of equal diſtance from the ſtraight lines, preſent themſelves, accurate meaſurements are to determine the choice. If one of the two beſt lines, which the intervening country affords, is found to be eaſier, the other ſhorter, the aſcent and the diſtance are to be jointly conſidered, the exertion and the time required are likewiſe to be duly weighed. Further, alſo, the nature of the ground, the ſource of materials and, generally, the comparative *expence* of forming the road by two doubtful lines, as well as their comparative *expoſure*, are to be taken into conſideration. A long line of road, acroſs a broken country, ſhould not be haſtily drawn or determined upon by the directors of this ſort of buſineſs.

But in regard to the moſt difficult and troubleſome part of this ſort of work,—the neceſſary management in the aſcent of hills,—it is obſerved that, whether in laying out a freſh line, or in altering an eſtabliſhed one, modern road ſurveyors, like many other reformers, have run from one extreme to another. To do away the abſurdity of going up one ſteep and down another, to aſcend a third in order to reach the required elevation (a common occurrence on fortuitous roads), they have ingeniouſly, but very injudiciouſly, given an uniform riſe from the bottom to the top of the aſcent. In the theory of mechanics, and where mechanic powers only were to be uſed, a regularly inclining plane would be perfectly proper, in a caſe of this kind. Where the requiſite power is to be applied by rational beings, the ſame principle, though not altogether perfect, may be allowed; but when the moving power is neither purely mechanical, nor in a ſufficient degree rational, but an irregular compound of theſe two qualities, the nature and habits of this power require, he thinks, to be conſulted. It is, he conceives, one of many inſtances, which ſhew the impropriety of applying purely mechanical principles, in agriculture and rural concerns, in which they are to be combined, not only with the power but the will of the animals. No man who has been accuſtomed to drive a road team, or in the habit of ſeeing one driven in a hilly country, and who properly regards what he ſees, would lay out a long line of aſcent without one or more breaks, or convenient reſting-places ; in which the animals of draft may relax at their eaſe, and ſet off again without difficulty. He, however, obſerves, theory will readily ſuggeſt that, by a drag-ſtaff, or pall, a carriage may be ſecurely ſtopped on the ſteepeſt aſcent. But practice well knows the danger of checking the efforts of beaſts of draft while they are ſtruggling againſt the collar. For if they poſſeſs any habits, or even the ſeeds of reſtiveneſs, nothing is, he contends, more likely to encourage, or produce it, than ſuffering them to ſtop under the difficulties of draft. Beſides, thoſe which are true to their work, well knowing the extraordinary difficulty to be overcome, in putting a carriage at reſt into motion in ſuch a ſituation, ſtop under a degree of anxiety ; while the more ſpirited and irritable ſtand on the rack, and tremble at the apprehenſion of the painful effort they have to make. But let them ſee an end, or a reſpite, of their endeavours, and they will ſtruggle with willingneſs. A reſt, after the difficulty is ſurmounted, comes as a reward for their exertions. But where the natural ſurface of the ground is well ſtudied in any given caſe, there will ſeldom, he ſuppoſes, be much difficulty in aſſigning the places proper for reſts ; ſo as to make the road not only eaſier for carriages of burden, but ſafer and more pleaſant to travellers, as well as more ſightly : beſides being better to be kept in repair, than an uniform deſcent ; by reaſon of the flatter ſtages being checks to the ſurface water, and convenient places to get rid of it, without injury to the face of the road. But where ſuch breaks do not occur, the line of aſcent ſhould be uniform ; or as nearly ſo as the natural ſurface, or immoveable obſtructions of the acclivity to be ſurmounted, will allow in the particular caſe.

Likewiſe in the ſetting out of theſe lines, the common level is to be ſet by an obſervation from the bottom to the top of the aſcent (theſe points having been previouſly determined on, by the given circumſtances of the general line of the road), or from ſtation to ſtation where a clear view cannot be had between the extremities ; and the degree of aſcent, thus aſcertained, is to be marked with a pencil upon the inſtrument that is made uſe of for the purpoſe. And by this mark it is adviſed to trace a rough line along the face of the hill ; in order to determine, with ſufficient truth, reſpecting the proper breaks, or reſting-places, that may be required ; endeavouring to fix upon ſuch natural breaks in the ſlope as are ſituated in, or ſufficiently near, the general line of aſcent. And that when this has been done, to aſcertain, by ſimilar obſervations, the exact angle of elevation, or degree of ſteepneſs of each riſe, or length of aſcent between the breaks, &c. by theſe means procuring an unerring guide, in marking out and forming the baſe or bed of the road ; without the riſk of incurring unneceſſary labour and expence in doing the work twice over to bring it to the truth, or a ſtate of ſuitable exactneſs.

But it is well remarked by Mr. Marſhall, that the beſt ſervices of the road ſurveyor lie in avoiding, not in ſurmounting hills. And that in a long line of road, between places of nearly equal elevation, this may often be done. There are inſtances of the moſt public roads going over the tops of hills, where lines of equal length might be traced along their baſes ; and the difficulty and danger of aſcending and deſcending the ſteeps be avoided by ſuch means.

Very much attention has lately been beſtowed on this de-

partment of the road-maker's bufinefs, efpecially in the more northern parts of the kingdom; but much is ftill left to be accomplifhed, efpecially in the weftern diftricts of the fouthern parts of the ifland, where an attachment ftill remains to the original lines or directions.

And it is fuggefted by Mr. Beatfon in the paper above alluded to, that the bufinefs of laying out the lines of roads may, in fact, be reduced to three fimple principles; thofe of fixing upon the *fhortefl*, the *mofl level*, and the *cheapefl* directions, for which, though apparently very eafy of execution, from the frequent occurrence of circumftances that render it neceffary to deviate from them, the knowledge and experience of the furveyor are found requifite. The firft requifite from its being a ftraight line, is often neceffary to be departed from in order to avoid the removal of expenfive obftacles, fuch as hills, rocks, water, and morafles. The fecond is of vaft importance, and fhould invariably be adhered to, if poffible, even though the other two fhould, in a certain degree, be given up; for it is infinitely better to go a confiderable way about to obtain a level road, than to go ftraight forward and be obliged to take an afcent; but it may, in fome cafes, be preferable to afcend a gentle rife, in order to obtain a good hard bottom, and a road eafily made, than to go on a level through a fwamp, or piece of water, which would require a much greater quantity of materials, be much more difficult to keep in repair, and occafion a great deal more expence. It is not the moft hilly line to appearance that is always to be rejected as being the leaft level; for the fteeper and fhorter fome hills are, it will be the eafier to obtain a level road in that direction, by cutting down the fummits, and laying the materials taken from them in the vallies or hollow parts, which, in many inftances, may be done with great facility. And the third, or the leaft expenfive line, is alfo frequently given up, in order to obtain one or both of the other two. It is therefore concluded, that much depends on the fkill and ability of the furveyor, who, before he finally determines on a line of road, ought to make himfelf perfectly mafter of every part of the intermediate and adjacent country; nor fhould he rafhly determine at once, but fhould examine repeatedly, over and over again, whether no other line would be better than that he firft thought of.

And with refpect to the parts or divifions of which a public road fhould confift, it is obvious that they fhould vary in fome meafure, according to the nature of the traffic or bufinefs which is carried on upon them, the fituation in which they are placed, and the particular circumftances of the different cafes. It is, however, contended by the author of the "Landed Property of England," that the plan and formation of all *public* roads fhould be the fame; every public lane, or other fcite of a public road, he conceives, ought, where the width and other circumftances will permit, to be divided into three travellable lines, namely: 1. A middle road of hard materials, for carriages and horfes, in winter and wet feafons: 2. A foft road, formed with the natural materials of the fcite, to be ufed in dry weather, to fave the unneceffary wear of the hard road, and to favour the feet of travelling animals; as well as for the fafety, eafe, and pleafantnefs of travelling in the fummer feafon: and 3. A commodious path, for the ufe of foot paffengers, at all feafons. But in thefe cafes, he thinks, modern practice has fimplified too much. Inftead of thefe three requifites of a public road, we generally find a parliamentary or turnpike road (away from the environs of great towns), confifting, fimply, of one uniform broadway of hard materials; upon which horfes ftumble, and carriages jolt, the year round: while travellers on foot are feen wading to their ankles in mud, or in duft, according to the ftate of the wind and weather. His notion of what the nature of a public road ought to be, is, that within the fences of a lane or road there fhould be a raifed foot-path, a convex hard road, a foft fummer road, and channels to carry off the water collected by the carriage roads; the foot-path being cut acrofs, in proper places, to permit the water, which falls on that fide of the middle road, to pafs off freely into the ditch at that fide, as well as to prevent horfemen from riding along the path; the oppofite hedge-bank being perforated, to let off, into the other drain on the contrary fide, the waters which may collect on that fide of the lane or road.

And in regard to *private* roads it is contended, that where they are much ufed, as in fuch as lead from a village or other place to a public road, they fhould have a double carriage path, fo that carriages may any where pafs each other. But that for fuch as lead merely to a farm-houfe or a hamlet, a fingle line fufficiently wide to let a fingle or faddle horfe pafs a carriage with occafional dilations for carriages to pafs in, are only in general requifite.

Form of Roads.—Further, in regard to the moft appropriate form of roads, there has been a great difference of opinion among the perfons engaged in this fort of work, fome contending in favour of the *convex* form, while others are inclined to think the *concave* fhape preferrable in many cafes; and ftill others, that they fhould be either made perfectly flat from one fide to the other, with inclined planes longitudinally, or be *wholly flat* in every direction. But experience fully fhews, that fome degree of the convex form is neceffary in almoft every cafe, in order that the wetnefs and moifture may be difcharged with greater facility, and of courfe the roads be preferved in a more dry ftate. And in fpeaking of this form of road, Mr. Beatfon obferves, that the rife in the middle is more or lefs according to the fancy or whim of the makers, but in general it is a great deal too much. This form is adopted on the idea, that whatever wet falls upon the road will run off towards the fides into drains made there for the purpofe of receiving it. If the roads were a perfect fmooth hard furface, this theory would, no doubt, he thinks, hold good; but in practice it is found not to be the cafe, for the wheels of carriages occafion fo many ruts, and fuch a roughnefs on the furface of the roads in general, that little or no water can run towards the fide-drains, however convex the road may be. It confequently lodges in thofe ruts, and every fucceeding carriage, he thinks, the more eafily makes them deeper, and works the water and materials together in fuch a manner, as very foon to render the road extremely difagreeable. This frequently happens, he afferts, even on roads that have been made moft incommodiouffly convex, for the very purpofe of keeping them dry; confequently, the convexity of a road has not the defired effect of preventing water lodging upon the furface. Befides, it is, he conceives, extremely inconvenient for all wheel carriages, and deftructive to the road itfelf, by making the loading reft unequally upon the wheels, unlefs when going on the very middle of the road, for the loweft wheel will always bear the greateft part of the burden, and therefore will injure the road the more in proportion. If a cart or any carriage with two wheels is loaded, we will fuppofe, with two tons weight; when that cart is upon a level from fide to fide, the load is equally divided, and each wheel fuftains the weight of one ton; but if that cart is going on the fide of a convex road, there will perhaps be the weight of a ton and a half upon one wheel, and only half a ton upon the other, confequently the lower wheel, in this cafe, will do the road as much injury, as if the cart were loaded with

with three tons upon a level, inſtead of two upon ſuch a declivity. The proportion of weight upon each wheel, according to the declivity, will depend on the nature of the loading of the cart, for the higher the centre of gravity of the load is, the greater will that weight be on the lower wheel on the ſame declivity; and therefore a cart loaded with hay, ſtraw, or wool, or any other bulky commodity, will be more injurious to a convex road, unleſs when on the middle of it, than the ſame cart loaded with the ſame weight of ſtone, lead, or iron, or any other weighty commodity which lies low in a cart: and nothing can be more injurious on ſuch roads, than a ſtage-coach loaded with outſide paſſengers. But the deſtructive conſequences of allowing carriages to heel much on any ſort of road are even viſible, though in a ſmall degree, he ſuppoſes, from the effect produced by a wheel going over a ſtone, or any hard ſubſtance lying in one of the tracks or ruts, in which caſe there will ſoon be a deep hole formed by the wheel in the other track, directly oppoſite to that ſtone or ſubſtance which raiſed the other wheel. Every precaution ought, therefore, to be uſed to prevent carriages heeling to one ſide on any part of a road. And he ſuggeſts, that the inconvenience, and in many caſes the danger, of going on either ſide of a convex road, makes all waggoners, carters, coachmen, &c. keep always on the middle, by which, on ſuch roads, there is ſeldom any other part uſed by wheel carriages, however wide the road may be; conſequently, by the carriages being always confined to the ſame track, that part of the road ſoon gets out of repair, and requires a conſtant outlay of money to keep it in proper order or condition for being travelled upon. It is alſo added, that the method of forming and making the convex roads, in the firſt inſtance, appears to him very abſurd. He ſuppoſes, that before any hard materials are laid on, the road is generally formed in ſomewhat a hollow manner, rounded below, in which there are drains, or ditches, on each ſide: alſo the footways or horſe roads when made high enough. Theſe are alſo ſometimes called the ſummer roads, on account, he ſuppoſes, of that being the only ſeaſon they can in general be travelled upon. The road forms a convex line, about ten or twelve inches lower at the ſides of it than the footway and ſummer road. After being thus formed and prepared, the hard materials, moſtly conſiſting of broken ſtones, are laid on, which, it is ſuppoſed, will fill up that ſpace which is the hollow in a convex line, and when finiſhed, the whole ſurface, from one ſide to the other, forms one convexity; the footways or horſe roads being made a continuation of the ſame curve. And this is ſtill with the idea, that all the water that falls on the road will run into the drains on each ſide. But let any perſon, in wet weather, take a view of a road thus formed, and he will find, that, in general, however great the convexity may be, the water will ſtand in every rut and every impreſſion made upon it, eſpecially if the road has been long travelled upon; that the ſtones on the ſurface are pulverized by heavy wheel carriages, and the wet earth from below worked up among them. Alſo where the road is but newly made or repaired, and the materials are ſufficiently porous to let through the water, it will then lodge on the convex ſurface, in every impreſſion of a ſtone or other uneven part, particularly at the ſides, where it is dammed again by the footways, and thus the bed or foundation of the road is kept conſtantly moiſt, and of courſe it will very ſoon go out of repair. By this continual moiſture the ſtones ſink down into the ſoft earth, of which the bed of the road is compoſed, and this earth works up through the harder materials, and occaſions all that dirtineſs generally on the ſurface of roads in wet weather, although, perhaps, ten or twelve inches in thickneſs of thoſe hard materials had been at firſt laid over it. Sometimes, indeed, there are under-drains made through the footway, from the ſide parts, at every ten or fifteen yards diſtance, to convey the water into the ditches; but even this is not found to anſwer the purpoſe intended, for the intermediate ſpaces ſoon become ſo impervious, that the water does not paſs through them to enter theſe drains, the wet earth being converted into a ſort of puddle, reſembling what is uſed, in aquatic works, for the purpoſe of preventing the moiſture from penetrating through, and conſequently it lodges in all the ruts and hollows on the ſurface, without paſſing off ſo quickly as ſhould always be the caſe in ſuch inſtances.

Beſides this there is another manner of forming theſe convex roads adviſed in the Bedfordſhire Agricultural Report, in which it is propoſed to leave a hollow or vacuum, as it is called, in the middle, to depoſit the hard materials in. The only difference that appears to be between this and the method deſcribed above, is, that inſtead of the bottom of this hollow being made convex, it is made flat, and alſo deeper. It is thought that this method is liable to the ſame objection as the former, perhaps even in a ſtronger degree; beſides, it would require a much greater thickneſs of hard materials, which are very expenſive, and thoſe materials would be deepeſt or thickeſt in the middle of the road, where the wheels of carriages hardly ever go, conſequently that part is not ſo liable to be cut up as the tracks in which wheels moſt generally run, and produce their greateſt effects. Mr. Marſhall ſeems, however, to think more favourably of this form of road, eſpecially for wet weather, aſſuming it as a ſound poſition, that roads, in general, which are intended to be travelled in wet ſeaſons, ſhould be *convex* or *ſhelving*, not flat or concave. It remains to determine the proper degree of convexity of the hard line of road; from the margin of which the dry-weather line ought to ſhelve gently to the foot of the hedge-bank; ſo that carriages may paſs freely, and ſafely, from one line to the other; and in order that the rain-water which falls on that ſide of the lane may find its way, eaſily, into the channel prepared for it, which is, he conceives, for a wet-weather road, to be regulated by a variety of circumſtances: as, firſt, by the materials of which it is to be formed: ſoft materials are moſt liable to be worn into ruts and hollows, and require to be laid up with a quicker deſcent for rain water, than hard materials, which require leſs elevation or rotundity of ſurface; and leaſt of all a firm even pavement. Secondly, that a convex road in the face of a ſteep is to be laid up higher, with a given material, than one on more level ground, on which rain-water has no other tendency than to the ſides; whereas in the face of a ſteep, it it may have an equal or greater tendency along the line of road; and is liable to be caught by the ſlighteſt impreſſions of wheels; and thus to wear channels, as may too often be ſeen, from the top to the bottom of the hill. Even where the ſurface of the road is perfectly ſmooth, it may have twice the diſtance to run, before it reach the outer margin, that it has on a level. And thirdly, that the degree of convexity is to be determined, in part, by the width of the road; the materials and deſcent being equal. A wide road requires to be formed with greater ſideway deſcent than a narrower one; which more readily frees itſelf from rain-water, inaſmuch as the diſtance is ſhorter from the crown to the outſkirts of the road in ſuch inſtances.

But that the freeing of a road from rain-water is not the only object to be kept in view, with regard to its convexity: the eaſe and ſafety of carriages, and particularly thoſe of burden, whoſe loads, being of light materials, are laid up high, require to be conſulted. A carriage moves moſt freely, and with the leaſt exertion of draft, when the load lies

lies evenly upon the wheels on either ſide. In proportion as the weight is thrown on one ſide or the other, the reſiſtance is increaſed; eſpecially on the road which is liable to impreſſion. Hence the inconvenience of a highly convex road in the face of a ſteep; and hence the utility of breaks in long aſcents, or ſuch roads as are formed in hilly ſituations.

In fact, he conceives it evident in reſpect to convexity, that every part of a road ſhould be equally and duly convex, —ſhould be equally ſafe and eaſy for carriages of every deſcription; otherwiſe it becomes partially worn; the more level parts only are uſed; the ſteeper being in a degree uſeleſs. Hence a road of even and due convexity is not only eaſy and ſafe, but may be formed of a narrower width, than one whoſe ſteep ſides are neither eaſy nor ſafe to be travelled; and whoſe crown, only, is in uſe for paſſing upon. And on meaſuring different paſſages of roads which appeared to lie in the moſt deſirable form, and taking their convexity, or the elevation of the crown or middle of the road above the baſe line, he has found that roads of twenty feet in width riſe about ten inches: namely, one inch in every foot, on either ſide. And he is of opinion that this reſult may be taken as a general guide in forming roads: this middle degree of convexity being liable to be altered according to the width of the road, the nature of the materials, and other circumſtances which have been ſtated already.

And concerning the ſecond or concave form of roads, Mr. Beatſon thinks that it is quite the reverſe of the common form, being loweſt in the middle, where other roads are generally made higheſt. By differing ſo widely from the common practice, and the general opinion of road makers, one would at firſt be almoſt inclined to ſuppoſe, that ſo ſingular a practice in forming roads could only proceed from a deſire or propenſity to differ from the reſt of mankind: but when we are told that the late celebrated and ingenious Mr. Bakewell was an advocate for this form; that the road by his farm of Diſhly, and that through Meſham, in the ſame county, are both upon this principle, and in much better order than the roads found about them; likewiſe that the road through Bredon, made under the direction of Mr. Wilkes, is of the ſame form, and is ſaid to be better now than ever remembered before, and kept in order at much leſs expence:—when we conſider theſe well authenticated facts, ſupported by ſuch reſpectable evidence, we naturally conclude that the reaſons for adopting this uncommon form of road, are founded on ſomething more ſubſtantial than mere whim and caprice; and conſequently deſerve to be more fully inveſtigated. This writer ſtates, that he has not been able to learn the manner of forming theſe kinds of roads before the hard materials are laid on, but, when completed, he underſtands the form is ſomething ſimilar to that of a paved ſtreet, with a drain for the water in the middle. The whole width of the road is divided into three equal parts, or nearly ſo. The ſides are made quite flat. The middle diviſion has a gradual but ſmall deſcent, or concavity, from each ſide to the middle part, which is the middle of the road. This concavity has alſo a ſmall deſcent lengthways, made on purpoſe, if not declining naturally, ſufficient to carry off the water to proper outlets. In the middle diviſion the beſt and hardeſt materials are laid. The direction of Mr. Wilkes, as ſtated in an ingenious paper, in the firſt volume of Communications to the Board of Agriculture, is, that when the fall is one foot in 150 or 200 feet forward, the fall from the ſides towards the middle ought to be 15 inches in 20 feet. When one foot in 100 to 150, to be 12 inches. One foot in 30 or leſs, to be even the whole breadth. Where the width of a road is 60 feet, one foot of fall to each 40 feet in length of the road. Twenty feet from the ſides towards the middle, to have nine inches of fall.

The inner 20 feet to be flat.

And Mr. Bakewell's idea, he is informed, was, that water, where it can conveniently be applied, ſhould frequently be let run upon this concave part, in order to waſh it quite clean; for it is always obſerved, where a ſmall ſtream of water comes upon a road, that part, if the bottom is good, is generally firmeſt, and hardly ever gives way. To have a command of water, therefore, to flood the road at pleaſure, he thought would be of great advantage in keeping it in order. And the other uſeful properties attending a road of this form are the following: There are three parts of it on which wheel carriages may go, without heeling to either ſide; on the ſide diviſions, and alſo on the middle diviſion, when the horſes walk in the loweſt part. This is certainly a material advantage, being much more eaſy for the horſes and leſs injurious to the road. By carriages uſing indiſcriminately theſe three tracks, all parts of the road will wear more equally and for a greater length of time; whereas in the convex roads, there being only one part, namely, the middle, on which carriages can go without heeling, that part only is moſt generally uſed, and conſequently ſooneſt gets out of repair, which is a great inconvenience in ſuch roads.

With reſpect to flat roads ſloping longitudinally, the advocates for them obſerve with good reaſon, that by being flat or level from ſide to ſide, the preſſure of wheel carriages will be more equal, the friction leſs, and all parts of the road may be travelled on with the ſame facility; conſequently it will wear more equally, be eaſier kept in repair, and require fewer materials for keeping it up. But notwithſtanding ſuch advantages are deſerving of attention, it muſt ſeem to thoſe unaccuſtomed to ſuch a form of road, a difficult matter to keep it ſufficiently dry, or free from the ſtagnation of water upon it. But from its having been obſerved that the ruts made by the wheels of carriages prevent the water running to the ſides of convex roads, it is propoſed that roads of this form ſhould have in every level part gentle ſlopes, ſufficient for water to run along, which, ſuppoſing them to be one foot in fifty, would hardly be perceptible. On theſe ſlopes, or inclined planes, the ruts made by the wheels of carriages would promote the water running off, by forming ſo many little channels or conductors for it to run into the lower part of theſe ſlopes, from whence it muſt be properly conveyed away. By this plan ſuch roads will be much more eaſily kept dry than the common roads uſually are or can be from the nature of their conſtruction.

And farther, in regard to the wholly flat form of roads, the reaſons given for them are nearly the ſame as ſtated in ſupport of the laſt, only that as there are few parts of a country ſo perfectly level, for any conſiderable diſtance, that water will not run either one way or another, it is conſequently unneceſſary to be at the expence and trouble of forming thoſe ſlopes or inclined planes recommended in the preceding form; but that proper outlets ſhould always be kept clear at every hollow part, and if the road ſhould in any place be quite level, a ſhallow croſs drain, that will occaſion no impediment to carriages at every 50 or 60 yards diſtance, or nearer, will keep the road ſufficiently dry.

And it is from theſe ſtatements concluded by Mr. Beatſon, that the main objects ſought after are, 1. To keep the road always as free from moiſture as poſſible: and 2. To conſtruct it in ſuch a manner, as to render the draft or communication eaſieſt, at the leaſt expence. In theſe are compre-

comprehended all the requiſites neceſſary to form a complete road. To attain them in the beſt manner is therefore the important point. Four different methods have been ſtated, each of which has its ſupporters. The arguments in favour of each have alſo been ſhortly mentioned, which will ſhew that their main object is the ſame, unleſs perhaps the idea of watering the concave road may be conſidered a deviation from one part of the general rule; but as that is propoſed to be done only to waſh the road occaſionally, in caſe it becomes dirty or ſluſhy, it cannot therefore be conſidered in that light in any reſpect whatever. But from theſe modes of conſtructing roads being in ſome meaſure unſatisfactory, he is induced to offer a new theory on the ſubject, which is founded on the knowledge of the ſtratified nature of the earth. It is however only given as theory, having never, he believes, been ſubjected to the teſt of actual practice. It is obſerved, that every perſon who has paid the leaſt attention to the ſtructure and formation of the different ſtrata of the earth, muſt have ſeen that ſome of theſe ſtrata are of ſo cloſe a texture as to be impenetrable to moiſture; others again are ſo porous, that water will eaſily run through them in any direction, till it meets with ſome obſtacle, or finds a vent. Of the firſt ſort ſome are leſs denſe, and of the latter ſome leſs porous than others, conſequently as they partake more or leſs of theſe qualities, the water or moiſture will the more or leſs quickly penetrate through them. But in order to ſhew this more clearly, and apply the principle to the conſtruction of roads, he ſuppoſes the ſection of a hill or eminence compoſed of a number of ſtrata. If the upper ſtratum or ſurface ſoil is of a porous nature, it is evident that any water which falls upon it, will penetrate through to the ſtratum below, where, if it cannot go farther, it will glide along the ſurface till it finds a vent at the bottom of the hill; if the ſecond ſtratum is hollow, and continues on towards any depreſſion in it, the water will lodge in that hollow, and form a ſort of pool or bog, as is ſometimes obſerved on the tops of hills; but if in this hollow place there is a communication with the porous ſtratum, no water will lodge there, but it will penetrate through and glide along the upper part of the denſe ſtratum below, till it finds a vent on the ſide or at the bottom of the hill, as before. And by the above it will alſo appear, that if the uppermoſt ſtratum is of a cloſe texture or clay, any water falling upon it will not only lodge in the large hollow, but in the ſmaller ones, and in all the other irregularities or concavities that may happen to be upon the ſurface. Hence, alſo, it is evident that in order to keep dry the ſurface of any ſuch piece of ground, it matters not of what ſhape or form that ſurface is, or whether it is convex or flat, provided there is a communication with ſome under ſtratum, ſufficiently porous to carry off the water below; but it is of ſome conſequence the form of the upper part of that ſtratum upon which the water is to run, for the ſmoother it is, the water will of courſe the more eaſily flow away, and be diſcharged from it.

It is eaſy, it is ſuppoſed, to apply theſe principles in the forming of roads in the following way: when a new road is to be formed, let it be done in the firſt inſtance nearly in the uſual manner, with ſuch materials as are on the ſpot, and the nearer the quality of theſe approaches to *clay*, ſo much the better. Inſtead, however, of forming it convex, as is generally done, let the lines on either ſide from the middle be quite ſtraight, and meet in an angle or ridge at that part or the middle of the road, having a ſlope from thence to each ſide, of about an inch in a foot. There are to be made ſmall drains for the more eaſily conducting away the water that may be collected at thoſe places. The road, being thus formed, muſt be allowed to harden and ſettle for ſome time before any other materials are laid on, great care being taken, while in that ſtate, to let no carriages or cattle upon it, and it ſhould be rolled with a long wooden roller, that will reach at once from each of the ſides to the middle. This roller ſhould be loaded with a box of ſtones to make it ſufficiently heavy, and that it may be the more portable when that box is taken off; and it may be ſo contrived, that by changing the horſes from one ſide to the other, there will be no occaſion to turn the roller, in order to make it roll the ſame ſpace over again. Being rolled in this manner, will conſolidate the materials compoſing the ridge of road, and prepare it for receiving thoſe to come afterwards, for it is a moſt abſurd practice to lay hard materials in the common way upon this firſt form or baſis of a road, before it is ſufficiently firm to bear them. When thus formed and properly ſettled, the next ſtep to be taken is to imitate the works of nature in dry ſoils as nearly as poſſible, by forming a ſtratum penetrable by water, compoſed either of ſand or ſandy gravel, or any other ſubſtance eaſieſt to be got, that is ſufficiently porous to admit water to paſs through it. This ſtratum ſhould be laid quite level, and extending from one ſide of the road to the other, filling up the ſmall drains alſo on the ſides. Over this are to be laid the beſt materials that can be got for completing the road, conſiſting either of ſtones broken very ſmall, or of the beſt gravel. This coat of hard materials need not exceed above ſix or ſeven inches in thickneſs, which being much leſs than is commonly uſed, will be a conſiderable ſaving; and it may even ſtill be leſs, if the directions hereafter given are ſtrictly attended to. If this covering conſiſts of broken ſtones, they ſhould afterwards be laid over with ſand or fine gravel, when eaſily procured, ſo as to fill up all the cavities betwixt them. The ſand or rubbiſh from a freeſtone quarry is excellent for this purpoſe, providing there is no mixture of earth in it, which ſhould be carefully guarded againſt in every ſtep taken after the road is firſt formed. Theſe finiſhing materials being properly laid on and ſmoothed with a rake, the whole ſhould now, before any carriages or horſes are admitted upon it, be well rolled with a heavy iron roller, divided in three parts for the purpoſe, the two hind diviſions of the roller being large, the front or middle diviſion ſmaller, to the framing of which the ſhafts are fixed, and ſo contrived, that it turns in the manner of the fore-wheels of a waggon; there is a box for holding ſtones to increaſe the weight when neceſſary; but in adding this weight, it muſt be obſerved to lay about two-thirds of it over the two large parts, and only one-third over the other, otherwiſe the preſſure will not be equal. Iron rollers are ſometimes made in three parts, as above, but being all in a line, and cloſe together, they are apt to be choaked by gravel and ſmall ſtones, which cannot happen in the conſtruction here recommended. It is contended, that if ſuch a roller were generally uſed upon roads, eſpecially when newly made, it would ſave a great deal of expence in repairing them; for it cannot be expected that any new road will immediately bear wheel-carriages, or continue long in repair, when compoſed entirely of looſe materials, without the ſmalleſt pains being taken to conſolidate them together. Frequent and heavy rolling would therefore produce the moſt beneficial effects, and would tend very much to keep the road free from deep ruts and holes; beſides, there is nothing could contribute more effectually to promote and preſerve firmneſs and ſolidity, two qualities without which it is impoſſible any road can, with propriety, be called a good one, or have the neceſſary degree of ſolidity and firmneſs.

The advantages that would reſult from this mode of conſtruction

ſtruction would be various: by being level on the ſurface, every part of it is equally commodious for carriages, conſequently it will all be equally travelled upon, and the deep ruts ſo frequent in other roads, will almoſt entirely be prevented. It will therefore be much eaſier kept in repair, and, if properly managed at firſt, will be made at leſs expence than the common roads, eſpecially in a ſandy ſoil, or where ſand or gravel is eaſily procured. The draft will be much eaſier on ſuch a road. And one very important advantage is, by having an under-ſtratum through which the water can penetrate, and the cavities among the harder materials being filled with the ſame porous ſubſtance, no water can ever lodge on the ſurface, nor can it ever become ſo dirty as other roads are in wet weather; all the water that falls on the ſurface, unleſs perhaps in very heavy rains, being conducted away underneath and in every part. And it may be added, that from the ſmall drains on each ſide of the road, croſs-drains ſhould be carried through the fences, provided the level of the ground will admit of it, at the diſtance of every ten or fifteen yards. Theſe croſs-drains may be made of wood, with about an inch bore, or of ſtone, if preferred.

It would be of great advantage to this ſort of road, as well as to every other road where the ground is incloſed on each ſide, that the fences ſhould be ſunk towards the fields, and the water be conducted through to theſe ſunk fences, inſtead of the common method of leaving large open ditches and drains on each ſide of the road. It muſt alſo be particularly attended to, that on all ſloping roads on a declivity, where the water is apt in heavy rains to run upon the ſurface, or at the ſides, that it ought never to be allowed to run in the ſame direction more than ten or fifteen yards, but at that diſtance to be conducted away to a ſide into the main drains. It will then do little or no harm, as it can never increaſe beyond a very weak ſtream; but if it is allowed to run one hundred or two hundred yards, it will probably be increaſed to ſuch a ſize before it reaches the bottom, that it will waſh away a great deal of the materials, and may beſides very much injure the road or fences on each ſide of it, which would be highly diſadvantageous in many reſpects. Beſides, it is ſuggeſted, that a road formed on this plan need not be quite ſo wide as roads in general are made, for the whole ſurface of it will be in uſe from one ſide to the other, and therefore from twenty to twenty-four feet wide is quite ſufficient, unleſs near populous towns or extenſive works, where great numbers of carts or waggons are employed. And in the interior parts of the country, twenty feet in width will anſwer every purpoſe required. He has obſerved in ſeveral places, where the roads have not been above eighteen or twenty feet wide, and properly made from ſide to ſide, that they were in much better condition than the neighbouring roads, from thirty to forty or fifty feet wide. On theſe wide roads, formed in the uſual way, there is ſeldom more than eight or ten feet in the middle of them generally made uſe of; the remainder one on each ſide being occupied by heaps of ſtones, ſcrapings, and other rubbiſh, which, although they may partly be of uſe ſometimes in repairing the roads, ought on no pretence to be allowed at all times, or at any time, to lie there; ſuch rubbiſh being not only diſgraceful on the ſides of a public highway, but even dangerous, particularly in the dark, for either carriages or horſes; beſides having various other diſadvantages ariſing from the growth of weeds, and the diſſemination of their ſeeds.

But in reſpect to the moſt proper and beſt form of the roadway of narrow lanes, as thoſe leading from village to village, in recluſe ſituations; where bridle roads, or pack-ways, have been ſo far opened as to admit carriages; or though the whole width of the lane may not be more than eight or ten feet, it is remarked by the author of the treatiſe on "Landed Property," that on ſuch a narrow ſpace, a whole barrel, or convex road, cannot eaſily be kept up. If raiſed, it preſently wears into a middle track, and two wheel-ruts, with foul drains on either ſide of them; and becomes, in wet weather, a dirty trough, which is unfit for either carriages or horſes, and in which a foot paſſenger has not where to ſet his foot. But that provided ſuch a lane be thrown into a ſhelving form, reſembling half a barrelled or convex road, a greater width of travellable road for carriages and horſes will be obtained; ruts will not be ſo liable to be formed; the whole of the water of rains will be thrown on one ſide; while the other will afford a comfortable walking path at all ſeaſons. And this, it is added, is now no longer merely a probable, but a tried improvement. Lanes, ten, twelve, or more feet wide, have been ſtrikingly improved by it. And it is further ſuggeſted, that when water, in a wet ſeaſon, is apt to ooze out of the banks on the upper ſide of the lane, a narrow channel is to be cut, to prevent its overflowing the road: or, in forming the bed of the road, the inclination may in ſome caſes be reverſed; ſo as to throw the drain on that ſide of the lane from whence the ſpring water iſſues: thus the ſame drain will ſerve for the ſpring and the rain-waters. And it is added, in regard to this ſemi-convex form of road, that it is applicable, not only to narrow lanes, but to the ſides of hills; where the road, as it generally ought, is conducted ſidelong, not directly, up the ſlope. By this form of the road, the whole of the water which falls upon it will be got rid of, without inconveniency or expence. And the bed of the road, for this purpoſe, may be made narrower than for a full convex road; a circumſtance which, in ſome caſes, may become a ſaving of much expence. The upper ſide of a road in this form being nearly level, and firm to the foot of the ſteep, would be choſen by aſcending carriages; while the lower ſide would acquire a looſeneſs of ſurface, and be uſed by laden carriages going downward; and while a raiſed foot-path, on the lower margin, would be a ſecure guard, and a relief to the apprehenſions of timorous travellers.

But in relation to the width of public roads where a blank is given, it ſhould be regulated, Mr. Marſhall ſays, by their publicity, as it is compound folly to make a road wider than its uſe demands. He ſuppoſes that there are few roads, even near populous towns, that require a greater width than about thirty-three feet. But every public road, under common circumſtances, ſhould have a line which is travelable at any ſeaſon, and of ample width to permit two carriages to paſs each other with freedom and ſafety. This ample width let us ſet down as one ſtatute pole. In deep clayey diſtricts, where hard materials are difficult to be procured, a ſingle road, of half a pole in breadth, with dilations at proper diſtances, to let carriages paſs each other, may, in many recluſe ſituations, be adviſable. This regards the breadth of the winter road, for carriages and animals of burden. But that the width of a public *lane* requires a more enlarged view. On the plan offered, it is to contain, not only a wet-weather road, for carriages and horſes; but a ſummer road, and driftway; as well as a foot-path, which may be uſed in any ſeaſon. He obſerves, that in many parts of the greateſt public roads acroſs the kingdom, the lane is not more than twenty feet wide. But this being filled with hard materials, from hedge-bank to hedge-bank, carriages alone ſeldom find any inconveniency in theſe narrow parts. But where carriages, and large droves of cattle or ſheep meet in them, ſtoppages are unavoidable, and great inconvenience is of courſe ſuſtained.

And

And it is thought, that the width of the *driftway* ought, like that of the hard materials, to be guided by the publicity of the given road. In a great public road, it ſhould certainly be wide enough to let two carriages paſs each other, or one pole in width. But in one of leſs publicity, or where the exiſting lane will not admit of that width, a ſingle carriage path may ſuffice; as this being a continuance of the width of the hard road, no difficulty in paſſing can be experienced, it is ſuppoſed, from it.

But the width of the *foot-path* and the ditch may vary from half a pole to ten feet.

It is therefore concluded, that on theſe premiſes, the width of the lane of a great public road, near a populous trading place, ought to be fifty-nine feet and a half; and that of a common market-road, thirty-three feet. And theſe widths, without any previous intention, come out nearly the ſame as thoſe directed by act of parliament, for the lanes of turnpike roads and highways. A great error in the act, however, is, that the lanes of all turnpike roads, ſhall be ſixty feet wide: thus incurring a ſerious waſte of land; and creating great nuiſances; which green lanes ever are to the occupiers of adjoining lands. He from this ſuggeſts, that where exiſting lanes are wider than all the deſired conveniencies require, ſlips ſhould be ſold off their ſides, and be laid to cottages, or to the adjoining incloſures; having receſſes here and there, in which to lodge materials. It has long appeared to his mind an evident poſition, that every part of a public lane ſhould be uſed; and conſequently that no part of it ought to be a nurſery for weeds, or an unprofitable common paſture for ſtarving ſtock. Still he remarks, that a wide lane has its advantages; eſpecially in a low cloſe ſituation. It gives freer admiſſion to the ſun and air than a narrow lane, and the road dries more quickly. And further, that by permitting a more forcible current of wind, the pulverized materials, or dirt of the road is, in dry ſeaſons, carried off in the ſtate of duſt; leaving the uſeful materials undiſturbed. And it is highly proper to place the principal line of road in the midway of the lane, that it may be the moſt effectually expoſed to the agency of the ſun and wind.

Mr. Beatſon even ſuſpects, that, in the whole kingdom, thouſands of acres of fertile lands are loſt to the public, merely by making the roads ſo much wider than there is any neceſſity for. In the vicinity of large towns, they ſhould have an ample width, as 30 or 40 feet; or, in ſome caſes, conſiderably more, as near the metropolis. But the practice of making them 40 or 50 feet wide, as is ſometimes the caſe, through a thinly inhabited part of the country, or near the moſt pitiful villages, where even 20 feet would be ſufficient, is, he contends, a mere waſte of ground for no purpoſe, and occaſions a very great additional expence in making ſuch roads, which certainly might be avoided. Suppoſing the medium neceſſary width of road to be 7 yards, or 21 feet, and that the medium width now made is 11 yards, or 33 feet; this is, upon that ſuppoſition, 4 yards wider than is neceſſary; which, in every mile, is a loſs of 1 acre 1 rood and 2 perches: and ſuppoſing there are 5000 miles of ſuch roads in the whole kingdom, there is a loſs of more than 6300 acres, which, if eſtimated the ſame as the improved value of the waſte lands, at 27*s.* *per* acre, and at 30 years' purchaſe, would produce 255,150*l.*; a ſum which, if laid out in improving the roads, and making eaſy communications through different parts of the kingdom, would be of the greateſt public advantage. And it is evident, that where they have the width ſtated as neceſſary by the firſt of the above writers, the loſs ſuſtained in this way muſt be ſtill greatly more conſiderable.

Mr. Marſhall thinks, that in the operation of forming roads of the public kind, the firſt buſineſs of the road-ſurveyor is to examine the lane, or other ſcite of the intended road, in every part, to aſcertain whether offenſive waters lodge beneath it, and whether quickſands or land-ſprings break out in a wet ſeaſon, in which this examination is requiſite to be made. If defects of this kind be found, effectual ſubdrains are to be run up to them from the ditches or ſide-drains of the lane, or other ſcite. And that the next operation is to adjuſt the ſurface of the ſcite; to ſtrike off the protuberances, and fill up the hollow parts; and thus, in ordinary caſes, to mould it to the firſt proper form, or according to ſome of the other forms that have been mentioned; the foot-path and the higher ſide of the ſoft road being raiſed with the earth which is required to be taken off the bed of the hard road, whoſe baſe or foundation ought to be formed with peculiar care. Every part is required to be firm and ſound; dry earth or hard materials being rammed into every hollow and yielding part. It is ſuggeſted that the firſt form is adapted to firm binding materials; to ſuch as acquire, by wear, a repellent ſurface, and ſhoot off the waters that fall upon it; not to thoſe which are looſe and incoheſive, yielding to preſſure, abſorbing rain-waters, and conveying them down to the baſe or bed of the road. Theſe require a flat or a convex bed, free from obſtructions on either ſide, ſo that the abſorbed waters may effect their eſcape at the baſe. And that on this firm and level bed the largeſt of the hard materials are to be laid; next, thoſe which are more finely and evenly broken; and, laſtly, a covering of ſtill finer materials: to aſſiſt the roller in giving ſufficient firmneſs to the ſurface, and to render it immediately capable of being travelled upon.

But in regard to the proper materials for conſtructing roads with, Mr. Marſhall thinks that although every diſtrict may be ſaid to have its own material, and often without choice or alternative, yet there may be inſtances in which uſeful materials are overlooked or diſregarded. And that in ſome parts, particularly in Lancaſhire, large paving ſtones are in common uſe; ſome of the more public roads being rough pavements, reſembling the ſtreets of ill-paved towns. But that in the northern, and ſome of the midland provinces, broken quarry ſtones are the ordinary road material; and that, taking the kingdom at large, they are the moſt common material. But in the ſouthern and weſtern counties, flints and other hard field ſtones, gathered off ley grounds, are in common uſe; and in the neighbourhood of the metropolis, and in other parts of the kingdom, ſharp flinty gravel is a favourite and valuable material. In many parts of England, ſmooth, water-worn, pebbly gravel, collected on the ſea-beach, and in river beds, is uſed; and if the pebbles are of a hard texture, and be properly broken, to make them bind, or unite firmly together, a good road may be made of this material. In ſome caſes, ſand and ſilt, or fine ſea-ſand, have been employed with ſucceſs.

It is likewiſe added, that the artificial materials of roads, which he has met with, in quantity, are the droſs and cinders of iron and copper works; and burnt clay, (burnt as bricks in heaps,) which in a clayey diſtrict, deſtitute of other materials, and where fuel is cheap, may be found a valuable ſubſtance for the purpoſe. It is ſuggeſted by Mr. Beatſon, that in a ſandy ſoil the roads may be made on the new conſtruction, he has already recommended, with the greateſt eaſe. In ſuch a ſoil, there will be nothing more to do than to level the ſurface properly, fill up all the hollow parts, roll it well with the long wooden roller, and lay on the materials intended to finiſh it with, in the manner directed,

rected, and then roll it with the heavy roller, as has been advised above.

But in cases where the soil consists entirely of a deep loose sand, the best and easiest way to make a lasting road is, to form it to the width intended for the hard materials, and then to let a channel be dug at least 18 inches in depth, and about the same width; let these be again filled, and firmly built up with strong turf or clay, or any other solid substance that will prevent the materials to be laid on the road from spreading to either side; openings being left at every 10 or 15 yards, to let the water that falls on the middle part of the road more easily through. Where the form of the ground requires making up, a little wall of the same nature, instead of digging a channel, may be built on each side, nearly as high as the surface of the road is intended to be. These will prevent the hard materials laid on from spreading, which is the principal cause of roads made in such soils giving way in so short a time; and these materials will not be so liable to sink into the sand, if it is properly rolled before they are laid on, as well as at different periods after it is finished. And if there be a fence on each side of the road, and materials can be spared to cover it from side to side, there will be the less occasion for the little walls; as these are only intended to keep the hard materials within the bounds prescribed, in case it is not judged proper to lay them the whole breadth of the road. Where, however, those walls are thought requisite, the spaces, by being covered with a little gravel or freestone-sand, will make very good foot-ways or horse-roads; but in a road finished in this way, there will be no occasion for horse-roads distinct from the main road, as the whole, if kept in proper order, will, he supposes, be sufficiently smooth and safe for horses, or even foot passengers, to go upon at any time. In speaking of the making of roads through a clayey soil, it is remarked that those formed in such districts are in common the most unpleasant of any, chiefly on account of proper precautions not being taken to prevent the water lodging on the surface; sometimes, perhaps, owing to a want of proper materials, such as stones or gravel: but he has often seen the very worst of clay roads, even where no such excuse could be given. And that it seems hardly ever to have occurred to those who had the direction of such roads, that sand, properly applied, would in a great measure remedy all the defects complained of; and there are few parts of a country where sand of some sort, or freestone-rock, or sandy gravel, may not be obtained by some means. In certain situations it may, no doubt, be more expensive and difficult to procure such materials than in others; but these are local advantages, which road-makers must lay their account with. But the excessive inconvenience of bad roads, the expence occasioned by the tear and wear of wheel-carriages and harness, the risk of dislocating the limbs of horses, together with many other disadvantages, ought to stimulate all concerned to exert their utmost endeavours to make roads good, and easily passable, be the difficulties what they may, that stand in the way of them.

It is hinted, that in such places as where no hard materials can be got, if the road were formed nearly in the same manner as that first noticed, the evils complained of might probably soon be remedied. The clay should be excavated, so as to form a ridge in the bottom of the excavation. There should be small openings or drains at every 10 or 15 yards, or at every hollow place, to conduct away the moisture into the main drains. If this excavation is then filled with sand, or any other porous matter easiest to be got, and finished as formerly directed, there is no doubt but the road would soon become as good as could be wished for. Something similar to this he has known put in practice by a very ingenious gentleman in Cheshire, on whose estate, being a strong clay soil, the roads were so excessively bad as hardly to be passable. He dug away the surface of the road to the depth of 12 or 14 inches, and having the command of plenty of sand, he filled up the excavation therewith, and covered the whole with gravel; by which means he has now made, so far as completed in this manner, as pleasant a road as one could wish to travel on. He is not certain if he left the bottom of the excavation with a ridge in the middle, as here directed; but he is clear this would be an advantage, as well as the outlets at certain distances, to let away the water.

And in constructing roads through boggy or morassy soils, it is advised, after proper steps have been taken, to drain off as much of the water as possible, by deep ditches or drains withinside the fences, if inclosed, or intended to be inclosed, on each side. These drains should be cast at least a twelvemonth before any thing else is done towards making the road; for if the place is very boggy, it will be found to subside considerably after the water is drained away; and some parts will subside more than others, in proportion to the depth of the mossy soil, and to the quantity of water lodged there. Those parts will, therefore, be the better seen the second season than the first. All hollows or irregularities should then be filled up and levelled, either by taking from the heights and filling up the hollows, or by some other proper materials nearest at hand. In either case, the surface sods should, with a push-plough or paring spade, be carefully pared off the heights to be lowered, and also off the hollows to be filled up. These sods should be laid aside, till those places are brought to their proper level, and should then be laid on again. This will make the whole surface of an uniform toughness, which would not be the case where the sods are not laid on in this way. After this has been done, the breadth of the intended part for receiving the hard materials should be marked off; then let that part be covered with sand, or such porous substance, as before recommended, to the thickness of at least 10 or 12 inches. Then roll this, and finish it as already directed; and there is no doubt but a road made in this manner may be as good through a moss as in any other situation. This he speaks of from experience, having seen the most pleasant roads made in this manner, through mosses formerly thought impassable. When the moss is too soft to admit horses upon it, the sandy stratum may be rolled by men, the weight of the roller being regulated by the stone box, according to their strength. Sometimes the rolling is altogether omitted; but it is much better to roll, when practicable. It is added, that there are other methods of making roads through mosses; as by laying a foundation of broom, furze, or heath, and then the hard materials above them. But sand is greatly preferable, where it can easily be got, and when the track of the road is properly drained, as it always ought to be, before any thing is laid upon it with a view of making a road. These principles and directions are, it is said, equally applicable on all other sorts of soil, with trifling variations, according to the peculiar circumstances of the cases.

And it is supposed, that in the above cases the roads were formed where the scite or track was nearly level from one side to the other; but there are other situations, such as when cut or formed on the sides of hills, where some other precautions become necessary to be attended to. In these cases it is observed, that in making them it frequently happens that the excavation affords a sufficient quantity of materials for the purpose; and the part cut out of

of the ſolid very rarely requires any covering laid upon it. This, however, depends on the nature of the ſoil. If the whole breadth of the road is formed from the ſolid, and that is ſufficiently hard, no extraneous materials will be neceſſary; but if the ſoil is a compound of clay, or of a ſoft nature, the above rules and regulations muſt be had recourſe to. And that where the parts are made up from the excavation, they ought to be formed conſiderably higher at firſt than the other parts, as they will naturally ſubſide for ſome time afterwards, and the hard materials ſhould not be laid on till they have ſufficient time for that purpoſe, which may be greatly expedited by rolling; and it ſhould be obſerved, that it is much better to be obliged to lower thoſe parts to their proper level before the materials are laid on, than to be under the neceſſity of making up any of them at the time. And further, that where the hill is of a conſiderable height above the road, a good deal of water will ſometimes come down. In this caſe it is in general better to intercept that water at ſome little diſtance from the ſide of the road, than to allow it to run down the face of the bank. If allowed to run down this face, it will very ſoon moulder it away, eſpecially in froſty weather, and will always choak up any drain that may be made, whether covered or open; for if covered, the earth that moulders down will in a ſhort time become ſo cloſe, that water will not get through it to the drain before it runs off upon the road; and if open, it would be extremely difficult and troubleſome to keep it clear. In this caſe, by intercepting it about four or ſix feet from the brink, and conducting it away to the moſt convenient outlet, it would be much eaſier to keep the road dry. If the face of the bank be irregular, the water may ſtill be conducted away, by making the drain recede from the brink at ſuch places, and keeping the courſe always at a proper level, or it might, he ſuppoſes, be let off at every hollow place by ſmall receſſes faced up with ſtone, or by wooden ſpouts ſunk upright in the bank at every ſuch hollow; to conduct the water from the upper drain to a croſs covered drain below the road, by which it may be carried away at the lower ſide, without any injury being done to the road. And it is adviſed, that in the forming and making of theſe, as well as all other roads, the preventing of any water running on them, except what falls from the clouds, ſhould carefully be attended to. Where this cannot eaſily be done, and where it is neceſſary to allow a ſtream to run along the ſide of a road, the drains or ditches which, as before obſerved, ſhould be withinſide the fences, ſhould be made of a proper ſize accordingly, as the ſmall drains filled with ſand or gravel, as already recommended, are only meant for ſuch roads as can have no extra water coming upon them in this way.

But in reſpect to *private* roads, the nature and manner of laying them out has been already noticed. And in reſpect to the method of forming them, Mr. Marſhall ſays, it is the ſame where ſtrong coheſive binding materials are made uſe of, whether in a lane, or acroſs open ground. The mode he adviſes is to form a receptacle for ſuch hard materials, twelve or more inches deep; either by digging to this depth beneath the natural ſurface, and carrying off the excavated ſoil; or to half the depth, diſpoſing of the ſoil raiſed in the operation on each ſide of the receptacle; ſo as to elevate the general ſurface of the road above that of the adjacent ground. And in this receptacle depoſit the materials; leaving the ſurface either in a convex or a ſemi-convex form, as the turn of the ſurface of the ground to be travelled over may direct: the margin or margins of the road, at which the rain-water is to be collected, being left a few inches beneath the adjoining ſward. But that in forming roads of every deſcription with ſand, looſe gravel, or other incoheſive abſorbent materials, which imbibe the rain-waters that fall on them, a receptacle of that kind is altogether improper. Such materials ought to be laid on a level or an elevated ſurface; and a ſhallow drain to be open on either ſide, for the abſorbent waters to filter into; thus preventing a ſurcharge, and freeing the ſurface entirely from collected moiſture, which would be highly injurious to it. And it is here added, that the ſurface of a road which is formed of well-broken ſtones, binding gravel, or other firmly coheſive materials, and which is much uſed, preſently becomes repellent of the water which falls upon it; no matter as to the baſis on which they are depoſited; provided it is ſound and firm enough to ſupport them. And that where the ſituation is low and the land of a moiſt retentive nature, a deep drain on one or on each ſide may be proper to give due firmneſs and ſtability to the baſe. Such drain, however, is not to be ſunk cloſe along the margin of the hard materials, to deter horſemen and carriage-drivers from coming near it, but a few feet diſtant from it; ſo that every inch of the hard road may be uſed with equal pleaſure and ſafety, and a commodious driving and walking path be formed between the road and the drain; proper channels being cut acroſs it, in order that it may be kept properly dry. And further that in a dry ſituation, as acroſs a gravelly or ſtony height, little more is frequently required than to remove the ſurface mould, and lay bare the rock or the bed of gravel beneath it; and then to give the indurate baſe a round or a ſhelving form, as the lying of the ground may require. In this way a travellable road may be made, and kept up at one-tenth of the expence incurred by the ordinary practice in this caſe; which is to gather up the ſurface ſoil into a ridge, and on this ſoft ſpongy bed to lay coat after coat of ſome hard materials, fetched perhaps from a diſtance! at much expence for the purpoſe.

But in addition to the above ſorts of roads there are ſtill others, which require ſome art to form and keep them up in particular ſituations; theſe have the denomination of carriage and horſe-tracks, and are deſcribed under theſe different heads.

Methods of Repairing Roads.—It is noticed by the author of the "Landed Property of England," that this is a buſineſs that incurs a heavy expence on landed property, and of courſe requires the peculiar attention of the proprietors and managers of land. And in the paper mentioned above it is obſerved, that where the funds of the pariſh will admit, which would generally be a ſaving, that proper perſons ſhould be appointed in them, or have the charge of a certain extent of road to ſee where any part is giving way or getting out of order, and to direct their immediate repairs. Alſo to take care that no water ſtands in the hollows or ruts upon them. And, that the ſummer ſeaſon is the beſt not only for making, but for repairing roads, nor ought they on any account to be touched in winter, unleſs to give a temporary aid to ſome ſudden breach that is perhaps almoſt impaſſable, or to let off any ſtanding water. Yet nothing is more common than to ſee a number of labourers employed on the highways in winter, when the days are ſhort, and but a few hours labour can be obtained of them. Indeed ſo little attention is there often paid to repairing the highways, that ſometimes old infirm people are employed for the purpoſe, as if repairing roads were a ſort of trifling bye job, merely for the employment of paupers, or lame, miſerable objects, who can get no other means of ſubſiſtence. And Mr.

Marſhall thinks, that in this ſort of work, the beſt ſervice of the ſurveyor is to keep their ſurfaces ſmooth and even; ſo that rain-water may find a free and ready paſſage to its proper drain. Ruts and hollow parts are to be filled up, level, or even with the general ſurface, as often as they are formed, and perfectly free from water. This attention is more eſpecially requiſite to a new made road, whoſe bed and foundation are not yet fully confirmed. But in every caſe, and at all times, a ſolicitous regard is due to this moſt important, yet moſt neglected part of road ſurveying. Much expence of materials and labour may thereby be ſaved, and the great end of road-making be fully obtained: namely, that of rendering the road in all ſeaſons eaſy, ſafe, and pleaſant to the traveller, as well as eaſy in the conveyance of all ſorts of articles. Beſides, he conceives, that in this operation, as well as that of making new roads, very much depends on breaking the materials *evenly*. For, by doing this, the wear of the road becomes regular. Where the heads of large ſtones riſe above the general ſurface, they become obſtacles to carriages, and ſtumbling blocks to horſes; beſide their tending, by the jolting motion which they give to carriages, to indent the ſurface on either ſide of them, and thus to increaſe the roughneſs, and haſten the decay of the road. It is added, that by the law of gravitation and the action of wheel-carriages, a pit or hollow place in the ſurface of a road is made deeper every time the wheel of a carriage paſſes through it. The periphery of the wheel acts as a chiſſel, and in falling into the hollow receives an impetus or acquired force in addition to the actual weight it is loaded with; and, in addition to this, an undue proportion of the general load is, by placing it out of its upright poſture, taken from the upper and thrown upon the lower wheel. Likewiſe hard protuberances, beſide being dangerous or diſagreeable to travellers, whether on horſeback or in carriages, are injurious to a road, as being the cauſes of pits and hollow places in its ſurface. Every hard protuberance, as the point of a ſtone ſtanding above the general ſurface of the road, or a large ſtone lying loofe upon it, is productive of four impreſſions: namely, two, by throwing additional weight upon the oppoſite wheels (going both ways), and two more by the impetus or acquired force of the wheels (paſſing both ways) in falling on the ſurface of the road. He therefore conſiders it to be the firſt duty of the ſurveyor, not only to fill up the ruts and hollows, from time to time, but to pick out or to cruſh with a heavy hammer the ſtones, whoſe tops riſe above the general ſurface; as well as to gather off thoſe which lie loofe upon the road; the latter being an operation that is readily performed, yet frequently neglected, and in ſome places to a ſhameful degree, eſpecially in the northern parts of the iſland.

And in reſpect to the ſizes moſt proper for road-ſtones it requires much latitude. Not only the intended uſe of the road, but the nature of the material is to be conſidered. A road for broad-wheeled carriages of burden, only, may be made of larger ſtones than one for narrow wheels. And hard ſtones require to be broken ſmaller than thoſe which more readily wear down, and form a travellable ſurface. For when once the ſurface of the materials becomes united and cemented together, and its rock-like texture eſtabliſhed, the ſtones that are cruſhed, and the ſmaller fragments which are ſplintered on, in wear, ſerve, he ſuppoſes, to incruſt and bind together the ſtratum of ſtones which lie next, in ſucceſſion, beneath: eſpecially if proper attention be paid to the irregularities of wear, and to bring back the ſurface, wherever it is requiſite, to its original evenneſs of convexity where that form is adopted:—ſo that it may, in every part, act as an arch, and may be able to reſiſt, with the greateſt firmneſs, the weight with which it may be impreſſed. It is, however, to be obſerved, that, in forming and repairing roads with ſtones of ſize, a conſiderable ſhare of the expence ariſes from the labour of reducing the materials; and, in conſequence, the ſmaller they are broken the greater becomes the expence. This, on ordinary occaſions, is a ſerious conſideration. Hence, in conſtructing and repairing common roads, it is adviſable, inſtead of reducing the ſurface ſtones to ſmall fragments with the hammer at a great coſt, to cover them with materials that are already reduced; as the rubbiſh of ſtone quarries, ſoft ſtones, or gravel, or the ſcrapings of the road to be repaired. Such cementing materials being waſhed and worked down by rains, and the action of carriages, and the feet of travelling animals, among the ſurface ſtones, aſſiſt much in binding and fixing them in a firm cruſt; and in making the road immediately paſſable by horſes and light carriages; moſt particularly if the whole be compreſſed, and united together with a heavy roller (ſuitable to the purpoſe), repeatedly paſſed over the ſurface of it. And another good method of ſaving expence in this way, where materials are readily procured, is that of placing the coarſe unbroken ſtones or other hard materials in the bottom part or bed of the road, covering them over with gravel, or other ſorts of materials that are of a ſmall kind. However, where the hard materials are broken down ſmall and evenly the roads are found to wear the beſt.

The proper materials for repairing roads are in a great meaſure the ſame as thoſe which are uſed for the making of them in the firſt inſtance. The writer of the Agricultural Report of Middleſex thinks the rounded ſtony materials of the nature of flint, found in gravel pits and river bottoms, are in every reſpect more fit for roads than any other flinty matters. The materials for the ſupport of great public roads ſhould, it is ſuppoſed, be ſelected from among ſuch ſtony ſubſtances as are tough as well as hard; for this purpoſe, hornblende is believed to be particularly ſuitable, to which may be added whinſtone, baſalts, iron-ore, and all ſuch ſtones as contain iron, as well as the ſlag, or the refuſe of furnaces. The comparative weight which ſtones of ſimilar ſize and figure can ſupport without being broken, is, it is imagined, the criterion by which to try them for this uſe.

Mr. Beatſon thinks, that if the above directions were ſtrictly attended to, and every appearance of a breach or defect in a road at once repaired, the ſame materials, when diſplaced, would very often, if properly relaid, and fit for the purpoſe, repair the part beginning to fail; whereas, if neglected for ſome time, and allowed to get much out of repair, it will probably require a conſiderable additional quantity of materials, and thereby occaſion a great deal of expence that might have been ſaved. He alſo ſuggeſts, that during the time of hard froſt, it may be very proper to drive materials, and lay them down for the purpoſe of being at hand to repair the roads when the ſeaſon permits, but ſuch a time is the moſt improper of any for applying thoſe materials. And that in laying them down it is a very general practice to place them in ſmall heaps along the ſides of the road, and even encroaching ſometimes very much upon the ſpace allotted for travelling on. This ought on no account to be allowed (unleſs thoſe materials are to be immediately uſed), for reaſons ſo obvious, it is unneceſſary to mention them. It would be much better to have receſſes at certain convenient places, for the purpoſe of laying the materials in till wanted; by which means the inconveniencies attending the common way would be totally avoided;

avoided; and travellers might then, without interruption, uſe any part of the road they found beſt; and beſides, there would then be leſs occaſion for making the roads ſo wide as they are generally made, which would undoubtedly ſave a great deal of money in keeping them in repair, or proper condition.

It is ſtated, that rolling of roads with a heavy roller, as directed above, would be a very beneficial practice in keeping them in good repair, eſpecially if the hard materials, that are worked out of place by the wheels of carriages, are raked in again previous to the roller paſſing over them. This would be an eaſy and expeditious operation, and if taken in proper time, would, in many caſes, be all that is neceſſary to put the road in repair. It is, however, an implement that is very ſeldom made uſe of for this purpoſe by the overlookers of roads.

And the uſe of machinery has probably been hitherto too little attended to in the execution of this ſort of work; but from the increaſing price of hand-labour, it certainly at preſent demands the ſerious notice of the managers of this ſort of buſineſs. For dragging over roads, when much out of repair, in order to replace the ſtones or gravel diſturbed by wheel-carriages, a ſort of harrow has been invented by Mr. Harriott of Great Stanbridge, in Eſſex, for which he received a premium from the Society for the Encouragement of Arts, &c. and of which he gives the following account. "Being appointed ſurveyor of the roads at Michaelmas, 1786, and finding them very bad, I provided a ſufficient quantity of ſtones and gravel againſt the next ſummer, to cover the roads pretty thick; but when ſo done, I found the heavy loads of chalk, gravel, and corn, ſoon turned the ſtones out, and made almoſt as deep a rut or rake as ever. Stubbing the quarters in I found an endleſs job, as well as a great expence; I, therefore, contrived the road-harrow, and by the help of which I have, during the laſt ſummer, at a very trifling expence to the pariſh (after the ruts were again filled up with ſtones), kept the roads in extraordinary good condition. A man, a boy, and two horſes will do three miles in length in one day, completely harrowing down the quarters, and drawing the ſtones together, which, by means of the mould-boards, are dropped into the ruts, far better than a man can ſtub them in. Now, if a man was employed to ſtub, he could not do it for leſs than a penny *per* rod, of ſixteen feet and a half, (the moſt common is three halfpence, or two-pence *per* rod, if they ſtub the outſide as well as the inſide quarter,) which would amount to one pound ſix ſhillings and eight-pence for one mile in length, conſequently to four pounds for three miles, which the road-harrow will do in one day; and for which I charge the pariſh for man, boy, and horſes, only eight ſhillings." And it is further ſtated by him, that it does the work better, as well as cheaper; that ſeveral other pariſhes are uſing them, and he thinks the uſe of them will ſoon become general, eſpecially where roads are mended with gravel. The head of the harrow is three feet long, from outſide to outſide of the bars. The bars four inches ſquare, and the length of them five feet. The mould-boards extend eleven inches farther, which is neceſſary to draw the ſtones (which the teeth of the harrow work up to the top) nearer the middle of the road. The mould-boards are four feet two inches long, ten inches deep, and two inches thick; they are ſhod with a bar of iron, and lined about ſix inches high with an iron plate. The teeth (which ſhould be ſteeled at the points) are one foot in length, from the under ſide of the bars to their points; they are one inch and a quarter ſquare, and are fixed with ſtrong nuts and ſcrews, with collars both on the under and upper ſide of the bars. The bars are made to go lengthwiſe inſtead of acroſs, to prevent them from ſplitting. The harrow is drawn by two horſes abreaſt, a boy leads the outſide horſe on the outer quarter, the other horſe goes on the horſe-path, the man ſteadying the harrow by the handles. Of courſe they take one inſide, and one outſide quarter as they go, and the other two quarters as they come back. And as this harrow is certified, by ſeveral people in the pariſh where it is uſed, to do more work with one man, a boy, and two horſes, in one day, and in a much better manner than could be effected by twenty men in the ſame time in the uſual way, it muſt certainly produce a prodigious ſaving both of time and money, and having been found to anſwer the purpoſe ſo extremely well, renders it worthy of attention by thoſe engaged in this kind of work.

Mr. Beatſon ſuggeſts, that after the uſe of this harrow, the heavy roller, noticed already, would have a very good effect, or there might be a roller of a lighter conſtruction faſtened behind the harrow, to roll at the ſame time; although the heavy roller would certainly make the beſt work. And likewiſe that other implements, nearly on the ſame principle, have been conſtructed, particularly one of which he was ſhewn a model by a gentleman near Cheſter. Its ſhape is in form of an iſoſceles triangle, which is laid upon the road, and drawn by ſhafts at the baſe. The two ſides, by meeting in an angle oppoſite the baſe, are ſuppoſed to draw the looſe materials towards the middle of the road. It has two ſmall wheels near the baſe or front, and one at the angle in the rear, with different contrivances for fixing the whole frame higher or lower as required.

It is alſo ſuggeſted that a machine for the more eaſily breaking ſtones to repair roads in the common way would be of very great uſe, as at preſent this is a tedious and laborious taſk. Under the article MACHINE, a very ingenious contrivance for removing the mud and dirt from roads has been deſcribed. But, although ſeveral contrivances have at different times been propoſed for facilitating the repair of roads, and leſſening the expence, yet that expence, Mr. Beatſon ſays, is no doubt very great, eſpecially in thoſe places where many heavy-loaded carriages are continually paſſing. The ruts made by the wheels ſoon become ſo deep, and the materials of the road are thereby ſo much torn up, that it is almoſt an impoſſibility, however hard the materials, to keep the road for any conſiderable time in proper condition, or ſtate of repair. It is, therefore, ſuggeſted, that theſe effects ſhould be attempted to be remedied by ſome means or other, as by a ſort of roller ſo fixed as to prevent the wheels from ſinking ſo as to form ruts.

It is evident that the principles and directions which have been given apply equally to private or parochial roads, which in general are in a worſe condition, from their being commonly worſe managed. The cauſes of their being in bad condition ſhould be attended to and removed, as much as poſſible, in the manner already ſuggeſted, as it is evident that they muſt have a great effect in promoting improvements in agriculture, by leſſening the expence of labour, and facilitating the means of conveyance of different articles. The effects of ſome ſorts of wheels have been more deſtructive to roads than others, and of courſe acts of parliament have been formed with the view of affording proper regulations in this reſpect. See WHEEL and WAGGON.

In ſpeaking of the draft from friction on the roads, Mr. Middleton, after conſidering what happens on thoſe made with gravel, and on iron railways, concludes, that, on gravelled roads, friction is not more than one-fifth part of the entire draft; the other four-fifths being occaſioned by

the obſtacles of duſt, ſludge, looſe ſand and gravel. Hence it follows, he thinks, that by removing theſe obſtructing cauſes, and keeping the roads conſtantly clean and hard, the draft would be ſo much leſſened, as to render the preſent number of labouring horſes unneceſſary. It is ſuggeſted, that many of theſe inconveniencies may be got rid of; and the roads be in the way of getting more dry, clean, and hard, by removing the offending matter while in the ſtate of duſt, when it occupies the leaſt poſſible ſpace, and is in the moſt favourable condition for being taken away. A ſmall portion of duſt, it is ſaid, when drenched with rain, becomes a large quantity of ſludge, in which ſtate it requires much labour to clear it away; on which account it is very advantageous to get quit of it before rain falls. This is, it is ſuppoſed, beſt effected by means of buſh-harrows wrought every windy day. But ſome might be taken away after being ſcraped together by ſuitable machinery for the purpoſe.

It is intimated, that the time ſeems to be approaching, when iron muſt be made to contribute largely towards the public roads. It is thought that iron rails, or bars, may be laid along the preſent turnpike roads, in ſuch a manner as to afford the moſt convenient track for all heavily laden carriages; and that this may be done without any material inconvenience to thoſe of lighter weight and ſwifter ſpeed. The great original expence of making ſuch roads will, it is ſuppoſed, be ſufficiently counterbalanced by their much longer duration, and the trouble fully compenſated by the ſuperior pleaſure of travelling over them.

On the whole, it is ſuppoſed, that the keeping of roads in the moſt perfect repair is an object of high importance; for that until canals, or inland navigation, became general, the ſupply of the markets, and the price of every article, will be in proportion to the ſtate of the roads over which they have to paſs in their way to towns. Bad roads, it is ſaid, require a greater number of horſes to draw any given weight along them, than would be neceſſary for the conveyance of the ſame weight over good ones; which extra draft muſt be paid for by increaſing the price of the article to the conſumer. The ſame number of horſes which, along *bad roads*, could only bring a ſcanty ſupply of the produce of the country from a ſmall diſtance, can, on *good roads*, convey a more abundant ſupply, and from greater diſtances: which is calculated to lower the price of the neceſſaries of life in the metropolis and other large towns, rather than *advance* them in the diſtant counties, and have a happy tendency towards *equalizing* the prices between the towns and the country.

And the author of the paper already noticed, thinks it a matter of great conſequence to have proper regard to the nature of the fences on the ſides of roads, as on theſe the goodneſs of them, and the expence of upholding them, very much depend. Where the form of the ground and ſituation will admit of it, the ſunk fence from the road, that is, with the deepeſt part towards the field, is by far the beſt. A fence of this ſort, in the form of a ditch or drain, may be made of any depth without the leaſt danger or inconvenience, which is not the caſe when open to the road; and the deeper it is made, the better effect it will have in keeping dry the foundation of the road, if properly conſtructed; nor will the road require to be ſo wide as uſual, at the ſame time there will be fully more room to travel on; for if the fences are of this kind, the whole width of the road may with ſafety be occupied, but when open to the road a conſiderable ſpace is loſt, by the fear or danger of approaching too near them. And the fences on the ſides may either be of ſtone, ſod, or a hedge or paling; but ought not to be more than eighteen inches, or two feet above the level of the road (except a paling), and the top of them, if broad enough, may, in ſome places, be made to ſerve as a foot-path. Nevertheleſs, the fence towards the field may be ſix feet in height, or as high as the purpoſe of it requires. The road will thus receive the whole benefit of the ſun, which is very eſſential towards keeping it dry, as well as the depth of the drains or ditches withinſide the field, to which there muſt be proper openings at certain diſtances, as before recommended; and in winter, after heavy falls of ſnow, there will be little chance of a road fenced in this manner ever being blocked up, for it will be obſerved, when a ſtorm of ſnow is attended with a high wind, that the drifted ſnow lodges chiefly about the fences, or where it meets with an obſtacle to occaſion an *eddy*; for where high fences are on the ſides of roads, they are almoſt to a certainty in ſuch caſes blocked up, to the great inconvenience of the whole neighbouring country or diſtrict in which it happens. The planting of trees on the ſides of roads ſhould always be avoided as much as poſſible; but where rows of them are to be put in, it ſhould never be done at leſs than ten or twelve feet diſtance from the fences, and not leſs than forty or fifty feet from each other, being conſtantly ſo ſituated as not to produce much ſhade on the road in the middle of the day.

Road, in *Ornamental Gardening*, that ſort of carriage-way which is peculiar to reſidences of the country kind. They are of many different ſorts, according to the nature, circumſtances, and ſituations of the different places. But when properly laid out and formed, they have moſtly one of the effects of building, at leaſt, in a partial manner, which is that of giving force and ſpirit to ſcenes of verdure and cultivation. They ſhould be laid out according to the nature of the ſituations; their directions and widths being provided by their conveniences, propriety, and utility. The methods of making and repairing of them are much the ſame as thoſe employed for other kinds of roads; but in the finiſhing, their ſurfaces ſhould be laid over with a finer and better coloured material of the gravel or ſome other ſort, and they ſhould be kept more perfectly rolled down and level; as the colours of ſuch ſurface materials and the margins of ſuch roads are principally what concerns picturesque effect, or that which is to be produced by them. In ſituations where the ſcene is avowedly of the artificial kind, the margins of them, according to the author of the work on "Country Reſidences," ſhould be parallel to each other, and correctly defined; as in that part of an approach-road, which comes within the parapet or fence which incloſes the manſion, or in thoſe roads which are within the bounds of the other more adorned parts of the ground. But in ſituations where the roads are not in theſe ſcenes, but are either in picturesque or natural pleaſure-grounds, paſture-fields, parks, foreſts, dingles, or other ſimilar places, the edges ſhould be irregular, and more or leſs rough or ſmooth, blending or ragged, as is ſeen to take place in roads or tracks through ſimilar ſcenery in wild nature. The excellent effects and ſuperior advantages which reſult from the adoption of theſe principles in the formation and conſtruction of roads of this nature, may often, it is ſaid, be ſeen in thoſe parts of much frequented approach-roads of reſidences, which are not thought proper or neceſſary to be ſubjected to the operation of the paring-iron, and the formal trimming of the gardener. And indeed, that one of the moſt ſtriking deformities in picturesque ſcenery, is that of the formal, ſtiff, and harſh edges of made roads, as they highly diſguſt the ſpectator, and prevent the true effect which ſhould be produced.

All roads of this ſort ſhould, therefore, be laid out, and formed

formed in ſuch a manner as to harmoniſe as perfectly as poſſible with the nature, circumſtances, ſituations, and ſcenery of the particular places in which they are to be had recourſe to. See WALK.

ROAD, *Approach*, that variety of this ſort of road which is peculiar to reſidences, manſions, or houſes of the country kind, and which leads or conducts to their principal or other entrances. In their manner of being laid out, they ſhould in their directions neither be too affectedly graceful, have too much waving in their appearance, be too much beſet and intercepted with trees; or be too vulgarly formed in the rectilineal and direct manner, or be too abrupt in their nature. There is a certain kind of dignity, propriety, and fitneſs requiſite in them, which is not eaſily deſcribed, but which, in given ſituations and circumſtances, readily preſents itſelf to the mind of the deſigner; and in conſequence of the whole of the operations, both of conceiving and deſigning them, being ſo ſimple, they are, for the moſt part, marked out upon the ground with great facility,—eaſily improved upon, and, in their execution, the work is merely that of road-making.

The accompanying circumſtances which appertain to roads of this nature have been already pointed out in ſpeaking of them in general, and they ought to be well attended to, as much of their beauty and effect ariſe from them.

The only proper approach-roads to caſtles, Mr. Loudon ſays, have been ſuppoſed thoſe of the avenue kind, but that there ſeems no reaſon in nature for ſuch a rule; and the arguments drawn from antiquity are wholly inſufficient to juſtify their conſtant introduction in ſuch caſes. However, wherever they exiſt with good effect, they ſhould, it is ſaid, be carefully preſerved; and even, in ſome ſituations, avenue roads to manſions, ſtraight private roads through monotonous cultivated countries, or public roads paſſing along eminencies, may be created and formed with great advantage and effect, as is the caſe in many places. Roads of this kind ſhould always be ſo contrived as to afford the beſt effect, and to produce the greateſt harmony, which the places are capable of admitting.

ROAD, *Drive*, another deſcription of road belongingto reſidences of the rural ſort, which is chiefly deſigned to ſhew and diſplay the beauties of the places, or of the ſurrounding country, or of both at the ſame time. They are principally had recourſe to in reſidences of the more extenſive and elegant kind, being moſtly contrived without any great difficulty. The main circumſtance to be attended to in this buſineſs, is that of only ſhewing one ſort of rural character at one time, but to diſplay the whole, in ſucceſſion, as much as poſſible. They are commonly formed, as to the road part, without much labour or trouble, being often ſimply made by levelling, and the materials upon the ſpot; they may, however, be conſtructed in the ſame manner as the other roads in ſuch ſituations.

The leading, or ſtriking characters of the ſpot, are here to be particularly regarded.

ROAD-*Gage*, a contrivance for the purpoſe of breaking road ſtones, or other hard materials, by. A ring, or an oval, of iron, of the proper ſize for the intended uſe, with a ſhort handle fixed to it, will anſwer this intention very well. Theſe gages are of great uſe in breaking ſtones by the load, or in other ways, before they are laid upon roads; and ſhould always be known to the workmen previous to their undertaking the buſineſs. See ROAD *Stones*.

ROAD-*Harrow*, an implement of the harrow kind, contrived for the purpoſe of forcing in the ſides of the ruts. One repreſented in the Eſſex Agricultural Survey levels the ruts and combs very expeditiouſly. It was invented by Mr. Patteſon, and coſts 5*l*. See ROADS.

ROAD-*Horſe*, ſuch a one as is employed in the teams on the road, and which in general performs the moſt laborious work. Under this deſcription comes the greater part of all the horſes in conſtant uſe, as it includes carriage horſes of every kind, roadſters, and hacks. Road-horſes of every denomination are, from their conſtant hard work, entitled to a proportionable degree of care and attention with the beſt horſes in the kingdom; and ſhould undergo the uſeful part of ſtable management, that ſo much contributes to the preſervation of health in horſes of a ſuperior deſcription. Thoſe which have inceſſant labour, or which travel poſt, muſt be ſupplied with at leaſt from one to two pecks of corn a day. Large and ſtrong carriage horſes, in perpetual work, require conſiderably more, or they will become apt to loſe fleſh by frequent perſpiration. Theſe rules, however, offer only a kind of general ſtandard.

ROAD-*Materials*, all ſuch ſubſtances as are employed, or made uſe of, in the making and repairing of roads; as thoſe of ſtony matters of different kinds and qualities, various ſorts of gravel, ſand, and a variety of other articles. They ſhould, in every caſe, be reduced as much as poſſible to the ſame ſizes, as the regular wear of roads depends very much upon it. See ROAD.

ROAD-*Pick*, an uſeful implement of this kind with three points. It has much reſemblance to the common pick-axe, only differing from it in having the flat edge-like end of that tool occupied by three ſtrong tines, about ſix inches in length, and ſtanding about ſix inches in width from the outſide to the outſide of them. It thus forms a ſort of ſmall trident, which is borne on the ſhank of the implement, and ſtands about ſix or eight inches from the ſocket and handle.

It is a very convenient tool in ſtriking off the protuberances, and filling in the ruts of hard roads; as well as to level aud adjuſt the ſurface with, in forming and repairing ſtone roads. The ſingle end is likewiſe capable of being employed for letting off water from ſhallow ruts, or hollow places, as well as for many other uſes of the common pick. See PICK.

ROAD-*Plough*, an inſtrument of the plough kind, invented and made by the late Mr. Brand, an ingenious blackſmith, in the county of Eſſex, at Lawford, near Maningtree. It is formed all of iron, and repreſented in the Agricultural Survey of that diſtrict. Its length is that of a common plough, with two ſmall wheels, one before and the other behind; and the coulter part is ſtrongly ſecured.

ROAD-*Roller*, a heavy kind of iron roller, formed in three ſeparate parts, uſed for rolling down the looſe materials on roads. It is drawn by a horſe or horſes in ſhafts, ſomewhat as in the common roller. See ROADS.

ROAD *Scraping Machine*, a contrivance made for the purpoſe of cleanſing roads from dirt, &c. Theſe machines are conſtructed in ſeveral different ways, by different makers; but a very uſeful one may be ſeen under the head *Machine*; which ſee. See alſo ROAD.

ROAD-*Stones*, all kinds of ſtones, whether of the field, quarry, or other ſorts, that are employed in the forming and mending of roads. For ſome uſes of this nature, the ſtones ſhould be conſiderably reduced, even in conſtructing or repairing ordinary roads. Mr. Marſhall has ſuggeſted, that by dropping road-ſtones through circular gages of different ſizes, it will be found that, for repairing ſmall breaches, thoſe which paſs freely through a ring, $2\frac{1}{2}$ inches in diameter, may be conſidered as of a middle ſize; and that

that for new forming or fresh covering the surface of a road, none ought to exceed 4 inches; $3\frac{1}{2}$ inches being, for these purposes, the middle size: that 2 inches and 4 inches may, as a matter of general information, be set down as the extremities of size of road-stones of a middle quality, for the above purposes. See ROAD-*Gage*.

ROAD-*Surveyor*, a person who has the care and management of a road, whether in the making or repairing of it. All such persons as are employed in this way should be well acquainted with the nature of laying out, forming, and keeping them in order. Each of the different methods, which are in common practice, ought to be well understood, as well as those had recourse to in particular districts or places. And, besides, he should be well informed with regard to every thing of a local nature that has any relation to them, and be a man of exertion and ingenuity.

ROAD-*Team*, any sort of team that is employed on the road, whether in carts, waggons, or other kinds of carriages. All teams of this nature should in general be well kept. See TEAM.

ROAD-*Work*, all such kind of work as is done upon the road, either by the labour of men or animals. It is also sometimes applied to the business of making and repairing of roads.

ROAD, in *Navigation*, denotes a place of anchorage at some distance from shore, and sheltered from the winds, where vessels usually moor to wait for a wind or tide proper to carry them into harbour, or to set sail.

When the bottom is clear of rocks, and the hold firm, and the place well covered from the wind, the road is said to be good. An open road is one which has but little land on any side.

The roads within his majesty's dominions are free to all merchant vessels, either of his subjects or allies. Captains and masters of ships who are forced by storms, &c. to cut their cables, and leave their anchors in the roads, are obliged to fix up marks or buoys, on pain of forfeiture of their anchors, &c.

The masters of ships, coming to moor in a road, must cast anchor at such a distance as that the cables, &c. may not mix, on pain of answering the damages. When there are several vessels in the same road, the outermost to the seaward is obliged to keep a light in his lantern in the night-time, to apprise vessels coming in from sea. See PORT.

ROAD *Aqueduct*, is an arch under a canal, through which a road passes.

ROAD *Bridge*, a bridge over a canal for the use of a road, instead of private use. See OCCUPATION *Bridges*.

ROAD, *Cock*. See COCKROAD.

ROAD-*Goose*, in *Zoology*, the name of a small species of wild goose. See *Anser* under DUCK.

ROADER, a vessel riding at anchor in a road, bay, or river.

ROADING, a term used on the Fen rivers, for cutting off the weeds at their bottom.

ROADING, in *Agriculture*, a provincial term used to signify the striving of teams for the lead on the roads. It was formerly much in use in Norfolk, but is at present nearly laid aside, probably from the danger that attended it.

ROADSTER, among *Horses*, a term frequently applied to such as are used for the purpose of riding.

ROAITHA, or ROUAITHA, in *Geography*, a town of Arabia, in Yemen; 56 miles S. of Medina.

ROAK, a provincial word, signifying a mist or fog.

ROAN, in *Geography*, a small island in the North sea, near the north of Scotland. N. lat. 58° 35′. W. long. 4° 11′.

ROAN, in the *Manege*. A roan horse is one of a bay, sorrel, or black colour, with grey or white spots intersperced very thick. When this party-coloured coat is accompanied with a black head and black extremities, he is called a roan with a black-a-moor's head; and if the same mixture is predominant upon a deep sorrel, it is called claret-roan.

ROANCARRICK ROCKS, in *Geography*, rocks in Bantry bay, on the S. coast of Ireland; 3 miles N.E. of Beat island.

ROANE, a county of America, in the district of East Tennessee, containing 5581 inhabitants.

ROANE-*Tree*, in *Botany*. See SERVICE-*Tree*.

ROANNE, in *Geography*, a town of France, and principal place of a district, in the department of the Loire, which here becomes navigable, and renders it a convenient staple for all goods conveyed from Lyons to Paris, Orleans, Nantes, &c. The place contains 6992, and the canton 14,790 inhabitants, on a territory of 225 kiliometres, in 13 communes. N. lat. 46° 2′. E. long. 4° 10′.

ROANOKE, an island in the Atlantic, on the coast of North Carolina, at the entrance into Albemarle sound, with a town of the same name. The north point of the island is about 7 miles W. of Roanoke inlet. N. lat. 35° 50′. W. long. 76°.—Also, a long and rapid river, formed by two principal branches, *viz.* Staunton, which rises in Virginia, and Dan, which rises in North Carolina. It empties itself into Albemarle sound, about N. lat. 35° 58′. W. long. 76° 56′. This river is navigable for sea-vessels nearly 30 miles; but for boats of 30 or 40 tons, to the falls. Above the falls, boats of 5 tons ascend about 200 miles. The planters on the banks of this river are supposed to be the wealthiest in North Carolina.

ROANOKE, *Little*, a river which discharges itself into the Staunton, about 15 miles above the junction of the Dan and Staunton.

ROANOKE *Inlet*, a channel on the coast of North Carolina, which leads into Albemarle sound. N. lat. 35° 56′. W. long. 76° 14′.

ROANPOUR, a town of Bengal; 17 miles S.S.E. of Mauldah.

ROARAGUR, a town of Hindoostan, in Visiapour; 22 miles N. of Sottarah.

ROARING BULL *Island*, an island in the North Atlantic ocean, near the east coast of Nova Scotia. N. lat. 45° 17′. W. long. 60° 44′.

ROARING *River*, a river of America, in the state of Tennessee, which runs N.W. into Cumberland river, 12 miles S.W. of the mouth of Obas river.

ROARING *Water Bay*, a bay on the S. coast of Ireland, in which is a number of small islands; 6 miles S.W. of Skibbereen. N. lat. 51° 28′. W. long. 9° 22′.

ROARING *Water*, a river of Ireland, which runs into the fore-mentioned bay, 5 miles W.S.W. of Skibbereen.

ROASCHIA, a town of France, in the department of the Stura; 8 miles S.W. of Coni.

ROASTING, in *Metallurgy* and *Chemical Manufacture*, is a process by which the volatile parts of metals and minerals are separated by the application of heat. The minerals are generally mixed with the fuel, and fired in heaps exposed to the open air. When the volatile substance is driven off with difficulty, the reverberatory furnace is sometimes employed.

This process is frequently, though improperly, called *calcining*, since the latter is confined to the oxydation of metals.

metals. In expelling the volatile parts from lime-ſtone and gypſum, the proceſs is termed *burning*, and in the latter ſometimes *boiling*. The term roaſting is principally confined to iron, and other ores abounding with ſulphur and arſenic.

The iron ores of this country are roaſted for the purpoſe of expelling ſulphur, water, and carbonic acid. The former would probably injure the quality of the iron in ſmelting; the latter would contribute to an expenditure of the heat of the furnace. The proceſs is conducted in the open air, by piling the iron-ſtone and ſmall coal in alternate ſtrata, allowing the maſs to burn till the coal is conſumed. The iron-ſtone, by this means, becomes of a red colour, and loſes much of its weight. In ſome iron-works the proceſs is performed in kilns, ſimilar to thoſe employed for burning lime-ſtone.

The ore from which zinc is obtained is generally blende, which is the ſulphuret of that metal. It is expoſed to the ſtrong heat of a reverberatory furnace, by which the ſulphur is expelled, and the metal oxydated.

When the metals or their oxyds are themſelves volatile, and are combined with ſulphur, roaſting is not practicable: recourſe muſt then be had to ſome other agent, which will combine with the ſulphur, and ſeparate the metal itſelf. Such is the caſe with *cinnabar* and *arſenic*. See the reſpective metals.

ROASTING, in *Domeſtic Economy*. When that change by heat which animal food undergoes to render it fit for digeſtion is brought about by a temperature capable of partially changing the ſurface, the proceſs has been termed roaſting; a ſimilar change in vegetable food, ſuch as bread, puddings, and pies, being termed baking. The moſt ancient method of roaſting, which is ſtill the general practice, is by turning the meat before the fire; and it is ſtill ſuppoſed, without any good reaſon, that meat cannot have its proper flavour when roaſted in any other way. It is true that *roaſters* or *ovens* of the common conſtruction are apt to give the meat a diſagreeable flavour, ariſing from the empyreumatic oil which is formed by the decompoſition of the fat, expoſed to the bottom of the oven. This evil has been completely remedied in two ways, firſt by providing againſt the evil of allowing the fat to burn, and ſecondly by carrying off by a ſtrong current of heated air the empyreumatic vapours.

The roaſter uſed in the Derby Infirmary, and in many private houſes in the neighbourhood, is not on any account objectionable, but it is particularly valuable in an economical point of view. This is principally effected by caſting the heat entirely upon the object of roaſting, inſtead of ſending three-fourths of the heat up a capacious chimney, and expending the greateſt part of the remainder upon the cook, and the walls and furniture of the kitchen.

The roaſter above alluded to is made of ſheet iron, of the ſtrength of about one pound to the ſquare foot: its form is that of a parallelepipedon, about twenty-five inches high, twenty-two long, and eighteen in breadth. The fire is put under it; but one courſe of bricks is placed immediately over the fire, and above this a cavity of five inches deep between the brick roof and the oven bottom. The flame of the fire paſſes a little to the right and left, and riſes perpendicularly up the ſides of the roaſter, freely communicating with the top of the ſame. By this means the flame and hot vapour will be the hotteſt at the top of the oven, becauſe of its greater levity, and its not being allowed to eſcape at this point, according to the common practice. After the hot vapour has beſtowed its heat on the ſuperior part, it now deſcends and enters on each ſide the cavity under the oven, from whence it paſſes up the back of the ſame, which back forms one ſide of the ſmoke chimney. This arrangement is ſufficient for diſtributing all the diſpoſable heat equally on every ſide of the roaſter. We ſhall next point out the contrivance for diſpoſing of the ſmell above alluded to. The door of the oven is caſed with wood, a piece of thick paper, ſteeped in a ſolution of alum, and ſmeared with clay, being placed between the wood and the iron, to prevent the wood from being charred. The door extends below the bottom of the oven about three inches. This, when the door is open, expoſes a plate three inches deep, and the width of the oven, and which conſtitutes the front of the cavity under the oven. At one ſide of this plate is a hole at the entrance of the tube, which extends to the other end of the cavity, where it is bent, and returns on the other ſide of the cavity, and opens into another cavity formed by a double plate, which conſtitutes the iron part of the door. The firſt entrance of this tube correſponds with an opening at the bottom of the door, ſo that when the door is ſhut, cold air can enter the tube. In its paſſage it becomes heated, and then enters the oven at the top, from the cavity in the door. It now paſſes over the meat, and eſcapes through a tube in the back plate, which extends ſo high as to reach above the ſmoke damper. By this means the roaſter is conſtantly cleared of any diſagreeable vapour, by a force equal to the draft of the chimney.

A ſliding rake is made, ſo as to fit the top and ſides of the oven, that the whole ſurface becomes perfectly ſcraped by one motion.

ROATO, in *Geography*, a town of France, in the department of the Tanaro; ten miles N.W. of Aſti.

ROB, in *Pharmacy*, the inſpiſſated juice of any ſubſtance, uſually boiled up to the conſiſtence of honey.

There are robs made of quinces, ſloes, cherries, mulberries, elderberries, barberries, gooſeberries, and other fruits, for various diſeaſes. The juice of grapes, thus prepared, is more particularly called rob, or *ſapa ſimplex*; this is almoſt of the conſiſtence of honey.

When only one-third of the humidity is boiled away, it is called *defrutum*; and when only boiled to the conſiſtence of a ſoft electuary, a *reſin*.

The word *rob* is pure Arabic; and ſignifies originally a juice dried in the ſun, or over the fire, that it may keep the longer without damage.

Sometimes it alſo denotes a compoſition of ſome juice made up with honey or ſugar, in which ſenſe it is confounded with loche or lohoc.

The rob is a form now much out of uſe, though there are ſeveral directed in the college diſpenſatory; as robs of black cherries, of ſloes, of quinces, of elder, &c.

It is poſſible that great improvements might be made, by introducing the uſe of this form among the malt-diſtillers. The great inconvenience attending that art being, that the malt being of a large bulk, in proportion to its ſaccharine part, and requiring a larger proportion of water to extract that ſaccharine part, many large veſſels, ſuch as maſh-tubs, coolers, fermenting backs, &c. are neceſſary; and the neceſſary labour on the ſubject is increaſed, and the commodity rendered dearer. The remedy of this ſhould ſeem the introducing a new art ſubſervient to that of the malt-diſtiller, and confining itſelf to the boiling down of malt-wort to a rob, ſo as to ſupply the malt-ſtiller with his ſubject, in the ſame manner as the fine-ſtillers are ſupplied with treacle from the ſugar-baker. By this means the buſineſs of the malt-ſtiller would be reduced to a great degree of ſimplicity, and the ſpirit produced would be alſo much finer than at preſent, becauſe the ſubject would come tolerably refined to his hands, and purged of its groſs, mealy, and huſky matter, which

which yields a disagreeable oil in distillation, and is also apt to burn to the still, and spoil the spirit. It is possible that a spirit purer and finer than that from treacle might this way be procured from malt, prudently managed. Shaw's Lect. p. 219.

ROBALI, in *Geography*, a town of Abyssinia; 75 miles S. of Miné.

ROBALO, in *Ichthyology*, a name by which some have called the *camuri*.

ROBARES, in *Geography*, rocks near the S. coast of Ireland; three miles S.E. of Gally Head. N. lat. 51° 31′. W. long. 8° 50′.

ROBASOME, a town of France, in the government of the Po; eight miles N.N.W. of Turin.

ROBBEN, or SEAL, *Island*, an island on the coast of Africa, near the Cape of Good Hope, at the entrance into False bay, about six miles in circumference. It serves as a place of exile for criminals sent from the Cape or the Indies, who are compelled to labour, and are guarded by twenty-four soldiers under the command of a serjeant. No women are permitted to live upon the island. Within this island and the continent there is excellent anchorage, where ships driven out by the S.E. winds, which blow from September to the end of April, the season when all ships bound for the Cape resort to Table Bay, usually bring up. Here, too, ships intending to come into Table Bay usually wait the abatement of the S.E. wind, if it should happen to be too strong for their working up against it. This island is too small, and at too great a distance, to afford the least shelter to Table Bay in the N.W. winds that blow in the winter months. S. lat. 33° 40′. E. long. 18° 20′.

ROBBERY, ROBBERIA, or *Roberia*, in *Law*, a felonious and forcible taking away another man's goods or money, from his person, presence, or estate, by putting him in fear, &c. 1 Hawk. P. C. 95.

A mere attempt to rob was held to be felony, so late as Henry the Fourth's time (1 Hal. P. C. 532.); and afterwards it was only a misdemeanor, and punishable with fine and imprisonment, till the stat. 7 Geo. II. cap. 21. which makes it a felony, transportable for seven years, unlawfully and maliciously to assault another, with any offensive weapon or instrument, or by menaces, or by other forcible or violent manner, to demand any money or goods, with a felonious intent to rob. If the thief, having once taken a purse, returns it, still it is a robbery. The previous putting in fear is the criterion that distinguishes robbery from other larcenies; and yet this putting in fear does not imply any great degree of terror or affright in the party robbed; it is sufficient that so much force, or threatening by word or gesture, be used, as might create an apprehension of danger, or oblige a man to part with his property without or against his consent. (Fost. 128.) Thus, if a man be knocked down without previous warning, and stripped of his property while senseless, though strictly he cannot be said to be *put in fear*, yet this is undoubtedly a robbery; or, if a person with a sword drawn beg an alms, and I give it him through mistrust and apprehension of violence, this is a felonious robbery. 1 Hawk. P. C. 96.

This is sometimes also called *violent theft*, and its punishment, be the value of the thing taken ever so small, is death.

This species of larceny is debarred of the benefit of clergy by 23 Hen. VIII. cap. 1. and other subsequent statutes; not indeed in general, but only when committed in or near the king's highway. A robbery, therefore, in a distant field or foot-path, was not punished with death (1 Hal. P. C. 535.), but was open to the benefit of clergy, till the stat. 3 & 4 W. & M. cap. 9. which takes away clergy from robbery wheresoever committed.

The word is said to have taken its rise hence, that anciently robbers only took away the *robes* or clothes from travellers. Though lord Coke, in the third of his Institutes, takes the name to have had its rise from Robin Hood, who lived under Richard I. in the borders of England and Scotland, by robbery, burning houses, rape, and spoil. Hence, also,

Robbers-men, or *roberds-men*, mentioned in several statutes for great thieves.

ROBBING. See HOUSE-*Robbing*.

ROBBINS, or ROBANDS, *i. e. rope-bands*, in a *Ship*, small lines, or braided cordage, which make the upper edges of the great sails fast to their respective yards, being reeved into eyelet-holes in the head of the sail under the head-rope for that purpose. They are generally of a sufficient length to pass two or three times about the said yard. The word is, *make fast the robbins;* for at sea they do not say, *tie*, but *make fast*.

ROBE, ROBA. See GOWN.

ROBES, *Master of the*, is an officer of the household, with an appointment of 500*l.* a-year, who has the ordering of all his majesty's robes. See MASTER *of the Wardrobe*.

He has several officers under him, as a clerk of the robes, a yeoman, three grooms, a page, a brusher, furrier, sempstress, laundress, starcher, and standing wardrobe-keepers at St. James's, Windsor castle, Hampton-court, &c. There is also in the establishment of his majesty's household a mistress of the robes, with an appointment of 500*l.* a-year, and two keepers of the robes. See WARDROBE.

ROBES *to Minstrels*. Innumerable bands of tumblers, buffoons, rope-dancers, musicians, players on instruments, and actors, were formerly retained in the courts of princes, who, by their gambols, farces, sports, and songs, diverted the company. These were called in Tuscany *Giullare* and *Giocolari*, and, by those who mentioned them in Latin, *Joculares* and *Joculatores*. These fabricators of amusement never departed without being well rewarded. But what appears the most extraordinary and different from our present customs is, that the costly and gorgeous robes, which it was usual for princes to receive from other great personages who visited their courts at feasts, or upon their marriage, as marks of their friendship and respect, were bestowed on these people. Benvenuto Aliprando, an old rustic poet, in his Chronicle, describes a marriage at the great court of Mantua, in the year 1340, while under the dominion of the Gonzaga family. "At that time," says he, "the different princes and nobles of Italy, whose names he mentions, presented the Gonzaghi with a variety of rich and precious vestments, which were called *robe*, robes, and which were afterwards given to musicians and buffoons," as the old poet informs us in the following lines:

> "Tutte le robe sopra nominate,
> Furon in tutto trent' otto e trecento,
> A buffoni e sonatori donate."

> "And all these costly robes of states,
> In all three hundred thirty-eight,
> To fidlers and buffoons were given."

The family of Gonzaga, in return, reciprocally exercised munificence towards the nobles who visited them, as the same old poet informs us in the following rude verses:

> "Otto giorno la corte si durare
> Torni eri, giostri, bagordi facia,

Bellar,

Bellar, cantar', e ſonar facean fare,
Quattro cento ſonator ſi dicia
Con buffoni alla corte ſi trovoe.
Roba e danar donar lor ſi facia.
Ciaſcun molto contento ſi chiamoe, &c."

"Eight days theſe ſports were held, where valiant knights
In tilts and tournaments their proweſs ſhow,
And minſtrels, full four hundred, crown the rites,
While dance and ſong teach ev'ry heart to glow.
To theſe and each buffoon who here was found,
Or gold was given, or robes of coſtly ſort;
And all, ſo well their ſpritely arts were crown'd,
Depart contented from the ſplendid court."

With what magnificence the princes of the houſe of Viſconti ſupported their court at Milan, during the ſame century, is frequently deſcribed by Corio the hiſtorian; but he particularly excites our wonder by his account of the ſolemn pomp with which the nuptials of Lionel, duke of Clarence, ſon of Edward III. king of England, was celebrated in 1368, with Violante, the daughter of Galeazzo Viſconti, duke of Milan. This event is circumſtantially related by ſeveral other ancient hiſtorians of Italy; and Aliprando of Mantua tells us, that Lionel gave five hundred ſuperb dreſſes to the minſtrels, muſicians, and buffoons, who were then aſſembled at Milan; that Galeazzo preſented them with many more; and Bernabo, his brother, rewarded them munificently with money on the occaſion.

The ſplendid robes and gorgeous attire of bards and minſtrels at all times are upon record. The flowing veſt of Orpheus, in the triple capacity of prieſt, legiſlator, and muſician, is ſpecified by Virgil; Arion is related by Herodotus to have leaped into the ſea, in the rich veſtments he uſually wore in public; Suidas ſpeaks of the ſaffron robe and Mileſian ſlippers worn by Antigenides; and the performers in the tragic chorus, which uſed to be furniſhed at the expence of ſome wealthy citizen of Athens, wore alſo a ſplendid and coſtly uniform.

In France the *Jongleurs*, and in Provence the *Troubadours*, or minſtrels, during the middle ages, had frequent preſents of coſtly robes from their patrons. In the "Fabliau Conte," or Tale of the red Roſe, a female complains to a *vavaſſor*, or yeoman, of his having taken from her a robe, to give to the minſtrels.

"Bien doit eſtre vavaſſor vis,
Qu'il vuet devenir meneſtrier;
Miez voudroi que fuſſiez rez, (raſé)
Sans aigue (eau) la teſte & le coul,
Que ia n'y remanſiſt chevoul,
S'apartient à ces jongleours,
Et à ces autres chanteours,
Qu'ils ayent de ces chevaliers,
Les robes, car c'eſt lor meſtiers."
Fabliau de la Roſe vermeille.

"I would not own the wretch for kin,
Who wou'd the minſtrel trade purſue,
He'd better *dry* ſhave head and chin,
And, with the hair, cut off the ſkin,
Than herd with ſuch a worthleſs crew.
Let ſplendid knights with uſual pride,
On fidlers laviſh ſuch rewards,
But 'tis to meaner fools denied
To ſtrip themſelves for vagrant bards."

The cuſtom of preſenting muſicians with ſuperb and expenſive dreſſes during the 14th century, in the manner already related, ſeems to have travelled into England, and to have continued here till after the eſtabliſhment of the king's band of four-and-twenty performers; part of their preſent ſalary being ſtill paid at the wardrobe office, as an equivalent for the annual dreſs with which they uſed to be furniſhed at his majeſty's expence. To this we may add, that the *waits*, or muſicians who attend on the mayor and aldermen, in moſt of our incorporate cities and towns, are furniſhed with ſplendid cloaks.

ROBE, in *Geography*, a river of Ireland, which, riſing in the eaſtern part of the county of Mayo, flows weſtward by the town of Ballinrobe; a few miles weſt of which it diſcharges itſelf into Lough Maſk.

ROBEC, a river of France, which runs into the Seine, a little below Rouen.

ROBEK, a river of France, which runs into the Meuſe, near Stevenſwaert.—Alſo, a river of France, formed by the union of the Clarence and the Nevee, which, after a ſhort courſe, runs into the Lys, 2 miles E. of St. Venant.

ROBEK, or *Robeque*, a town of France, in the department of the Straits of Calais; 3 miles S. of St. Venant.

ROBEL, a town of the duchy of Mecklenburg; 9 miles S. of Wehrau. N. lat. 53° 10'. E. long. 12° 45'.

ROBER, a river of France, which runs into the Moſelle, at Treves.

ROBERDSMEN. See ROBBERY.

ROBERGIA, in *Botany*, received that appellation from Profeſſor Schreber, in memory of Laurence Roberg, profeſſor of phyſic in the univerſity of Upſal, who was born in 1664, and died in 1742. His moſt curious, though very compendious and ſuperficial publication, entitled *Grundvahl til Plantekjænningen*, is an anonymous introduction to botany, on Tournefort's plan, of 20 duodecimo pages, with as many rude wooden cuts of flowers, to illuſtrate the principal claſſes. Of the fifteen various inaugural diſſertations, publiſhed under the preſidency of Roberg, only two are botanical; one being that of John Olaus Rudbeck, on the *Sceptrum Carolinum* (ſee RUDBECK); and the other by Loſsberg on the Generation of Plants.—Schreb. Gen. 309. Willd. Sp. Pl. v. 1. 752. Mart. Mill. Dict. v. 4. (Rourea; Aubl. Guian. v. 1. 467. Juſſ. 369.)—Claſs and order, *Decandria Pentagynia*. Nat. Ord. *Terebintaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, roundiſh, concave ſegments, permanent. *Cor.* of five roundiſh petals, the length of the calyx. *Stam.* Filaments ten, inſerted into the receptacle, the length of the corolla; anthers roundiſh. *Piſt.* Germen ſuperior, roundiſh, villous; ſtyles five, capillary; ſtigmas rather thick, furrowed. *Peric.* Drupa ovate, moſt convex on one ſide, ſlightly hollowed out at the other. *Seed.* Nut the ſhape of the drupa, of one cell, with a bivalve ſhell.

Eſſ. Ch. Calyx in five deep ſegments. Petals five. Drupa ſuperior, of one cell. Nut with a bivalve ſhell, and ſingle kernel.

1. R. *fruteſcens*. Willd. n. 1. (Rourea fruteſcens; Aubl. Guian. v. 1. 467. t. 187.)—Native of woods in Guiana, belonging to the pariſh of Aroura, flowering in Auguſt. The *ſtem* is ſhrubby, ſupporting itſelf by branching over the neighbouring trees. *Leaves* alternate, pinnate, of three or four pair, with an odd one, of ſtalked, elliptical, pointed, entire leaflets, from an inch and a half to three inches long; ſmooth above; downy and whitiſh beneath. *Flowers* in axillary, branched panicles, white, with a ſcent ſweeter than that of lilac. *Fruit* black, with a greeniſh kernel.

ROBERT, in *Biography*, emperor of Germany, ſur-

named the *Short*, born in 1352, was count palatine at the time of the depofition of Wenceflaus; and Frederic, duke of Brunfwick, who was firft elected by the German princes to fupply the vacancy, having been affaffinated, Robert was chofen in his ftead in 1400. Wenceflaus had fold the dukedom of Milan to John Galeazzo, who had withdrawn his ftate from the fovereignty of the empire, and by force of arms had annexed to it feveral neighbouring towns and diftricts. Robert, therefore, invited by the pope and Florentines, led an army into Italy, and entered the duchy of Milan; but he was fo much haraffed, as to be obliged to march back to Germany, without having effected any thing. On his return he was involved in fome petty wars with princes and ftates, who difputed his authority; and a confederation was formed againft him, which fubfifted during the whole of his reign. The moft inveterate of his opponents was the elector of Mentz, who began to build a caftle at Hochft, in defiance of him. Robert affembled troops to reduce him to obedience; but having advanced to Oppenheim, was feized with a fever, which proved fatal to him in 1410, at the age of 58. He was a prince of more prudence than enterprize, but poffeffed qualities which would have rendered his reign happy in lefs turbulent times. He was juft, clement, and pious, an enlightened politician, and a lover of learning, as he manifefted by founding the univerfity of Heidelberg.

Robert, king of France, fon of Hugh Capet, was affociated by his father to the crown in 988, and fucceeded him in 997, being then in his 27th year, and highly efteemed for his qualities both of body and mind. He had married Bertha, daughter of Conrad, king of Burgundy, and widow of Eudes, count of Blois. As he was diftantly related to his queen, and had alfo ftood god-father to one of her children by her former hufband, his marriage was confidered as invalid by Gregory V.; the parties were commanded to quit each other, and to fubmit to feven years' penance, on pain of excommunication. The king refufing to comply with this mandate, the fentence was iffued againft him, and the greater part of his own bifhops joined in it. The effects of this excommunication are a ftriking example of the fuperftition of the age. The lords of his court broke off all intercourfe with him, and the fervants, who remained to wait upon him, fhewed their horror of his fituation by throwing to the dogs all the relics of food touched by the king or queen, and burning the veffels they had ufed. It was even reported that the queen was delivered of a monfter. At length the king gave way, and parting with Bertha, by whom he had no iffue, efpoufed Conftance, daughter of the count of Arles, a beautiful woman, but violent and capricious, who difquieted all the remainder of his life.

The death of the duke of Burgundy, the king's uncle, without lawful heirs, in 1002, caufed that rich inheritance to fall to the crown of France; and after a war carried on for fome years with another claimant, Robert obtained poffeffion of the country, with which he invefted his fecond fon, Henry. The termination of this war gave much fatisfaction to the king, who was more inclined to the arts of peace than to military exploits; and he occupied himfelf in cares for the regulation of his court and houfehold, and the cultivation of letters and religion among his people. He built and repaired many magnificent religious edifices, and merited the title of the devout. By the perfuafion of the queen, he affociated his eldeft fon, Hugh, in the government, in his 18th year. This prince, difgufted with the haughtinefs and avarice of his mother, withdrew from court, and was guilty of fome diforders; but by the mild treatment of his father, he was brought back to his duty. In 1022, Robert difplayed his attachment to orthodoxy, by caufing a council to affemble at Orleans, for the purpofe of inquiring into a herefy introduced from Italy, which had been embraced even by fome diftinguifhed ecclefiaftics. Several of the culprits were burnt alive, in the prefence of the king and queen; the latter of whom manifefted the fury of her zeal, by thrufting out an eye of one who had been her confeffor, as he was led to execution. On the death of the emperor Henry II., in 1024, an Italian party offered the imperial crown and kingdom of Italy to Robert, or his fon; but the king had too much wifdom to involve himfelf in a war on fuch a project. In 1026 he loft his eldeft fon Hugh; on which event, he affociated in the crown his next fon, Henry, notwithftanding the oppofition of Conftance, who preferred her fon Robert. He died at Melun, in 1030, or 1031, about the age of 60, after a reign of 33 years. This prince was extremely beloved by his fubjects, on account of his mildnefs, juftice, and piety.

Robert was contemporary with Guido d'Arezzo. He was a great mufician, and a good poet: he wrote feveral hymns for the church, and fet them to mufic. They have been preferved among the ecclefiaftical chants, and are ftill the moft agreeable in its fervice. Conftance, his fecond wife, preffed him to write a hymn in her praife; and he made her believe that the hymn "Conftantia Martyrum" had been written for her, and fhe was fatisfied.

Trithemius writes, that Robert made a pilgrimage to Rome, and depofited on the altar himfelf, at St. Peter's, his hymns, in the prefence of the pope.

One of his beft hymns is "Veni, Sancte Spiritus." To him is likewife afcribed "Chorus Novæ Jerufalem;" the "Profe on the Afcenfion;" "Rex omnipotens Die odierna;" "Sancti Spiritûs adfit nobis Gratiâ." Laborde.

Robert I., king of Scotland, of the family of Bruce, memorable as the reftorer of the independence of his country, was grandfon of that Robert Bruce who was the unfuccefsful competitor with John Baliol for the crown of Scotland. But the death of his father, who left him heir to his eftates and pretenfions, with that of John Baliol, whofe fon was a captive with the Englifh, infpired him with high defigns both for himfelf and his country, which was then in a ftate of fubjection to Edward; and having left the Englifh court, to which, it is faid, his purpofes had been betrayed, he arrived in Scotland about the clofe of 1305, with the refolution of declaring himfelf. The Scottifh writers mention Comyn as the perfon who had given information againft him; but whether this were the fact, or fome other caufe of quarrel rofe between them, it is certain that at an interview at Dumfries, in February 1306, Bruce with his dagger ftabbed Comyn, who was afterwards difpatched by one of his affociates. This deed of violence could be juftified only by greater daring; and Bruce immediately proceeded to feize the caftle of Dumfries, to confine the Englifh judges affembled there, to affert his claim to the crown, and to fummon all the friends of his family to his affiftance. He was foon at the head of a body of troops, with which he penetrated as far as Perth, the Englifh every where flying before him; and in March he was folemnly crowned at Scone, in prefence of fome bifhops and nobles, and a great number of gentlemen. The king of England, highly enraged at the news of thefe events, ordered all the forces of the northern counties to enter Scotland, and join the family of Comyn, in order to take vengeance on the rebel, as he was termed. The earl of Pembroke marched to Perth, where he furprifed and defeated Bruce's troops at Methven, in June, their leader himfelf efcaping with difficulty. The broken remnant of his army was again routed by lord Lorn, the

the nephew of Comyn; and Bruce, dismissing his few followers, was constrained to take refuge in an unfrequented isle of the Hebrides.

Neither friends nor foes were acquainted with the fate of Bruce, when he suddenly appeared at his estate of Carrick, at the head of a small but resolute band, with which he surprised an English lord, who had obtained a grant of that property; but on the approach of a detachment from the English army, he retreated to the Highlands. In the mean time, Edward was preparing for an expedition into Scotland with a force which was to reduce it to entire submission. He was soon after delivered from the most formidable of his foes, by the death of Edward I. near Carlisle, as he was just upon the point of entering Scotland with a great army. His son, Edward II., though he obeyed his father's dying injunction of marching into Scotland, yet pursued the war with no vigour, and soon returned to England to join his favourite Gaveston. Robert, who had reduced the western counties, left them in charge of his gallant friend, sir James Douglas, and proceeded against his enemies in the north. He afterwards made himself master of Inverness, and the northern districts; and at length, having taken the castle of Forfar and the town of Perth, he brought the whole of Scotland, except a few fortresses, to acknowledge his authority. In the beginning of 1314, there remained in Scotland only the castles of Stirling, Dunbar, and Berwick, in the hands of the English. Edward had now, after the death of Gaveston, reconciled himself with his discontented barons; and it was resolved that he should make an attempt to recover Scotland, with such a force as might overcome all resistance. At the head of the greatest army that had ever entered that country from England, he moved from Berwick in June 1314, and marched for Stirling, to relieve its castle, then besieged by Robert in person. The Scotch army, much inferior in number to the English, but composed of veteran troops, awaited the approach of the enemy on the banks of the rivulet of Bannock, in the road to Stirling. In a skirmish of cavalry preceding the engagement, Robert displayed his strength and prowess by cleaving down to the chin, with his battle-axe, an opposite commander, of the family of Bohun. This was an omen of the success of the great battle of Bannockburn, in which, through the able disposition and conduct of Robert, the Scotch obtained the most decisive victory over the English that their annals boast, and established the independence of their country. Edward himself narrowly escaped; and the number of noble prisoners was such as to enable Robert to recover, by exchange, his wife, daughter, and sister, with several men of rank, who had been the captives of Edward I. The king of Scotland followed up his success by an invasion of England, in which he ravaged the northern counties without opposition. He now thought himself strong enough to give the English government molestation in another quarter; and in 1315 he sent his brother, Edward, over with a body of troops to the north of Ireland, to assist the natives in freeing themselves from the dominion of England. Robert himself followed with a large reinforcement in 1316, but was compelled by famine to return; and his brother, after experiencing a variety of fortune, was defeated and slain in an engagement with the English near Dundalk.

The deposition and death of Edward II., in 1327, gave occasion to a breach of the truce on the part of the king of Scotland, who seems not to have considered himself as bound to the new government. In reality, however, he was tempted by the disordered state of England to renew hostilities, for which he had been some time preparing. Young Edward III. was not a prince to suffer an insult without resistance and retaliation; and learning that the Scotch under Douglas and Murray, were making dreadful ravages in Northumberland, he assembled a powerful army, and went in search of them. They, however, eluded all his attempts to bring them to action, and retired to their own country. Edward dismissed his army, and in the same year a peace was agreed upon between the two nations, by an article of which the king of England renounced all claim to superiority over the kings or kingdom of Scotland; and thus the great object of Robert's reign, the independence of his country, was finally established. At the same time, his only son David, then five years of age, was contracted to Joan, Edward's sister. Robert was now nearly worn out with the cares and fatigues of his active life; and in 1329, at his castle of Cardross, he expired, in the 54th year of his age and the 24th of his reign, leaving a name memorable in the annals of his country, which he rescued by his courage and wisdom from a foreign yoke, and restored to its rank among nations. Hume. Henry. Univ. Hist.

Robert, king of Naples, son of Charles II., by the sister of Ladislaus, king of Hungary, born in 1279, was duke of Calabria at the time of his father's death, in 1309. The succession was disputed between him and the son of his elder brother, Carobert, king of Hungary; but the college of cardinals (Naples being then considered as a fief of the holy see) decided in Robert's favour. He was crowned at Avignon, and, in gratitude to the pope, exerted himself to oppose the Ghibelline or imperial party in Italy. At this time the crown of Sicily was in possession of Frederic III. of Arragon, who, for his defence against the king of Naples, formed an alliance with the emperor. Robert was ambitious to extend his dominion, and almost the whole of his reign was spent in fruitless attempts to conquer the island of Sicily. He also, during his contests with the Imperialists, aggrandized himself in Lombardy, and for some time he held the sovereignty of great part of Romagna, Florence, Lucca, Ferrara, Genoa, and several other places in Piedmont. He was the most potent prince in Italy of his age; but it is less on account of his political and military successes that he deserves commemoration, than because he was the greatest royal proficient in science and letters, and the most munificent patron of them, in the century in which he lived. Many of the early writers give their testimony to his merits in this respect; and Petrarch, in particular, in several parts of his writings, is profuse in his praise. Robert, however, is said, when a child, to have been so slow of comprehension, that it was with the greatest difficulty he could be taught the elements of grammar; and it was not till his preceptor had interested him in Æsop's Fables, that he exhibited any fondness for learning. The private character of the king was highly amiable, and the only fault with which he is taxed was a disposition to avarice, that grew upon him with his years. He had the misfortune of losing his only son, Charles, at the age of 31, on which occasion he exclaimed that the crown was fallen from his head. He died in January 1343, in the 64th year of his age, and 34th of his reign.

Robert, Claude, a French ecclesiastic and chronologist of some celebrity, was born at Chelay, a village between Bar-sur-Seine and Tonnerre, on the borders of Burgundy, in the year 1564. From some seminary in the province just mentioned, he went to pursue his academical studies at Paris, where he obtained an exhibition in the college of Cambray. As soon as he had been admitted to the degree of licentiate in canon law, he accompanied his pupil into Burgundy, where, in 1590, he was presented to a canonry of the Chapel-au-Riche at Dijon. Afterwards he travelled with his pupil through

through France, Flanders, Germany, and Italy. At Rome he was introduced to perſons of the greateſt diſtinction, and received ſeveral marks of eſteem from the cardinals Bellarmine and Baronius. It was in this city that he firſt conceived the plan of his "Gallia Chriſtiana." He was afterwards nominated biſhop of Chalons-ſur-Saone; upon which event this prelate conferred a canonry of his cathedral upon his preceptor, and made him his archdeacon and grand vicar. The biſhop was deſirous of expreſſing his regard for our author, by collating him to other benefices; but M. Robert conſtantly refuſed any additional preferment. He diſcharged the duties of his appointments with the ſtricteſt fidelity, and died in the epiſcopal palace at Chalons in 1637, when about 73 years of age. The moſt conſiderable of his production is entitled "Gallia Chriſtiana," &c. publiſhed at Paris in 1626, in folio, with an appendix, preface, and chronological tables of the popes and anti-popes, the Eaſtern and Weſtern emperors, the kings of France and England, the councils of France, the indictions, &c. He left behind him materials for a ſecond edition of this work, which were made uſe of by M. St. Marthe, whoſe new collections increaſed the work to three volumes folio. It was afterwards extended by the Benedictines to twelve volumes folio.

Robert de Vaugondy, a French geographer, was born at Paris in the year 1688. Little is known of his private hiſtory, but he became geographer to the king, and died at Paris in 1766. His works are "An Introduction to Sanſon's Geography," 1743; "An Abridgment of the different Syſtems of the World," 1745; "Sacred Geography," 1746; "A Treatiſe on the Uſe of the Globes;" "A Portable Atlas;" and above all "Atlas Univerſel," publiſhed in 1756, conſiſting of 108 maps, upon a large ſcale, engraved with neatneſs and accuracy. He had a ſon, who for ſome time was the aſſiduous companion of his labours, and who aſſiſted him in the "Atlas Univerſel," to which work is prefixed an hiſtorical preface, in ſix chapters, treating of the origin, progreſs, and preſent ſtate of geography.

Robert de Brienne, harper to Edward I. previous to his aſcending the throne. The harp for many ages ſeems to have been the favourite inſtrument of the inhabitants of this iſland, whether under Britiſh, Saxon, Daniſh, or Norman kings. Many diſgraceful circumſtances are blazoned of the poor minſtrels; it is therefore but juſt to relate thoſe that redounded to their honour, and the Chronicle of Walter Heming furniſhes an incident that well deſerves to be recorded.

Edward I., according to this hiſtorian, about the year 1271, a ſhort time before he aſcended the throne, took his harper with him to the Holy Land; and this muſician muſt have been a cloſe and conſtant attendant on his maſter, for when Edward was wounded with a poiſoned knife at Ptolemais, the harper, *citharæda ſuus*, hearing the ſtruggle, ruſhed into the royal apartment, and killed the aſſaſſin. This ſignal ſervice from his bard did not, however, incline the monarch, afterwards, to ſpare his brethren in Wales. See Grey's Ode, "Ruin ſeize thee, ruthleſs king!"

Robert, *Herb*, in *Botany*. See Geranium.

Robert *Bay*, in *Geography*, a bay on the E. coaſt of Newfoundland.

Robert *Bay*. See Cul *de Sac Robert*.

Roberts's *Iſland*, a ſmall iſland on the Florida ſtream. N. lat. 24° 42′. W. long. 81° 33′.

Roberts's *Iſlands*, a cluſter of ſmall iſlands in the Pacific ocean, the largeſt being eight miles long and from two to three wide, four others being very ſmall; diſcovered in the year 1792 by lieutenant Herget, commander of the Dædalus ſtore-ſhip. S. lat. 7° 53′. E. long. 219° 50′.

Roberti, John, in *Biography*, a celebrated profeſſor of divinity among the Jeſuits, was born in the year 1569. He commenced his academical ſtudies at Liege, and continued them at Cologne, where, when he was twenty-two years of age, he entered into the ſociety of Jeſus. His proficiency in various branches of learning is highly commended, particularly in the belles-lettres, the ſeveral departments of theological learning, and eccleſiaſtical hiſtory. He was made profeſſor of divinity, and created doctor of that faculty, at Mentz, diſcharging the duties of his poſt with great reputation, during a long ſucceſſion of years, in that city, at Doway, at Treves, and at Wurzburg. He died at Namur in 1651, in the 82d year of his age. He was author of many works on theological ſubjects, of which the moſt important, and that which proves how deeply he was verſed in ſcripture criticiſm, was entitled "Myſticæ Ezekielis Quadrigæ, hoc eſt, Evangelia Hiſtoriarum et Temporum Serie vinculata Gr. et Lat."

ROBERTON, in *Geography*, a townſhip of Waſhington county, Pennſylvania, containing 899 inhabitants.

ROBERTSON, William, in *Biography*, was born at Dublin in 1705, and received his grammar-learning under Dr. Francis Hutcheſon, afterwards the celebrated profeſſor of moral philoſophy in the univerſity of Glaſgow. In the year 1722 young Robertſon removed to that univerſity, where he continued till the year 1725, when he was admitted to the degree of M. A. During this year there was a diſpute between Mr. Sterling, the principal of the univerſity, and the ſtudents, about the right of chooſing the rector, in which Mr. Robertſon took an active part, being ſelected by his fellow ſtudents to read their proteſt againſt the perſon, and his authority, who had been choſen rector in oppoſition to their wiſhes. Thus diſtinguiſhed, he excited againſt himſelf the indignation of the principal, Mr. Sterling, and his rector, and was the only one of more than fourſcore petitioners againſt whom they inſtituted proceedings. He was cited before the faculty, and after a trial which laſted ſeveral days a ſentence of expulſion was pronounced. Mr. Robertſon was ſatisfied of the juſtice of his cauſe, and preſented a memorial on the ſubject to the duke of Argyle, through whoſe influence an appeal was made to the king, who appointed a commiſſion to viſit the univerſity of Glaſgow, with full powers to examine into and rectify all exiſting abuſes. As a reſult of this enquiry, the right of electing their rector was reſtored to the ſtudents: the viſitors on this occaſion alſo, among whom was the earl of Hay, called the principal to a ſevere account for the public money which he had embezzled, and aſcertained the right of the univerſity to ſend two gentlemen, upon handſome exhibitions, to Baliol college in Oxford: they moreover annulled the expulſion of Mr. Robertſon, and ordered that meaſure particularly to be recorded in the proceedings of the commiſſion; declared the election of the rector, who had been named by the principal, to be void; and aſſembled the ſtudents, who immediately choſe the ſon of lord Roſs to be their rector.

While the viſitors were exerciſing their powers, Mr. Robertſon remained at London, and on the return of lord Hay he introduced Mr. Robertſon to Dr. Hoadly, the biſhop of Wincheſter, who made him known to Dr. Wake, archbiſhop of Canterbury; and he was entertained with much civility by both theſe prelates. He had, from a thorough conviction of its importance, devoted himſelf to the clerical profeſſion; but at preſent being too young to be admitted into orders, he employed himſelf, while in London, in viſiting public libraries, attending lectures, and improving

himſelf as opportunity offered. As ſoon as he was old enough to receive ordination, he was nominated by Dr. Hoadly to the cure of Tallow, in the county of Carlow. Here he continued till he was of age for prieſt's orders, to which he was admitted on the 10th of November 1729, and on the next day he was preſented by lord Carteret, then lord lieutenant of Ireland, to the rectory of Ravilly, in the county of Carlow, and to another rectory in the county of Wicklow. In 1728 he married Elizabeth, the daughter of major William Baxter, by whom he had twenty-one children.

Mr. Robertſon firſt appeared as an author about the year 1738, by a pamphlet entitled "A Scheme for utterly abolifhing the preſent heavy and vexatious Tax of Tythes:" the object of this work was to pay the clergy and impropriators a tax upon land in lieu of tythes, and it excited ſo much attention, that ſeveral editions of it were called for in a ſhort ſpace of time. In 1739 Mr. Robertſon received from lord Cathcart a deputation to be his chaplain; and in the year 1743 he obtained leave from his dioceſan to nominate a curate at Ravilly, and to reſide ſome time in Dublin for the education of his children. Immediately on his ſettlement in this city he was invited to the cure of St. Luke's pariſh, which he retained about five years, when he returned to Ravilly. While in that city he formed a ſcheme, jointly with Mr. Kane Percival, to raiſe a fund for the ſupport of the widows and children of clergymen within the dioceſe of Dublin, which has ſince produced very happy effects. In 1758 he met with a ſevere affliction in the death of his wife, to whom he was moſt tenderly attached, but he ſuſtained the loſs with exemplary reſignation to the will of God. Soon after this he found a new patron in Dr. Richard Robinſon, who had been tranſlated from the ſee of Killala to that of Ferns, and who preſented to Mr. Robertſon the firſt benefice which became vacant in his lordſhip's preſentation. Before, however, he could be collated to it, he, for the firſt time, had the "Free and Candid Diſquiſitions relating to the Church of England, &c." put into his hands; and, by the peruſal, he was led to entertain ſuch doubts reſpecting ſome points to which he would be required to declare his aſſent, as made him defer his attendance on the biſhop. At length he received a letter from his lordſhip, calling upon him to come immediately for inſtitution. Upon this he wrote a very affecting letter to the prelate, in which he returned the moſt grateful thanks for his kindneſs, but ſaid he could no longer conſcientiouſly comply with the terms required by law to qualify him for ſuch preferment. "In debating this matter with myſelf," ſays he, "beſides the arguments directly to the purpoſe, ſeveral ſtrong collateral conſiderations came in upon the poſitive ſide of the queſtion. The ſtraightneſs of my circumſtances preſſed me cloſe; a numerous family, quite unprovided for, pleaded with the moſt pathetic and moving eloquence. And the infirmities and wants of age now coming faſt upon me were urged feelingly. But one ſingle conſideration prevailed over all theſe—that the Creator and Governor of the univerſe, whom it is my firſt duty to worſhip and adore, being the God of truth, it muſt be diſagreeable to him to profeſs, ſubſcribe, or declare, in any matter relating to his worſhip and ſervice, what is not believed ſtrictly and ſimply to be true."

Mr. Robertſon, though he refuſed to ſubſcribe for the ſake of preferment, did not feel it neceſſary to quit the church, and continued to perform the duties of pariſh prieſt; but from this time he omitted the reading of the Athanaſian creed, and ſome other parts of the public ſervice which appeared to him to countenance unſcriptural tenets. Finding, however, that this mode of conduct gave offence to ſome perſons, he reſigned his benefices in 1764, and in 1766 he publiſhed, by way of apology to his friends for what he had done, his learned and ingenious little work, entitled "An Attempt to explain the Words Reaſon, Subſtance, Perſon, Creeds, Orthodox, &c." to which he ſubjoined the letter written to his biſhop, of which an extract has been given above. He now came to London, where he met with a very cordial and liberal reception from many excellent men, who generouſly contributed to his ſupport. In the following year he preſented a copy of his "Attempt, &c." to the univerſity of Glaſgow, and, in return, received a moſt obliging letter, accompanied with the diploma of D.D. In 1768 he was nominated to the maſterſhip of the free grammar-ſchool at Wolverhampton, in Staffordſhire, by the company of Merchant Taylors; which, though honourable to the patrons, was not lucrative to the doctor, the ſalary being only 70*l. per ann.*, and this was, for ſome years, diminiſhed by a penſion of 40*l.* to a ſuperannuated predeceſſor. Dr. Robertſon was, however, ſatisfied, and through the kindneſs of his friends was prevented from wanting what was neceſſary to his ſupport. At one time he received from an unknown hand a preſent of 500*l.*, and from various perſons ſtated aſſiſtance was ſent him. In 1772 he was choſen one of the committee of the ſociety of clergymen, &c. employed to draw up, and preſent to the houſe of commons, a petition praying for relief from the obligation of ſubſcription to the 39 articles. In the courſe of a few years he had the misfortune to loſe all his children one after another; and he himſelf died in May 1783, in the 79th year of his age. Dr. Robertſon was poſſeſſed of great learning and an excellent judgment; he had a fine imagination, and a temper regulated by the mild and amiable ſpirit of Chriſt; and in his addreſs and manners he was at all times eaſy and cheerful. When he quitted the church he was probably of the Arian ſchool, but in the latter years of his life he became a firm believer in the ſimple humanity of Chriſt. He was mentioned by Mr. Lindſey, a few months before his death, as "the aged and venerable father of Unitarian nonconformity of our own days;" and in another work the ſame writer ſays, "the example of an excellent perſon now living at Wolverhampton, Dr. Robertſon, has been a ſecret reproach to me ever ſince I heard of it." See Lindſey's Apology for reſigning the Vicarage of Catterick, his Hiſtorical View of the Unitarian Doctrine, and Dr. Diſney's Communications to the Gent. Mag. 1783.

Robertson, William, D. D., a celebrated hiſtorian, was born in 1721, at Borthwick, in Mid Lothian, of which pariſh his father was then miniſter. He received the early part of his education at Dalkeith, under Mr. Leſlie, a maſter of high repute. In 1733 he entered upon his academical ſtudies at Edinburgh. After the completion of his courſe, he obtained a licence to preach in 1741, and in 1743 he was preſented, by the earl of Hopetoun, to the living of Gladſmuir, in Eaſt Lothian. On this living, which was not more than 100*l. per ann.*, he contrived to educate his ſix ſiſters and a brother, who, about this time, were left orphans by the death of both their parents. Here alſo he diſplayed his zealous attachment to the cauſe of liberty, by his efforts, in the year of the rebellion, in favour of the houſe of Brunſwick, which he carried ſo far as to quit, for a ſeaſon, his parochial charge, and join the volunteers of Edinburgh. He became, in a ſhort time, diſtinguiſhed for his eloquence and good taſte as a preacher; and, in 1755, a ſermon which he delivered before the Society for propagating Chriſtian Knowledge, and which was the only compoſition of that kind that he ever publiſhed, raiſed him very high as a pulpit orator. It paſſed through five editions, and was

tranſlated

tranſlated into the German language. He had, ſome years previouſly to this, begun to take a part in the debates of the general aſſembly of the church of Scotland, and, as he poſſeſſed great talents for buſineſs, as well as the powers of a public ſpeaker, he acquired an aſcendancy in that body which, during a long period, gave him the lead in the eccleſiaſtical politics of the country. In 1754 a "Select Society" had been eſtabliſhed in Edinburgh, among the firſt members of which are found many names that, in proceſs of time, became highly diſtinguiſhed in literature and public life. Among the number of theſe was that of Robertſon, who was moſt aſſiduous in his attendance, and obtained from it an increaſe of reputation. In the mean time he was deeply engaged in the ſtudies neceſſary for completing the plan of an hiſtorical work which he had formed ſoon after his firſt ſettlement as a miniſter, and having taken a journey to London for the purpoſe of making arrangements for the publication, his "Hiſtory of Scotland during the Reigns of Queen Mary, and King James VI." made its appearance in the year 1759, in two vols. 4to. He had, previouſly to this, as appears by the title-page of the volume, obtained the degree of D. D. It was received by the public with general approbation and applauſe. The celebrated Hume, ſo far from betraying jealouſy or envy at the appearance of a competitor for the hiſtoric palm, took the warmeſt intereſt in the ſucceſs of the work.

The Hiſtory of Scotland appears to have been the moſt popular of the author's works, and it had paſſed through fourteen editions during the life of the author. It had, in every reſpect, a favourable influence on his fortune, ſince the fame which he acquired by the publication was probably the cauſe of his rapid promotion. He had removed to Edinburgh, in conſequence of a preſentation to one of the churches of that city, while it was in the preſs; in the ſame year he was nominated chaplain of Stirling-caſtle; in 1761 he was appointed one of the king's chaplains in ordinary in Scotland, and in the following year he was elected principal of the univerſity of Edinburgh. Two years after this he was appointed to the poſt of hiſtoriographer royal of Scotland, with the ſalary of 200*l. per ann.*, ſo that, at this period, he was the beſt beneficed clergyman of his church. He was, moreover, the acknowledged head of the party which held the chief ſway in a national church; and the period from his becoming principal of the univerſity of Edinburgh, to his retreat from public life, was commonly denominated "Dr. Robertſon's adminiſtration."

In the midſt of the numerous avocations which his ſeveral offices created, he proceeded to collect materials for his "Hiſtory of the Reign of the Emperor Charles V.," which he publiſhed in 1769, in three quarto volumes. This work was, like the former, received with high approbation; it increaſed his reputation both on account of the greater maturity of ſtyle to which he had attained, and of the more profound and varied reſearch which the weight and copiouſneſs of the theme led him to diſplay. The introductory volume contained a view of the progreſs of ſociety in Europe from the ſubverſion of the Roman empire to the beginning of the ſixteenth century, which was particularly admired, as preſenting a maſterly ſurvey of the gradations by which the ſocial inſtitutions of antiquity have paſſed, through the barbariſm of the dark ages, into all that characterizes the ſtate of modern Europe. So highly pleaſed was Catharine, the empreſs of Ruſſia, with the Hiſtory of Charles V., that ſhe conveyed her acknowledgments to the author in a preſent of a rich ſnuff-box ſet with diamonds.

In the year 1777, Dr. Robertſon publiſhed his "Hiſtory of America," in two vols. 4to., which, from the new views of man and nature that it preſents, and the magnificence and variety of its ſcenery, is perhaps the moſt entertaining of his productions. Either gratitude for the communications obtained from the Spaniſh court, or candour carried far beyond the bounds of moderation, led him to extenuate the cruelties that had been committed by that nation in their conqueſts in the new world, to a degree that brought upon him cenſure. The work proved ſo acceptable to the Spaniſh nation, that the author was unanimouſly elected a member of the Royal Academy of Madrid. In 1791 Dr. Robertſon publiſhed "An Hiſtorical Diſquiſition concerning the Knowledge which the Ancients had of India, and the Progreſs of Trade with that Country, prior to the Diſcovery of the Cape of Good Hope." After this, Dr. Robertſon's health began to decline, and in June 1793 he died at the age of 72. As an hiſtorian his ſtyle is pure, ſweet, dignified without ſtiffneſs, ſingularly perſpicuous, and often eloquent; the arrangement of his materials is ſkilful and luminous, his mode of narration is diſtinct, and his deſcriptions highly graphical; and he diſplays a ſagacity in the developement of cauſes and effects, and in his judgment of public characters and tranſactions, which is very remarkable in one who was brought up in retirement. "If," ſays one of his biographers, "there is leſs glow and ardour in his expreſſions of moral and political feelings, than ſome writers in a free country have manifeſted; there is, on the other hand, all the candour and impartiality which belongs to a cool temper, when enlightened by knowledge and directed by principle." To his private and ſocial virtues the moſt liberal teſtimony has been given, even by thoſe who were his opponents in church politics. See Dr. Dugald Stewart's Life of Principal Robertſon.

Robertson, Joseph, was born at Knipe, in Weſtmoreland, in 1726, and educated at Appleby ſchool, from which place, in 1746, he went to Queen's college, Oxford, where he took his degree of M. A., and, on entering holy orders, he was preſented to the vicarage of Hertford, in Hampſhire. In 1764 he became an author, by contributing largely to the Critical Review, an occupation in which he continued more than 20 years. In 1770 he was preſented to the rectory of Sutton, in Eſſex, and in 1779 to the vicarage of Horncaſtle, in Lincolnſhire. In 1782 he publiſhed what he entitled "An Introduction to Polite Literature," a very ſmall volume, and which cannot certainly deſerve ſo high ſounding a title. It has been reprinted ſeveral times. It is a ſort of ſpelling-book or primer, with good rules for pronunciation. The author was, however, ſo tenacious of his property, that he attacked, with much ſeverity, the late Dr. Paley, for copying a part of it without acknowledgment, into a little piece intended for the uſe of Sunday ſchools. Dr. Paley's reply and defence is that of a gentleman and ſcholar, and muſt be quite ſatisfactory to the candid reader. Mr. Robertſon's next piece, "An Eſſay on Punctuation," was publiſhed in 1785; it is a work of conſiderable merit, and has gone through ſeveral editions. In 1788 appeared his "Diſſertation on the Parian Chronicle." Mr. Robertſon publiſhed, in 1795, a new "Tranſlation of Telemachus;" and in 1798 "An Eſſay on the Education of Young Ladies," which was followed by an "Eſſay on the Nature of Engliſh Verſe." He died in 1802. See Gent. Mag. vol. lxii. Monthly Mag. Meadley's Memoirs of Dr. Paley.

Robertson's *County*, in *Geography*, a county of America, in the diſtrict of Weſt Tenneſſee, bordering N. on Kentucky, and containing 7270 inhabitants. It is watered by Cumberland and Red rivers.

ROBERVAL, Giles Perſonne de, in *Biography*, an excellent

excellent mathematician of the 17th century, was born at Roberval, a ſeignory belonging to his family, in the dioceſe of Beauvais, in the year 1602. In the courſe of his education he diſcovered a ſtrong inclination towards the ſtudy of the mathematics, with which he made himſelf very converſant. When he was 30 years of age he obtained the profeſſorſhip of mathematics in the college of Gervais, at Paris; and afterwards he conteſted, with other candidates, the ſucceſſion to the vacant chair of Ramus, which he gained by the ſuperiority of his powers in diſputation. He ſucceeded Morin as mathematical profeſſor at the college-royal, the duties of which office he performed with high reputation ſo long as he lived. He was choſen a member of the Royal Academy of Sciences in 1666, and communicated to that body ſome curious experiments on the Torricellian vacuum, which he made in the years 1647 and 1648. He invented two new kinds of balances, one of which was adapted to the weighing of air. Roberval died in 1675, at the age of 73. His chief works are "A Treatiſe on Mechanics," inſerted in Merſenne's "Univerſal Harmony." A treatiſe "On the Mundane Syſtem," written in Latin, attributed to Ariſtarchus of Samos, but generally believed to be his own production. Beſides theſe he contributed ſeveral papers to the Memoirs of the Academy of Sciences: ſuch as "Experiments concerning the Preſſure of the Air;" "Obſervations on the Compoſition of Motion, and on the Tangents of Curve Lines;" "The Geometrical Reſolution of Plane and Cubic Equations;" "A Treatiſe on Indiviſibles;" at the end of which he has explained a new method for the transformation of figures, to which Torricelli gave the name of "Robervallian Lines."

ROBERVALLIAN Lines, a name given to certain lines, uſed for the transformation of figures: thus called from their inventor M. de Roberval.

Theſe lines bound ſpaces infinitely extended in length, which are nevertheleſs equal to other ſpaces terminated on all ſides.

The abbot Gallois, in the Memoirs of the Royal Academy, anno 1693, obſerves, that the method of transforming figures, explained at the latter end of M. de Roberval's Treatiſe of Indiviſibles, is the ſame with that ſince publiſhed by Mr. James Gregory, in his Univerſal Geometry, and afterwards by Barrow, in his Lectiones Geometricæ; and that, by a letter of Torricelli, it appears that Roberval was the inventor of this manner of transforming figures, by means of certain lines, which Torricelli therefore called *Robervallian lines*.

He adds, that it is highly probable, that J. Gregory firſt learned the method in the journey he made to Padua in 1668; the method itſelf having been known in Italy from the year 1646, though the book was not publiſhed till the year 1692.

This account Dr. David Gregory has endeavoured to refute, in vindication of his brother. His anſwer is inſerted in the Phil. Tranſ. an. 1694, and the abbot has rejoined in the French Memoirs of the Academy.

ROBESON, in *Geography*, a county of North Carolina, in Fayette diſtrict, bounded S. by the ſtate of South Carolina. It contains 7528 inhabitants. The chief town is Lamberton.—Alſo, a townſhip of Lancaſter county, Pennſylvania; containing 1807 inhabitants.

ROBESPIERRE, Maximiliam Isidore, in *Biography*, was born at Arras in 1759. His father, a barriſter, having ruined himſelf by his prodigality, left France before the revolution, eſtabliſhed a ſchool at Cologne, where, however, he did not remain long, and he went from thence into England, and afterwards to America. Deſerted by his father, and his mother dying when he was only nine years old, he was taken under the patronage of the biſhop of Arras, M. de Conzie, who cauſed him to be ſent to the college of Louis le Grand, where he was taken on the foundation. From a very early age he was noticed for his love of independence; he was however timid, and in his temper gloomy and unſociable. He was extremely aſſiduous in his ſtudies, and gave hopes of talent, that were not realized in after-life. In 1775, when Lewis XVI. made his entry into Paris, he was choſen by his fellow ſtudents to préſent to that prince the homage of their gratitude. Becoming a barriſter in the council of Artois, he obtained a place in the academy of Arras. In the year 1789 he took an active part in all the revolutionary meetings, and was appointed a deputy from the province of Artois to the States-General. He manifeſted but little talent as an orator or legiſlator, but attached himſelf to Neckar, and then to Mirabeau, during the heights of their popularity; but when they became leſs careſſed by the people, Robeſpierre was the firſt to notice the difference, and deſerted them for ſome other leader. The firſt time that he made himſelf at all remarked in the conſtituent aſſembly, was on the 20th of July 1789, when he oppoſed the ſcheme of martial law; and from that period, ſays his biographer, "he endeavoured to legitimatize inſurrection." By courting the people, and diſplaying a determined hoſtility to the royal prerogatives, he laid the foundation for future influence in the democratic party; and it has been conſidered a very remarkable circumſtance, in connection with his future conduct, that the moſt frequent topic of his declamation was the injuſtice of capital puniſhment in any caſe.

After the diſſolution of the conſtituent aſſembly, followed by the election of the legiſlative body, the members of which being all new, Robeſpierre's chief theatre of action was the Jacobin club, at which he was the principal ſpeaker. He alſo publiſhed a weekly paper, entitled "Le Defenſeur de la Conſtitution." He now took a decided part with the republicans, though it does not appear that he was an actor in the inſurrection of the 10th of Auguſt, or in the priſon-maſſacres of September. In the new aſſembly, which met in September 1792, he was returned a member for the city of Paris, and he ſoon became the head of the party called the Mountain, which was oppoſed to the followers of Briſſot, who then poſſeſſed the miniſterial power. He was now charged with the deſire of making himſelf dictator, but his party in the ſenate was too powerful for his accuſer to carry the point, and the aſſembly paſſed a decree to print and circulate the ſpeech which he made in juſtification of himſelf. By this he became ſtill more popular, and his ſubſequent exertions to bring the unfortunate king to trial, augmented his influence with the democratic part of the nation. Soon after the execution of Lewis, Robeſpierre, aſſiſted by Danton and Marat, gained a moſt decided ſupremacy in the national convention, and the period commenced which has been emphatically, but juſtly, denominated the reign of terror. The Briſſotines, to the number of twenty-one, were accuſed, condemned, and guillotined. After them followed the queen, the duke of Orleans, and other members of the royal family. The ſcaffold daily ſtreamed with the blood of nobles, prieſts, and all who by character and condition could be ſuſpected of being attached to the ancient government. In ſome of the provinces, maſſacres were perpetrated againſt whole orders of men, without diſtinction: the levelling principle was extended to all ſuperiority of ſcience and talent, and it ſeemed Robeſpierre's object to bring back an age of barbariſm. At length his own confederates, Danton, Deſmoulins, Fabre d'Eglantine, and others, were brought to the block.

block. In the midſt of all theſe horrors he exhibited a feſtival, in which the exiſtence of the Supreme Being was ſolemnly recogniſed; and as the reſtorer of religion, he appointed days for public worſhip.

The reign of terror was now become too intolerable to be endured. No man was ſafe from a tyrant whoſe bloody diſpoſition ſeemed to grow with the acts of cruelty which it generated, and who had eſtabliſhed ſuch a ſyſtem of domeſtic treachery, as deſtroyed the confidence of ſociety, and ſubjected every individual to accuſation. He loſt his popularity, and a decree of the convention was paſſed againſt him: in the act of arreſting him two piſtols were fired, by which he was wounded in the head and the under-jaw. He endured in ſilence the pain of his wounds, and the upbraidings of his foes, and was carried to the ſame dungeon which he had made to many the paſſage to death. On the next day, after being taken, with his accomplices, before the revolutionary tribunal, he was led, July 28, 1794, to execution, amidſt the acclamations and curſes of thouſands of ſpectators. Such was the well-merited end of Robeſpierre, in the 36th year of his age. Although a concurrence of circumſtances enabled him to act a conſiderable part in the revolution, he was not one of the ſuperior figures in point of abilities and force of character. Natural reſerve, cunning, habitual diſſimulation, and a total want of feeling, carried him through difficulties which might have overwhelmed a greater man; but as he never made a friend, and was unſupported by native courage, he ſunk under the firſt ſerious oppoſition. He was regarded as incorruptible, and never accumulated money: nevertheleſs, he always took care to open the path of honour and wealth to his own creatures, and eſpecially to his rivals, in order that he might have an additional method of ruining them. Upon the whole, he has left a name more the object of horror and deteſtation, than that of any other among the perſonages of the ſame awful drama.—Ann. Regiſter. Lives of Remarkable Characters, who have diſtinguiſhed themſelves in the French Revolution. Biog. Anec. of the Founders of the Fr. Rev.

ROBIA Herba, in *Botany*, a name given by Paulus Ægineta, and many others, to a plant uſed in dyeing.

The near reſemblance of the name to the word *rubia*, has made many conclude that it was the *rubia*, or madder, which they have meant by it; but they have taken care in their writings to diſtinguiſh it from that plant, and it is plainly the *geniſtella tinctoria*, or dyer's weed, that they meant by the *robia herba*. They ſay it was uſed to dye yellow, and that it was alſo a cuſtom to ſtain the hair with it.

Theſe are the properties recorded of the *cymene* and *æcomenium* of the Greeks, and the *lutum*, or *lutea herba*, of the Latins, which were names of the *geniſtella tinctoria*. Pliny ſays, that the *lutum* had leaves like flax, and flowers like broom, which is exactly the caſe with the *geniſtella tinctoria*, but by no means agrees with the glaſtum or woad.

ROBIESSOU, in *Geography*, a town of Auſtrian Poland; 22 miles S. of Chelm.

ROBIGALIA, or Rubigalia, in *Antiquity*. See Rubigalia.

ROBILLANTE, in *Geography*, a town of France, in the department of the Stura; ſix miles S. of Coni.

ROBIN, or, as it is more uſually called, *Robin red-breaſt*, *Rubecula*, in *Ornithology*. See Red-*breaſt*.

Robin, *Ragged*, in *Botany*. See Campion.

Robin, *Wake*. See Wake *Robin*.

ROBINAL, in *Geography*, a town of Mexico, in the province of Vera Paz; containing 800 inhabitants; 40 miles S.S.W. of Vera Paz.

ROBIN-HOOD's Bay, a bay on the E. coaſt of Newfoundland, frequented by ſmall veſſels.

ROBINIA, in *Botany*, commemorates John Robin, botaniſt to Henry IV. and Louis XIII. of France, who publiſhed a catalogue of his own garden, which has gone through ſeveral editions. He alſo ſupplied deſcriptions to Vallet's figures. A popular French author, who calls himſelf M. de Vigneul-Marville, but whoſe real name was d'Argonne, in his *Melanges*, ſtigmatizes Robin for his greedy and ſelfiſh love of flowers, the more curious kinds of which he would rather deſtroy, than communicate to his friends. In alluſion to this, and to a report of his being an eunuch, he was addreſſed in a bitter Latin ſatire, as by nature an enemy to all propagation. De Theis, nevertheleſs, ſpeaks of Veſpaſian Robin as his ſon. They publiſhed conjointly a botanical *Enchiridion*, or manual, and one of them introduced into the French gardens, from American ſeeds, that ſpecies of *Robinia* called *Pſedo-acacia* by Tournefort, who under that name founded the preſent genus.—Linn. Gen. 378. Schreb. 501. Willd. Sp. Pl. v. 3. 1131. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 323. Purſh v. 2. 487. Juſſ. 358. Lamarck Illuſtr. t. 606. Gærtn. t. 145. (Pſeudoacacia; Tourn. t. 417. Caragana; Lamarck Dict. v. 1. 615. Illuſtr. t. 607. Juſſ. 358.)—Claſs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, ſmall, bell-ſhaped, four-cleft; the three lower teeth narroweſt; the upper one twice as broad, with a broad ſhallow ſinus; all of equal length. *Cor.* papilionaceous. Standard roundiſh, large, ſpreading, obtuſe. Wings oblong-ovate, diſtinct, each with a very ſhort blunt appendage. Keel nearly ſemiorbicular, compreſſed, obtuſe, the length of the wings. *Stam.* Filaments diadelphous, one ſimple, the other nine combined, aſcending towards the extremity; anthers roundiſh. *Piſt.* Germen cylindrical, oblong; ſtyle thread ſhaped, bent upwards; ſtigma terminal. *Peric.* Legume large, long, gibbous, compreſſed. *Seeds* few, kidney-ſhaped.

Eſſ. Ch. Calyx four-cleft; the upper ſegment divided. Standard roundiſh, reflexed. Stamens in two diſtinct ſets. Legume elongated, gibbous, of one cell, with many ſeeds.

Obſ. Juſſieu and Lamarck diſtinguiſh their genus *Caragana*, by its ſmooth abrupt ſtigma, and a ſomewhat cylindrical inflated legume. The former adds, that the leaves are abruptly pinnate, without the terminal leaflet ſeen in *Robinia*. Yet Lamarck's plates do not confirm all theſe diſtinctions. Linnæus deſcribes the ſtigma as downy, and yet in his Syſt. Veg. ranges *Robinia* among genera which want that character. In fact the ſtyle, rather than the ſtigma, is downy.

1. R. *Pſeudoacacia*. Common Acacia, or Robinia. Linn. Sp. Pl. 1043. Willd. n. 1. Ait. n. 1. Purſh n. 1. "Schmidt Arb. t. 32." (Pſeudoacacia; Duham. Arb. v. 2. 188. n. 1. t. 42.)—Partial ſtalks ſingle-flowered. Leaves pinnate, with an odd leaflet. Stipulas ſpinous. Legumes ſmooth, compreſſed.—Native of dry fertile ridges, on the mountains of North America, from Canada to Carolina, flowering in May and June. *Purſh*. Cultivated here, by the elder Tradeſcant, before 1640. *Parkinſon*. This is a large and handſome *tree*, of quick growth, beautiful in *foliage*, and highly ornamental, when laden in ſummer with bunches of white ſweet-ſcented *flowers*, reſembling thoſe of the *laburnum* in ſize and poſition. The branches are liable to be ſhivered off by our autumnal ſtorms. Mr. Purſh ſays, "the wood is almoſt incorruptible, and particularly calculated for poſts of gates and fences." The *leaves* are deciduous

deciduous, a ſpan long, of a peculiarly pleaſant light green, conſiſting of many elliptical, oppoſite or alternate, ſtalked leaflets. The ſhort awl-ſhaped *ſtipulas* become rigid ſpines. *Legumes* pale, wavy, compreſſed, two or three inches long.

2. R. *viſcoſa*. Clammy Robinia. Willd. n. 2. Ait. n. 2. Purſh n. 2. Venten. Jard. de Cels, t. 4. (R. glutinoſa; Curt. Mag. t. 560. R. Pſeudoacaciæ var. Sm. in Abbot's Inſ. of Georgia, v. 1. 37. t. 19.)—Partial ſtalks ſingle-flowered. Leaves pinnate, with an odd leaflet. Branches and legumes clothed with viſcid glands.—Native of the banks of rivers in South Carolina, eſpecially the Savannah, flowering in June and July; and ſaid to have been introduced into our gardens, where it is quite hardy, by Mr. R. Whitley, in 1797. This ſpecies not being known to us when Abbot's Inſects of Georgia were publiſhed, was, in that work, miſtaken for a red-flowered variety of the foregoing. The whole *tree* is of a ſmaller ſize than that ſpecies, and diſtinguiſhed by its dark red viſcid *branches*. The *flowers* are variegated with pink and white. *Stipulas* forming ſtraighter ſpines. The creeping *roots* are ſaid, by Mr. Purſh, to be troubleſome in ſmall plantations. Hence, however, our gardeners propagate the tree the more eaſily by cuttings of the root, inſtead of grafting this ſpecies on the more brittle *Pſeudoacacia*.

3. R. *violacea*. Violet Robinia. Linn. Sp. Pl. 1044. Willd. n. 3. Ait. n. 3. Jacq. Amer. 219. t. 177. f. 49. —Partial ſtalks two-flowered. Calyx but ſlightly toothed. Leaves pinnate, with an odd leaflet. Branches without thorns.—Found by Jacquin in buſhy places about Carthagena in South America, flowering in July and Auguſt. Miller cultivated this plant, but it is now unknown in our ſtoves. Jacquin deſcribes it about twelve feet high, erect, with ſhining *leaves*, whoſe *leaflets* are about ſix pair, ſtalked, ovate, obtuſe, emarginate, two inches long. *Cluſters* axillary, half a foot in length; their partial ſtalks ſhort, numerous, each bearing two *flowers*, which reſemble our ſweet violet in ſcent as well as colour.

4. R. *ſtriata*. Striated-leaved Robinia. Willd. n. 4.—"Partial ſtalks ſingle-flowered. Leaves pinnate, with an odd leaflet; downy beneath. Branches without thorns." —Gathered by Bredemeyer, on open ſunny hills in the Caraccas. A large *ſhrub*, with pale, unarmed, warty *branches*. *Leaves* half a foot long, compoſed of from fifteen to twenty-five oblong, pointed *leaflets*, each an inch in length, ſtriated with veins; ſhining above; covered with cloſe-preſſed hairs beneath. *Stipulas* lanceolate, deciduous. *Cluſters* ſimple, ſhorter than the leaves, downy, as well as the *calyx*. *Bracteas* awl-ſhaped, very ſhort. *Corolla* yellow, *Willdenow*.

5. R. *hiſpida*. Hairy Robinia, or Roſe Acacia. Linn. Mant. 101; excluding the reference to Jacquin. Willd. n. 5. Ait. n. 4. Purſh n. 3. Curt. Mag. t. 311. (R. foliis impari-pinnatis; foliolis ovatis, ramis pedunculiſque hiſpidis; Mill. Ic. 163. t. 244. Pſeudoacacia hiſpida, floribus roſeis; Cateſb. Carol. v. 3. 20. t. 20.)—Branches, calyx, and flower-ſtalks hiſpid. Thorns none. Leaves pinnate, with an odd leaflet. Partial ſtalks ſingle-flowered.—Native of mountains in Virginia and Carolina. Hardy with us, flowering from May to September, being a very ornamental *ſhrub*, on account of its large pink copious *bloſſoms*, enhanced, like a moſs roſe, by the brown briſtly covering of the *ſtalks* and *calyx*. Purſh notices a taller and leſs hiſpid variety.

6. R. *ſepium*. Hedge Robinia. Willd. n. 6. Jacq. Amer. 221. t. 179. f. 101. Swartz Ind. Occ. v. 3. 1258. —Partial ſtalks moſtly two-flowered. Leaves pinnate, with an odd leaflet, pointed. Thorns none.—Native of the banks of rivers, in the receſſes of mountains of the Weſt Indies, flowering about March and April. A *tree* twenty or thirty feet high, with long, lax, ſpreading *branches*. The *leaflets* differ from thoſe of *violacea*, n. 3, in being pointed, not emarginate. *Cluſters* rather drooping, of numerous purple *flowers*; their *ſtalks* ſmooth.

7. R. *ſquamata*. Scaly-branched Robinia. Willd. n. 7. "Vahl Symb. v. 3. 88. t. 69."—Partial ſtalks ſingle-flowered. Leaves pinnate, with an odd leaflet, ſpinous-pointed. Stipulas ſpinous.—Native of the iſland of St. Thomas. *Branches* round, ſmooth, leafy towards the ends, ſcaly below the leaves; bearing ſmaller ones ſcarcely an inch long, clothed with four rows of imbricated, ovate, pointed ſcales. *Leaflets* about nine pair, oval or roundiſh, ſmooth and ſhining on both ſides, the midrib of each extended into a terminal ſpine. *Stipulas* permanent, hardening into thorns. *Cluſters* axillary, downy, of four or five diſtant *flowers*. *Bracteas* ſmall, linear. *Calyx* ſmooth, with lanceolate ſegments. *Legume* compreſſed, linear, occaſionally contracted here and there, as if jointed.

8. R. *uliginoſa*. Swamp Robinia. Willd. n. 8.—"Partial ſtalks three-flowered. Leaves ternate, oblong, pointed. Branches twining, without thorns."—Native of the Eaſt Indies; communicated to Willdenow by Dr. Roxburgh. The *branches* are deſcribed as round and ſmooth. *Leaflets* an inch and half long, pointed, ſmooth. *Cluſters* from the old branches, three inches in length. *Flowers* apparently white.

9. R. *ſcandens*. Climbing Robinia. Willd. n. 9. (R. Nicou; Aubl. Guian. v. 2. 771. t. 308.)—Partial ſtalks ſingle-flowered. Leaves pinnate, with an odd leaflet, oval, pointed, ſmooth. Branches twining, without thorns.—Native of the woods of Guiana, flowering in June. A twining *ſhrub*, of lofty growth, crowning the neighbouring trees with its leafy *branches*, and purple *bloſſoms*. The *leaflets* are uſually ſeven, each about four inches long. *Flowers* in axillary cluſters. *Legume* compreſſed, thick-edged, ſmooth, meaſuring about two inches. The natives of Guiana beat the water with freſh cut twigs of this ſhrub, by which means the fiſh are intoxicated, and floating inſenſible near the ſurface, are eaſily caught.

10. R. *tomentoſa*. Downy Robinia. Willd. n. 10. (R. Panacoco; Aubl. Guian. v. 2. 768. t. 307.)—Partial ſtalks ſingle-flowered. Leaves pinnate, with an odd leaflet, elliptical, pointed, coriaceous; ſomewhat downy beneath: their common ſtalk rough. Stem arboreous, without thorns. —Found by Aublet in the woods of Cayenne and Guiana, being one of the largeſt trees of thoſe countries. The *trunk* is 60 feet or upwards in height, and uſually a yard in diameter; its baſe ſubdivided above ground, ſo as to form cavities ſix or eight feet wide, affording ſhelter to wild beaſts. The head conſiſts of ſtrong and widely extended *branches*, which when young are clothed, like the main ſtalks of the *leaves*, with red or ruſty down. The *leaflets* are from eleven to fourteen, various in ſize, from three to eight inches long, veiny and wrinkled; ſmooth above; more or leſs hairy or downy beneath. *Stipulas* deciduous. *Cluſters* at the ends of the branches. *Flowers* reddiſh. *Legume* two inches long, half-lanceolate. The bark of the *tree*, when wounded, diſtils a copious reſinous balſam. The *wood* is almoſt incorruptible, Aublet having obſerved poſts, partly in the ground, which were quite ſound, though ſaid to be above 60 years old.

11. R. *florida*. Flowery Robinia. Willd. n. 11. "Vahl. Symb. v. 3. 89. t. 70."—Stalks ſimple, ſingle-flowered. Leaves abruptly pinnate, ſmooth; their common

ſtalks unarmed. Stipulas lanceolate, permanent, flexible. Calyx nearly entire.—Native of the Weſt Indies. A very beautiful *ſhrub*, entirely covered with large purpliſh *flowers*, four or five from each bud, on ſimple capillary *ſtalks*, before the leaves appear. *Branches* round, ſmooth, dotted, purpliſh-grey. *Lower leaves* from the flowering buds of the preceding year, uſually two or three together, the length of the finger; *upper ones* on the young branches ſolitary, alternate, half as long again; leaflets ſtalked, oppoſite, oblong, ſmooth, veiny, pointed, the uppermoſt rather ſmalleſt: common footſtalk without any terminal ſpine. *Stipulas* lanceolate, ſmall, thin, flexible, permanent. *Calyx* cup-ſhaped, nearly entire, finely downy. *Corolla* large; its claws the length of the calyx. *Germen* ſmooth. *Vahl.*

12. R. *polyantha.* Many-flowered Robinia. Swartz Ind. Occ. v. 3. 1260.—Stalks ſimple, ſingle-flowered. Leaves abruptly pinnate; hoary beneath; their common ſtalks unarmed. Stipulas awl-ſhaped, cloſe-preſſed, permanent. Calyx with linear teeth.—Native of thickets on the mountains of Hiſpaniola. A *ſhrub*, about ſix feet high, erect, with copious *branches*, deſtitute of dots; greyiſh and downy when young. *Flowers* pale purple, three or four from each bud, appearing moſtly before the leaves, as in the laſt, from which this ſpecies chiefly differs in the ſmaller ſize of every part, and in the teeth of its *calyx*, which are nearly, if not entirely, wanting in *R. florida.* *Swartz.*

13. R. *Caragana.* Caragana Robinia, or Siberian Pea-tree. Linn. Sp. Pl. 1044. Willd. n. 12. Ait. n. 5. "Schmidt Arb. t. 33." (R. Altagana; Pall. Roſſ. v. 1. p. 1. 68. t. 42, the middle figure only.)—Stalks ſimple, ſingle-flowered, many together. Leaves abruptly pinnate, of about four pair of elliptical leaflets; their common ſtalks unarmed. Stipulas thorny. Legume cylindrical.—Native of Siberia. Cultivated by Miller in 1752. Hardy in our gardens, flowering in April and May. The *ſtem* forms a buſhy *ſhrub*, producing from each bud numerous large yellow *flowers*, on long ſimple ſtalks, accompanied by ſeveral abruptly pinnated, nearly ſmooth, *leaves*, which become alternate on the protruding *branches*. The *leaflets* are moſtly alternate, elliptical or obovate, hardly an inch long. The *ſtipulas* change into ſtraight awl-ſhaped thorns.

14. R. *Altagana.* Sand Robinia. Willd. n. 13. Ait. n. 6. L'Herit. Stirp. 159. t. 76. Pall. Roſſ. v. 1. p. 1. 69, the ſmall variety, t. 42, the lateral figures.—Stalks ſimple, ſingle-flowered, ſolitary. Leaves abruptly pinnate, of about eight pair of obovate, or inverſely heart-ſhaped, leaflets; their common ſtalks unarmed. Stipulas thorny. Legume compreſſed.—Native of ſandy ground in Siberia. Introduced into England by Mr. Bell, in 1789. Differs from the laſt, of which Pallas made it a variety, in its more humble ſize, emarginate, numerous, and hoary *leaflets*; ſolitary *flowers*; and eſpecially its compreſſed *legume*. Theſe two ſpecies, ſo nearly akin, prove the ſuppoſed generic diſtinction of the cylindrical and compreſſed *legumes*, aſſerted by Lamarck to be of no avail, in a natural point of view, for the purpoſe of dividing *Robinia* into two genera.

15. R. *jubata.* Bearded Robinia. Willd. n. 14. Ait. n. 7. "Pall. in Nov. Act. Petrop. v. 10. 370. t. 6."—Stalks ſimple, ſingle-flowered. Leaves abruptly pinnate, of numerous pairs of lanceolate, downy leaflets; their common ſtalks thread-ſhaped, ſpinous, permanent, reflexed. Branches villous.—Found near lake Baical in Siberia, from whence it was imported by Mr. Buſh, in 1796. This is a ſmall *ſhrub*, ſcarcely two feet high, with villous *branches*, aſſuming a very peculiar aſpect in conſequence of its numerous, reflexed, permanent, hardened and ſpinous *common footſtalks*. The *leaflets* are narrow. *Flowers* purpliſh. *Legumes* cylindrical, hard, reddiſh-brown.

16. R. *tragacanthoides.* Tragacanthine Robinia. Willd. n. 15. "Pall. in Nov. Act. Petrop. v. 10. 371. t. 7."—Stalks ſimple, ſingle-flowered. Leaves abruptly pinnate, of two pair of oblong-lanceolate, ſilky leaflets; their common ſtalks ſpinous and permanent, as well as the ſtipulas. Legume downy, ſomewhat compreſſed.—Native of granite rocks in Siberia, beyond lake Baical. A ſmall *ſhrub*, very much branched. *Branches* downy, armed with ſtrong, recurved, ſtipulaceous *ſpines*. *Leaflets* ſmall, tapering at each end, tipped with terminal, ſolitary thorns. *Flowers* yellow. *Legume* cylindrical, ſlightly compreſſed. *Willd.*

17. R. *ſpinoſa.* Thorny Robinia. Linn. Mant. 269. Willd. n. 16. Ait. n. 8. "Schmidt Arb. t. 36." (R. ferox; Pall. Roſſ. v. 1. p. 1. 70. t. 44.)—Stalks ſingle-flowered, very ſhort. Leaves abruptly pinnate, of about three pair of wedge-ſhaped ſmooth leaflets; their common ſtalks ſpinous and permanent, as well as the ſtipulas. Legume cylindrical. Native of moiſt gravelly vallies, as well as of dry ſandy hills, in Siberia. Hardy in our gardens, flowering in April and May. Pallas reports, that it is frequent about Pekin in China, where, being fixed with clay on the tops of walls, it ſerves to keep off intruders. The long ſtrong *thorns*, formed by the hardened *footſtalks*, render the buſhes of this ſpecies excellent for hedges. The *ſtems* are as tall as a man, much branched. *Leaflets* oblong-wedge-ſhaped, hardly an inch in length. *Flowers* yellow, axillary, either ſolitary or two or three together, each on a ſimple *ſtalk* not half the length of its *calyx*.

18. R. *Halodendron.* Salt-tree Robinia. Pall. It. v. 2. append. 741. t. W. Roſſ. v. 1. p. 1. 72. t. 46. Linn. Suppl. 330. Willd. n. 17. Ait. n. 9. Curt. Mag. t. 1016. —Stalks three-flowered. Leaves abruptly pinnate, of two pair of ſilky leaflets; their common ſtalks ſpinous and permanent. Legume inflated.—Found by Pallas, in dry ſalt fields, about the river Irtis, in Siberia. The late Dr. Pitcairn is mentioned as having firſt imported it in 1779. This *ſhrub* is hardy with us, but ſeldom bloſſoms, which is much to be regretted on account of its beauty. Its thorny habit nearly accords with the foregoing; but the *leaflets* are fewer, larger, and ſilky, of a glaucous hue. *Corolla* of a delicate roſe-colour. *Legume* ovate, inflated, an inch long, ſcarcely leſs different from the *Caragana* tribe, than from the original *Robinia*; yet no perſon who attends to natural genera could think of ſeparating this plant from the laſt.

19. R. *Chamlagu.* Shining Robinia. L'Herit. Stirp. 161. t. 77. Willd. n. 18. Ait. n. 10.—Stalks ſingle-flowered. Leaves abruptly pinnate, of two pair of obovate ſmooth leaflets; their common ſtalks ſpinous. Stipulas awl-ſhaped, ſpinous, permanent. Branches decumbent.—Suppoſed to be a native of China. It has long been cultivated in the French gardens, and was ſent to Kew, in 1773, by Monſ. Richard. The ſhrub is hardy, flowering in May and June. The *ſtem*, at firſt erect, throws out long decumbent *branches*. *Leaves* green, ſmooth and ſhining; each leaflet tipped with a ſmall briſtly point. *Flowers* large, on long, ſolitary, ſimple *ſtalks*, pendulous, yellow; the diſk of their *ſtandard* at firſt green, afterwards deep red. The young *legume* is cylindrical, but we have never ſeen it full-grown. The *footſtalks*, though ſpinous, are leſs hard and permanent than in many of the other ſpecies.

20. R. *fruteſcens.* Buſh Robinia. Linn. Sp. Pl. 1044. Willd. n. 19. Ait. n. 11. Pall. Roſſ. v. 1. p. 1. 69. t. 43. —Stalks ſingle-flowered. Leaves of four, obovate, ſmooth, briſtle-pointed, equal-ſtalked leaflets. Branches aſcending. —Native of hills in the temperate parts of Siberia. Cultivated

vated by Miller in 1752; flowering in the ſpring. The *ſtem* is branched, buſhy, and erect, various in height, from two to eight or nine feet. *Leaves* different from all the foregoing, conſiſting of four, nearly equal, obovate *leaflets*, each on its own ſhort partial ſtalk, at the ſummit of a rigid, ſpinous-tipped, *common footſtalk*, not a quarter the length of the leaflets. *Stipulas* lanceolate, oblique, combined with the common footſtalk, and at length hardened with it into a three-branched divaricated ſpine. *Flowers* yellow, their ſimple ſolitary ſtalks longer than the leaves. The *foliage* varies greatly in luxuriance, according to circumſtances. The *legume* is cylindrical.

21. R. *pygmæa*. Dwarf Robinia. Linn. Sp. Pl. 1044. Willd. n. 20. Ait. n. 12. Pall. Roſſ. v. 1. p. 1. 71. t. 45. (Aſphalatus fruteſcens minor anguſtifolius, cortice aureo; Amm. Ruth. 204. t. 35.)—Stalks ſingle-flowered. Leaves of four linear-lanceolate, ſpinous-pointed, nearly ſeſſile leaflets.—Native of rocky hills in many parts of Siberia. Cultivated by Miller in 1751; flowering in the ſpring. This has much affinity to the laſt, but the narrow *leaflets* and their ſpinous points, as well as the more evident and pungent thorns of their ſhort *common footſtalk* and *ſtipulas*, readily diſtinguiſh it. The *flowers* are yellow. *Leaves* often more or leſs ſilky or hairy.

R. *mitis*, Linn. Sp. Pl. 1044, is referred by Willdenow to *Dalbergia*, under the name of *arborea*; Sp. Pl. v. 3. 901. Ait. H. Kew. v. 4. 248. This is *Pongamia glabra*, Venten. Malmaiſ. t. 28; an Eaſt Indian tree, of loſty growth, which has not yet bloſſomed in our ſtoves. Ventenat ſaw its flowers at the garden of Malmaiſon. The *calyx* is purple; *petals* white. *Legume* ovate, pointed, thick and woody.

We are not acquainted with *R. amara* and *flava* of Loureiro, Cochinch. 455, 456, nor dare we adopt them without examination.

Robinia, in *Gardening*, compriſes plants of the hardy, deciduous, tree and ſhrub ſorts, with tender kinds for the ſtove. The ſpecies cultivated are moſtly theſe: the falſe or common acacia (R. pſeudo-acacia); the roſe acacia, or robinia (R. hiſpida); the Siberian abrupt-leaved robinia (R. caragana); the ſhrubby robinia (R. fruteſcens); the dwarf robinia (R. pygmæa); the thorny robinia (R. ſpinoſa); the aſh-leaved robinia (R. violacea); and the ſmooth Indian robinia (R. mitis).

The firſt ſort grows very faſt whilſt young, ſo that in a few years from ſeed, the plants riſe to eight or ten feet high, and it is not uncommon to ſee ſhoots of this tree ſix or eight feet long in one ſummer; the branches are armed with ſtrong crooked thorns. But there is a variety which has no thorns on the branches, but which is eaſily known at firſt ſight by its peculiar appearance. And the echinated, or prickly-podded American falſe acacia, in which the pods are much ſhorter, and cloſely beſet with ſhort prickles, but in other reſpects agrees with the common ſort.

The ſixth ſpecies, on account of the length and toughneſs of the branches, and its large ſtout thorns, is admirably adapted to form impenetrable hedges, and is ſufficiently hardy to bear our climate.

Method of Culture.—The firſt ſix hardy ſorts are all capable of being raiſed from ſeeds, cuttings, layers, and ſuckers; but the ſeed method is ſaid to afford the beſt plants.

The ſeeds ſhould be ſown about the end of March or beginning of the following month, on a bed of light mould, being covered to the depth of about half an inch. In the firſt ſort and varieties the plants moſtly appear in the courſe of ſix or eight weeks; but in the other kinds often not till the next ſpring. They ſhould be well weeded and watered, and when ſufficiently ſtrong, be ſet out in the ſpring or autumn in nurſery-rows, for two or three years, in order to remain, to have proper growth for final planting out. The cuttings ſhould be made from the young ſhoots, and be planted out in the beginning of autumn, in a ſhady border, where the ſoil is mellow. They are moſtly well rooted in the courſe of a twelvemonth, when they may be removed into nurſery-rows as above. The layers ſhould be made from the young wood, being laid down in the autumn, when, in the courſe of the year, they moſtly become well rooted, and may be taken off and planted out in nurſery-rows, as the ſeedling plants. And the ſuckers, which are produced in plenty from the two firſt ſorts, may be removed in the early autumn or ſpring, and be planted out in nurſery-rows or in beds, to be afterwards removed into them.

The two laſt, or tender ſorts, may likewiſe be raiſed from ſeeds and cuttings, but they muſt be ſown and planted in pots filled with good mould, to have the aſſiſtance of a hot-bed in the ſtove, by being plunged in it. When the plants have attained a little growth, they ſhould be ſhaken out of the pots, and planted ſeparately in ſmall pots, filled with the ſame ſort of earth, plunging them in the tan-bed, affording due ſhade till well rooted, managing them afterwards as other tender ſtove plants. And as the plants are moſt tender while young, they ſhould therefore be kept in the ſtove tan-bed till they have acquired ſtrength, when they may be preſerved in the dry ſtove, with a temperate heat in winter, and be expoſed in the open air in ſummer, in a warm ſheltered ſituation, when the weather is fine.

It may be noticed that the hardy ſorts have a fine effect in the border clumps and other parts of pleaſure-grounds, and the tender kinds afford variety in the ſtove-collections.

ROBINS, Benjamin, in *Biography*, a celebrated mathematician, was born at the city of Bath in the year 1707. His parents were in very low circumſtances, and utterly unable to give their ſon much education. His genius, however, ſtrongly urged him to the purſuit of knowledge: he became his own inſtructor, and made an early and ſurpriſing progreſs in various branches of literature and ſcience, particularly in the mathematics. He came to London under the patronage of Dr. Pemberton; and at the age of 20, he gave a demonſtration of the laſt propoſition of Newton's Treatiſe on Quadratures, which was ſo ably performed, that it was thought deſerving a place in the Philoſophical Tranſactions for the year 1727; and towards the cloſe of the ſame year he was admitted a member of the Royal Society. In the courſe of the following year he embraced an opportunity of offering to the public a ſpecimen of his acquaintance with natural philoſophy. The Royal Academy of Sciences at Paris, among their prize queſtions in 1724 and 1726, had aſked for a demonſtration of the laws of motion in bodies impinging on one another. On this occaſion, John Bernouilli appeared in the liſt of candidates, but did not obtain the reward. He felt himſelf aggrieved, and appealed to the learned world, by publiſhing his demonſtration in 1727. In the following year, Mr. Robins publiſhed a confutation of Bernouilli's performance, which was allowed to be unanſwerable. Mr. Robins, about this time, began to take pupils, profeſſing to teach the mathematics only; yet he frequently aſſiſted them with inſtruction and advice on other ſubjects, for which he was well qualified, by the rich ſtores of knowledge with which his mind was furniſhed. After ſome time he abandoned the laborious buſineſs of education, and devoted his attention to ſubjects which required more exerciſe. Among other things, he made many experiments in gunnery, from a belief that the

resistance of the air had a much greater effect on swift flying projectiles than was generally supposed. He likewise directed his attention to the mechanic arts, such as the construction of mills, the building of bridges, draining of fens, rendering rivers navigable, and the making of harbours. The art of fortification, likewise, very much engaged his thoughts: with this view he took pains to inspect all the principal strong places in Flanders, during some journies which he made on the continent with persons of distinction. On his return, he undertook a defence of the doctrine of fluxions, as laid down by sir Isaac Newton, in opposition to the objections brought against it by the learned bishop Berkeley. In 1735 Mr. Robins published "A Discourse concerning the Nature and Certainty of Sir Isaac Newton's Method of Fluxions and of prime and ultimate Ratios." On the same subject he wrote two or three other pieces.

In the year 1739 he published, without his name, three pamphlets on political topics, and on the popular side of the question; and so highly did they raise the author in the estimation of the patriotic party, that when a committee of the house of commons was appointed to examine into the conduct of sir Robert Walpole, he was chosen their secretary. In 1742 Mr. Robins published a small treatise, entitled "New Principles of Gunnery;" containing the result of many experiments, by which he discovered the force of gunpowder, and the difference in the resisting power of the air to swift and slow motions. From which it appeared, that the opposition of that medium to bullets and shells, discharged from cannon and mortars, far exceeded what was generally imagined; and that the track which their motion described differed from that of a parabolic line, to a degree unsuspected by any who had written expressly on the subject, from the time of Galileo. This publication was undertaken to demonstrate his own superiority, as a man of talents, over a successful competitor, Mr. Muller, for a situation in the Royal Military Academy at Woolwich. Some time after the publication of this work, a paper having been admitted into the Philosophical Transactions, containing experiments intended to invalidate some of Mr. Robins's opinions, he thought proper, in an account which he gave of his book in the same Transactions, to take some notice of those experiments. In consequence of this, several dissertations of his on the resistance of the air were read, and experiments to confirm his doctrine were exhibited before the Royal Society, in the year 1746-7; for which he was presented with the annual gold medal by that society. His reputation was now so high, that he was invited by the prince of Orange to assist in the defence of Bergen-op-Zoom, which was besieged by the French, and he actually crossed the sea with that view; but he had scarcely reached the Dutch camp, before the French, owing either to negligence or treachery in the garrison, unexpectedly became masters of the place.

In the year 1748, Anson's "Voyage round the World" was published, bearing the name of Walter in the title-page, though it was soon known to have been Mr. Robins's production. No work of the kind ever met with a more favourable reception: four large editions were sold within a year, and it has been since reprinted very frequently in all sizes. It was translated in almost all the European languages. He was next employed to draw up an apology for the unfortunate defeat of the king's troops by the rebels, at Preston-Pans in Scotland, which was prefixed to "The Report of the Proceedings and Opinion of the Board of General Officers, on their Examination into the Conduct of Lieutenant-General Sir John Cope," &c.

After this, Mr. Robins had opportunities, through the favour of lord Anson, of making further experiments in gunnery; an account of which, with other pieces, were published after his death. Through the interest of the same nobleman, he contributed to the improvement of the Royal Observatory of Greenwich, by procuring for it many valuable instruments. In the year 1749 he was made engineer-general to the East India Company; and with a complete set of astronomical instruments, for making observations and experiments, he arrived in India in the summer of 1750. He set about the business which he had undertaken immediately, with the utmost diligence, and soon formed plans for fort St. David and Madras; but he did not live to carry them into execution. The change of climate was more than he could endure, and he died at the early age of 44, in July 1751.

Mr. Robins was one of the most accurate and elegant mathematical writers of this country, and he made more real improvements in artillery, and on subjects relating to the resistance of the air to projectiles, than all the preceding authors on the subject. His "New Principles of Gunnery" were translated into various languages, and commented upon by several eminent mathematicians. Euler translated it into the German, and accompanied the version with a large and critical commentary. This again was published in England, with an English translation of the German commentary and notes, by Mr. Hugh Brown, in 1777. All Mr. Robins's mathematical and philosophical pieces were collected, and published in 2 vols. 8vo. 1761, by Dr. Wilson, with an account of the author, from which the foregoing article is chiefly extracted.

ROBINSON, Robert, born in October 1735, at Swaffham, in the county of Norfolk, was son of Mr. Michael Robinson, a native of North Britain, and Mary, the daughter of Mr. Robert Wilkin of Mildenhall, Suffolk, a man of great respectability in private life, and in possession of a moderate independence. Robert was the youngest of their three children: his elder brother was apprenticed to a painter, and his sister to a mantua-maker; he was sent to a Latin school at the age of six years, where he made a considerable proficiency, and discovered an uncommon capacity for learning. His father, in the course of his profession, was removed from Swaffham to Scarning, in the same county, where finding his situation very unpleasant, he left the place, his family returning home, and he shortly after died at Winchester. At Scarning young Robinson was sent to an endowed grammar-school, then under the care of the Rev. Joseph Brett. Several persons of eminence received the early parts of their education at the same school, among whom was the late lord Thurlow. At this school he gained a considerable knowledge of the French, as well as of the classical languages. At the age of 14 he was put apprentice to a hair-dresser, in Crutched-Friars, London. For this occupation his mind was very ill adapted, and he stole from the hours devoted to sleep no small portion of time for the improvement of his mind. During his apprenticeship he appears to have imbibed serious impressions of religion, which he encouraged, by attending the most celebrated preachers of the day among the Independents, the Baptists, and the clergy falsely named evangelical; for they dwell, in their pulpit discourses, upon all sorts of subjects, excepting only those contained in the four gospels. Dr. Guise and Gill among the dissenters, Romaine in the church, and Whitfield, the leader of the Calvinistical Methodists, were his chief favourites. At this period Robinson had a considerable portion of enthusiasm in his constitution, which is not an undesireable quality in young people

people left much to themselves, and liable to a thousand temptations in corrupt and licentious cities and large towns. It is often the best preservative of their morals, and will frequently grow into rational and energetic modes of thinking and acting.

About the age of 20, Robert Robinson had his indentures given him up, at his own request, feeling a great desire to become a preacher. He had, previously to this, been in the habit of preaching for the hour together to himself, thinking that he should thereby be better prepared to address an audience assembled to hear his discourses. His first sermon was delivered to a very small congregation at Mildenhall, in Suffolk; and his reception was such as to justify the hope that he had taken that direction to which his talents naturally tended. He was soon after invited to preach at the Tabernacle in Norwich, and at several places in Norfolk and Cambridgeshire. He continued to preach among the Methodists two years, during which period he appears to have turned his attention more particularly to the controversy between the members of the established church and the dissenters, and to have determined, upon the fullest conviction, to take his lot with the latter. He had, however, according to Dr. Rees, who preached his funeral sermon, a temptation to connect himself with the former, too powerful for any but a man of Christian integrity to resist. "A rich relation," says the doctor, "who had promised to provide liberally for him, and who had bequeathed him a considerable sum of money in his will, threatened to deprive him of every advantage which he had been encouraged to expect, unless he quitted his connection with the dissenters. But the rights of conscience, and the approbation of God, were superior in his regard to every worldly consideration: he preserved his integrity, steadily maintained his principles, and persevered in his connection with the dissenters; but forfeited the favour of his relation, and every advantage which, living or dying, he had in his power to bestow."

He now attempted to incorporate the Methodists, among whom he ministered, into a regular church; but proving unsuccessful, he determined to separate from them. Having done so, he formed a small *Independent* congregation at Norwich, and during his connection with them, he administered infant baptism; but on leaving this congregation, he renounced infant baptism, and administered this ordinance only to adults, and by immersion.

In the spring of 1759 he was invited to preach to a small congregation of Antepædobaptists at Cambridge. About the same time he married Miss Ellen Payne; and in 1761 he accepted the pastoral office in this church. When Mr. Robinson first settled with this society, it consisted only of 34 members, most of whom were very poor, so that he could look only for a salary of a few pounds at most; but it increased rapidly under him, and in a few years he had the satisfaction of seeing a new and more commodious place of worship, erected at the sole expence of the congregation; and in 1774, the number of families connected with it was not less than 200, many of whom ranked among the most respectable in the town and neighbourhood. Mr. Robinson preached twice or thrice on each Sunday, and usually once on some other day in the week, at Cambridge. On some of the other mornings and evenings in the week, excepting in times of hay and corn-harvest, he expounded the scriptures, or delivered religious and moral lectures, in the village where he lived, or in the neighbouring villages. To young persons he rendered essential service, by delivering lectures to them at his own house, or by private conversation. These various employments of his time he rendered consistent with his other numerous engagements, and close application to study, by the excellent habit which he had acquired, when young, of rising early in the morning, *viz.* at four or five o'clock; a practice that ought to be recommended to every student. "I wish," says the late Gilbert Wakefield, speaking on the same subject, "my advice and imperfect experience of its benefits could persuade every youth to engrave it, in impressions not to be effaced, on the tablet of his heart, and exemplify it in his daily practice."

"——————— Ni
Posces ante diem librum cum lumine; si non
Intendes animum studiis et rebus honestis,
Invidiâ vel amore vigil torquebere."

"Rise, light thy candle, see thy task begun,
E'er redd'ning streaks proclaim the distant sun;
Or lust's fierce whirlwind will thy calm molest,
Or envy cloud the sunshine of thy breast."

Soon after the opening of the new meeting-house, the abilities of Mr. Robinson as a preacher began to attract the notice of the academics, many of whom, from serious motives, became regular attendants; while others came to meeting only to indulge their curiosity, or perhaps to ridicule the minister. Of the latter description were several under-graduates, who frequently disturbed the devotion of the congregation by an indecency of behaviour. Complaints of their conduct had been repeatedly made to the magistrates of the university, and the heads of the colleges, but without procuring redress. At length the rudeness of these young men required measures to be taken, which should no longer be treated with contempt. A legal process was began, which induced two of the worst offenders to agree to ask pardon in the public papers. The persons aggrieved, however, remitted this punishment in the case of one of the delinquents, on account of his otherwise excellent character. The evil was, by this measure, well nigh cured, and Mr. Robinson had little or no reason to complain afterwards of interruption from that quarter. From this period, many of the most respectable members of the university solicited his acquaintance, and entertained a due respect for his worth, however they differed from him in opinion; and through their aid and influence, he obtained freedom and access to the valuable libraries at Cambridge, and was permitted, in many cases, the more important privilege of having books from them at his own house.

In the year 1773, Mr. Robinson's family having become so numerous that his salary as a minister was found inadequate to his support, he found it necessary to have recourse to other means for making a provision for them. He accordingly removed to Chesterton, near Cambridge, and commenced farmer, to which, in time, he added the business of a dealer in corn and coals. His farming and mercantile engagements, however, did not diminish his ardour for literary pursuits, as is evident from his various publications. The first work which contributed to make him known as an author, was published in 1774, under the title of "Arcana," or the Principles of the late Petitioners to Parliament for relief in Matters of Subscription, in eight letters to a friend. The reception which this piece met with was extremely encouraging: it procured the author many valuable friends among the dissenters. His next publication was an "Appendix" to "The Legal Degrees of Marriage, stated and considered by John Alleyne, Barrister at Law," 2d edition, 1775. It consists of a discussion of the question, "Is it lawful and right for a man to marry the sister of his deceased wife?" in which he maintained, in a very

very forcible manner, the affirmative ſide of the queſtion. In the ſame year he publiſhed an entire volume of "Sermons, from the original French of the late Rev. James Saurin, Paſtor of the French Church at the Hague," which was followed, at different periods, by four others. Introductory to theſe volumes are prefatory diſſertations, containing intereſting memoirs of the Reformation in France, and the life of Saurin, together with reflections on Deiſm, Chriſtian liberty, &c. The fame which Mr. Robinſon acquired by this publication, induced certain divines, and among them dignitaries of the eſtabliſhed church, to offer him liberal terms for original ſermons for their own uſe.

In the year 1776, the controverſy reſpecting the divinity of Chriſt, which had been carried on principally by members of the church of England, ſome of whom had reſigned their livings, much engaged the public attention. Mr. Robinſon appeared on the popular ſide of the queſtion, and publiſhed "A Plea for the Divinity of our Lord Jeſus Chriſt, &c." This piece is written with much ingenuity, and it procured the author a number of handſome compliments, not only from diſſenting miniſters, but alſo from ſeveral dignitaries of the eſtabliſhed church. Among the latter were Dr. Hinchliffe, biſhop of Peterborough, Dr. Hallifax, afterwards biſhop of Glouceſter, Dr. Beadon, afterwards biſhop of Bath and Wells, and Dr. Tucker, dean of Glouceſter. Some years after, Mr. Lindſey publiſhed, without his name, "An Examination of Mr. Robinſon's Plea for the Divinity of Chriſt;" in a ſecond edition, in 1789, Mr. Lindſey prefixed his name. Mr. Robinſon was frequently called upon to reply to Mr. Lindſey, but he declined. To his friends he ſaid, "The anonymous examiner has not touched my arguments, and his ſpirit is bitter and contemptuous. His faith ſtands on criticiſms; and my argument is, that if the doctrine requires critical proof, it is not popular, and therefore not divine." In 1777, Mr. Robinſon publiſhed a ſmall tract, entitled "The Hiſtory and Myſtery of Good Friday," that has paſſed through numerous large editions, and in which the evil and folly of church holidays is with equal humour, learning, and argument, unanſwerably demonſtrated. In 1778, Mr. Robinſon publiſhed "A Plan of Lectures on the Principles of Nonconformity, for the Inſtruction of Catechumens." This piece contains an outline of the whole controverſy of the diſſenters with the church of England, and of their hiſtory, from the period of the Reformation, to the year 1778. In the houſe of lords it was mentioned with due reſpect by the earl of Shelburne; and it was ably defended in the houſe of commons by Mr. Fox, in oppoſition to an illiberal attack upon the principles of diſſent, from the eloquent Mr. Burke, whoſe calumnies were confined to no people nor ſet of principles. Towards the cloſe of the ſame year, Mr. Robinſon publiſhed "An Eſſay on the Compoſition of a Sermon, tranſlated from the original French of the Rev. John Claude, with Notes," in 2 vols. 8vo. The preface to the firſt volume of the "Eſſay" conſiſts of memoirs of the life of the author.

In 1780, Mr. Robinſon paid a viſit to the univerſity of Oxford, and afterwards accompanied ſome friends in a tour into Scotland, where he was much gratified by civilities ſhewn him by ſome of the literati of Edinburgh; and he might have received the diploma of doctor of divinity, had he not thought proper to decline that compliment. Soon after his return to Cambridge, he publiſhed a little tract well calculated to produce a Catholic ſpirit among his brethren of the Baptiſt denomination, entitled "The General Doctrine of Toleration, applied to the particular Caſe of Free Communion." It was about this period he preached and publiſhed a ſermon, entitled "Slavery inconſiſtent with the Spirit of Chriſtianity," and he was the author of the admirable petition of the gentry, clergy, freeholders, and other inhabitants in the county of Cambridge, which was preſented to the houſe of commons. In the year 1781, Mr. Robinſon, at the deſire of his brethren, began to collect materials for the Hiſtory of the Engliſh Baptiſts. In his reſearches he was led to enter on a larger field than what had been originally propoſed to him, and inſtead of confining himſelf to the hiſtory of Engliſh Baptiſts, he was induced to trace the hiſtory of baptiſm from the earlieſt uſe of that rite, as well as that of Baptiſts in all ages.

In the year 1782, Mr. Robinſon publiſhed "A Political Catechiſm," intended to convey, in a familiar manner, juſt ideas of good civil government, and the Britiſh conſtitution. This tract was written at the time that the North adminiſtration was diſcarded from the councils of their ſovereign for that of the marquis of Rockingham. To ſupport the ſyſtem profeſſed by the latter—to diſſeminate ſafe political principles—to place public happineſs on its true baſis, were the motives which induced Mr. Robinſon to endeavour to attract the attention of youth to this ſubject. This work, as well as the preface to the "Plan of Lectures," and his ſermon, entitled "Chriſtian Submiſſion to Civil Government," afford ample evidence of the ſoundneſs of his principles as a friend to civil government in general, and to that form of civil government, the Britiſh conſtitution, in particular. It was in 1786 that Mr. Robinſon publiſhed "Sixteen Diſcourſes on ſeveral Texts of Scripture, addreſſed to Chriſtian Aſſemblies, in Villages near Cambridge; to which are added Six Morning Exerciſes." Theſe diſcourſes were delivered extempore to plain and illiterate audiences, in a ſimple but animated ſtyle; and they were afterwards written out, from memory, by the author, as nearly as he could recollect them. They are chiefly on practical ſubjects; but ſuch of them as touch on doctrinal ſubjects diſplay much candour and liberality. This ſpirit of liberality excited ſerious apprehenſions concerning the purity of his faith among many of his orthodox friends, who expoſtulated with him, both in perſon and by letter. Soon after this he afforded real ground for entertaining apprehenſions that his faith in the gloomy doctrines of Calviniſm was not ſo ſtrong as in the opinion of his brethren it ought to have been. Many of them attacked him in their pulpits, endeavouring to diminiſh his well-earned popularity, by ſtigmatizing him with the names of Arian and Socinian; but others, though themſelves zealouſly attached to thoſe doctrines, which he ſeemed inclined to abandon, continued his faithful and invariable friends. With his congregation at Cambridge he ſtill continued his miniſterial labours; he had been the miniſter of their choice, and remained high in their eſteem.

During the latter years of his life, the large field of enquiry upon which Mr. Robinſon had entered, led him to ſuch a courſe of intenſe application, as undermined the ſtrength of his conſtitution, before he had given the finiſhing hand to his labours, and brought on a gradual decay, attended with a great depreſſion of ſpirits. In theſe circumſtances, it was hoped by his family that a journey to Birmingham, and an interview with Dr. Prieſtley, which he had long wiſhed for, might prove beneficial to him. Having arrived at that town, he ventured to preach twice on the ſame Sunday for the benefit of the charity ſchools. His friends perceived that he was ill, but none of them ſuſpected his end was ſo near; he ſpent the evening of the following Tueſday in the cheerful ſociety of his friends, and

and retired to rest as usual; but on the next morning he was found dead in his bed, where he appears to have expired exactly as he hoped it might be permitted him to leave the world, suddenly—and alone, without feeling the agonies of death, or occasioning alarm or distress to affectionate relatives and friends. He died June 8th, 1790, in the 55th year of his age.

Mr. Robinson was a wonderful example of a man who rose to considerable eminence by his own exertions. To his great talents and extensive learning his various writings bear the fullest testimony. He possessed an ardent love of truth, was laborious in the search after it, and at all times was a strenuous advocate for such principles as he had adopted upon deliberate conviction, while he ever exercised candour and liberality toward those whose opinions differed from his own. Of civil and religious liberty he was the enlightened, steady, and zealous friend. In his domestic relations he was attentive and affectionate; and to the poor a friend, comforter, and, as far as his limited means permitted, a generous benefactor. As a preacher, "there was always a variety, and often an originality, both in what he said, and in his mode of saying it. It was his constant aim to lead the attention of his hearers to the weightier matters of the law; to inform the judgment before he attempted to interest the passions; and, after inculcating just notions of truth and duty, to enforce a corresponding practice. There have been few preachers who have done so much to rescue the human mind from bondage; to correct prevailing errors; to promote a liberal spirit of inquiry; to recommend mutual forbearance and candour among Christians of different opinions; to weaken their attachment to creeds and forms of human device and imposition, and to direct their chief attention to the principles and duties of piety, virtue, and universal charity. He had a manner of supplanting rooted prejudices without occasioning alarm; of sapping instead of storming the fortifications of error; of gaining assent to general principles, inconsistent with the opinions which he wished to expose: and of leading men to think, judge, and determine for themselves, and to pursue these principles to their consequences, in which he wonderfully excelled, and which produced, in many instances, the best effects." See Dr. Rees's Sermon before referred to.

It has already been observed, that Mr. Robinson died before he had completed the great work to which his attention had been chiefly confined for several years. One part of his comprehensive plan, however, was finished, and the whole, excepting a few sheets, printed off, and corrected by himself while passing through the press. This was published in the year 1790, under the title of "The History of Baptism," which is one of the most acute and ingenious defences of the distinguishing tenets of the Baptists which has ever yet appeared, deduced not only from the records of history, but from the relics of Christian antiquity, being illustrated with engravings from ancient paintings and buildings, and from Danish and Saxon remains in our British churches. This part of the plan was to have been followed by a history of the Baptists, which was left in an incomplete state, but which was published in 1792, under the title of "Ecclesiastical Researches." This work was carried through the press under the superintendance of Mr. Frend, who had long enjoyed the friendship of Mr. Robinson. Besides much information which these researches contain, that is not to be found in any other English work on the subject, and the interesting views of the progress of civil and religious liberty, together with well-drawn characters of its principal advocates, the reader will meet with a variety of important and excellent matter on other topics: the author has introduced into his narrative ingenious remarks, useful to elucidate the leading object of his inquiries, on the geography, government, laws, antiquities, commerce, productions, and customs and manners of the inhabitants of the several countries treated of. Since the death of the author, Mr. Benjamin Flower has collected all Mr. Robinson's works, with the exception of his "History of Baptism," "Ecclesiastical Researches," "Claude's Essay on the Composition of a Sermon," and his "Village Sermons," and published them in four volumes, 8vo., to which we refer our readers, who will find, by looking them over, that we have in our enumeration of Mr. Robinson's works omitted some of minor importance. And in the year 1812, the same person published certain posthumous pieces of our author in one volume octavo: these, on the whole, cannot be said to add to the reputation of Mr. Robinson; they consist of seven sermons, and three dissertations, "On the Nature and Operations of the Human Mind, as relating more particularly to Theological Inquiries;" "Literary Precautions necessary to the Study of Theology;" "On Predestination; or, Moderate Calvinism considered as the safe Path between Two Extremes." To these tracts are added "An Historical Account of Protestant Dissenting Churches in Cambridgeshire," and divers of Mr. Robinson's letters. See Dr. Rees's Sermon on the Death of Mr. Robinson; Dyer's Life of Robinson, 1796; and Flower's Memoirs, prefixed to the first vol. of the Miscellaneous Works, 1807.

Robinson, Richard, archbishop of Armagh, and baron Rokeby, was born in 1709. He was educated at Westminster school, from whence he was elected to Christ-church, Oxford, after which he became chaplain to archbishop Blackburne, of York, who gave him a prebend in his cathedral. He went with the duke of Dorset to Ireland, and was preferred to the see of Killala, from whence, in 1759, he was translated to Leighlin and Ferns, and in 1761 to Kildare. In 1765 he was advanced to the primacy of Ireland, and in 1777 he was created a peer. He built a palace in his diocese of Armagh, with an observatory. (See the article Observatory.) He also founded a school, and built four new churches. He died in 1794. Europ. Mag.

Robinson, John, organist of St. Laurence Jewry, of St. Magnus church, and of Westminster abbey. He was regarded as one of the best performers on keyed instruments of his time. As an organ-player he was attended by great crowds wherever he performed. He was educated in the chapel-royal, under Dr. Blow. His wife was the daughter of Dr. William Turner, and a public singer. She performed in Scarlatti's opera of Narcissus, brought on the stage by Roscingrave, in 1720; and to distinguish her from Mrs. Anastasia Robinson, who sung in the same opera, she was called Mrs. Turner Robinson. This celebrated organist died at an advanced age in 1762, and was succeeded, in Westminster abbey, by Dr. Benjamin Cook.

Robinson, *Miss*, daughter of the celebrated organist of Westminster abbey, who sung at concerts, and, one season, in Handel's oratorios. She was a coarse singer, with an unpleasant toned voice; but that did not prevent her from becoming a great player on the harpsichord; particularly on a harpsichord made by Rucker, with pedals, of which she had acquired, by labour and perseverance, a facility of execution equal to German organists. The result, however, was not equal to the great difficulty of using them. The pedals of an organ often produce fine effects in sustaining notes with the feet, while both hands are at liberty to ramble about

about in the treble at their pleasure. But on a harpsichord with pedals to short-lived sounds, the clatter of striking them so often is abominable; it is not music, but noise.

Robinson, *Mrs.* Anastasia, a most amiable and accomplished person, who performed as a singer in our first Italian operas, from the year 1714 to 1724. This performer, descended from a good family in Leicestershire, was the daughter of a portrait painter, who, having visited Italy for improvement in his art, had made himself master of the Italian language, and acquired a good taste in music. And finding that his daughter Anastasia, during her childhood, had an ear for music, and a promising voice, he had her taught by Dr. Crosts, at first as an accomplishment; but afterwards being afflicted with a disorder in his eyes, which terminated in a total loss of sight; and this misfortune depriving him of the means of supporting himself and family by his pencil, he was under the necessity of availing himself of his daughter's disposition for music, to turn it to account as a profession. She not only prosecuted her musical studies with great diligence, but by the assistance of her father had acquired such a knowledge in the Italian tongue as enabled her to converse in that language, and to read the best poets in it with facility. And that her taste in singing might approach nearer to that of the natives of Italy, she had vocal instructions from Sandoni, at that time an eminent Italian singing master resident in London, and likewise from the opera singer called the Baroness.

Her first public exhibition was at the concerts in York-buildings, and at other places, where she usually accompanied herself on the harpsichord. Her general education had been pursued with the utmost care and attention to the improvement of her mind, as well as to ornamental and external accomplishments; and these advantages, seconded by her own disposition and amiable qualities, rendered her conduct strictly prudent and irreproachable. And what still entitled her to general favour, was a behaviour full of timidity and respect to her superiors, and an undissembled gentleness and affability to others, which, with a native cheerfulness that diffused itself to all around her, gained her at all times such a reception from the public, as seemed to ensure her success in whatever she should undertake. Encouraged by the partiality of the public towards his daughter, and particularly by the countenance and patronage of some persons of high rank of her own sex, Mr. Robinson took a house in Golden-square, where he established weekly concerts and assemblies in the manner of *conversazioni*, which were frequented by all such as had any pretensions to politeness and good taste.

Thus qualified and encouraged, she was prevailed upon to accept of an engagement at the Opera, where she made her first appearance in Creso, and her second in the character of Ismina, the principal female part in Arminio. From this period till the year 1724, she continued to perform a principal part at the Opera with increasing favour and applause. Her salary is said to have been 1000*l.*, and her emoluments, by benefits and presents, were estimated at nearly as much more. When she quitted the stage it was supposed to have been in consequence of her marriage with the gallant earl of Peterborough, the friend of Pope and Swift, who distinguished himself so heroically in Spain during the reign of queen Anne. Though the marriage was not publicly declared till the earl's death in 1735, yet it was then spoken of as an event which had long taken place. And such was the purity of her conduct and character, that she was instantly visited at Fulham as the lady of the mansion, by persons of the highest rank. Here, and at Mount Bevis, the earl's seat near Southampton, she resided in an exalted station till the year of her decease, 1750, surviving her lord fifteen years; who, at the time of the connexion, must have been considerably beyond his prime, as he was arrived at his seventy-fifth year when he died.

The following anecdotes of Mrs. Anastasia Robinson having been communicated to us in 1787, by the late venerable Mrs. Delany, her contemporary and intimate acquaintance, they will doubtless be read with confidence and pleasure, not only by such as had the happiness of knowing her personally, but by all those to whom rumour has conveyed a faithful account of her longevity, virtues, and accomplishments; for this excellent person having been allowed by Providence to extend her existence to the great age of eighty-eight, in the constant enjoyment of all the felicity which the friendship and admiration of rank, virtue, and talents could bestow; it seems as if, without hyperbole, she may be said to have been "beloved by God and man."

"Mrs. Anastasia Robinson was of a middling stature, not handsome, but of a pleasing, modest countenance, with large blue eyes. Her deportment was easy, unaffected, and graceful. Her manner and address very engaging; and her behaviour, on all occasions, that of a gentlewoman, with perfect propriety. She was not only liked by all her acquaintance, but loved and caressed by persons of the highest rank, with whom she appeared always equal, without assuming. Her father's house, in Golden-square, was frequented by all the men of genius and refined taste of the times; among the number of persons of distinction who frequented Mr. Robinson's house, and seemed to distinguish his daughter in a particular manner, were the earl of Peterborough and general H——; the latter had shewn a long attachment to her, and his attentions were so remarkable, that they seemed more than the effects of common politeness; and as he was a very agreeable man, and in good circumstances, he was favourably received, not doubting but that his intentions were honourable. A declaration of a very contrary nature was treated with the contempt it deserved, though Mrs. A. Robinson was very much prepossessed in his favour.

"Soon after this, lord P. endeavoured to convince her of his partial regard for her; but, agreeable and artful as he was, she remained very much upon her guard, which rather increased than diminished his admiration and passion for her. Yet still his pride struggled with his inclination; for all this time she was engaged to sing in public, a circumstance very grievous to her, but urged by the best of motives, she submitted to it, in order to assist her parents, whose fortune was much reduced by Mr. Robinson's loss of sight, which deprived him of the benefit of his profession as a painter.

"At length lord P. made his declaration to her on honourable terms; he found it would be vain to make proposals on any other; and as he omitted no circumstance that could engage her esteem and gratitude, she accepted them, as she was sincerely attached to him. He earnestly requested her keeping it a secret till it was a more convenient time for him to make it known, to which she readily consented, having a perfect confidence in his honour. Among the persons of distinction that professed a friendship for Mrs. A. Robinson, were the earl and countess of Oxford, daughter-in-law to the lord-treasurer Oxford, who not only bore every public testimony of their affection and esteem for Mrs. A. Robinson, but lady Oxford attended her when she was privately married to the earl of P., and lady P. ever acknowledged her obligations with the warmest gratitude; and after lady Oxford's death, she was particularly distinguished by the duchess of Portland, lady Oxford's daughter, and

and was always mentioned by her with the greateſt kindneſs for the many friendly offices ſhe uſed to do her in her childhood when in lady Oxford's family, which made a laſting impreſſion upon the ducheſs of Portland's noble and generous heart.

"Mrs. A. Robinſon had one ſiſter, a very pretty accompliſhed woman, who married Dr. Arbuthnot's brother. After the death of Mr. Robinſon, lord P. took a houſe near Fulham, in the neighbourhood of his own villa at Parſon's-Green, where he ſettled Mrs. Robinſon and her mother. They never lived under the ſame roof, till the earl, being ſeized with a violent fit of illneſs, ſolicited her to attend him at Mount Bevis, near Southampton, which ſhe refuſed with firmneſs, but upon condition that, though ſtill denied to take his name, ſhe might be permitted to wear her wedding ring; to which, finding her inexorable, he at length conſented.

"His haughty ſpirit was ſtill reluctant to the making a declaration, that would have done juſtice to ſo worthy a character as the perſon to whom he was now united; and, indeed, his uncontrollable temper, and high opinion of his own actions, made him a very awful huſband, ill ſuited to lady P—'s good ſenſe, amiable temper, and delicate ſentiments. She was a Roman Catholic, but never gave offence to thoſe of a contrary opinion, though very ſtrict in what ſhe thought her duty. Her excellent principles and fortitude of mind ſupported her through many ſevere trials in her conjugal ſtate. But at laſt he prevailed on himſelf to do her juſtice, inſtigated, it is ſuppoſed, by his bad ſtate of health, which obliged him to ſeek another climate, and ſhe abſolutely refuſed to go with him unleſs he declared his marriage; her attendance upon him in his illneſs nearly coſt her her life.

"He appointed a day for all his neareſt relations to meet him at the apartment over the gate-way of St. James's palace, belonging to Mr. Pointz, who was married to lord Peterborough's niece, and at that time preceptor to prince William, afterwards duke of Cumberland. Lord P. alſo appointed lady P. to be there at the ſame time; when they were all aſſembled he began a moſt eloquent oration, enumerating all the virtues and perfections of Mrs. A. Robinſon, and the rectitude of her conduct during his long acquaintance with her, for which he acknowledged his great obligations and ſincere attachment, declaring he was determined to do her that juſtice which he ought to have done long ago, which was preſenting her to all his family as his wife. He ſpoke this harangue with ſo much energy, and in parts ſo pathetically, that lady P. not being appriſed of his intentions, was ſo affected that ſhe fainted away in the midſt of the company.

"After lord P—'s death ſhe lived a very retired life, chiefly at Mount Bevis, and was ſeldom prevailed on to leave that habitation, but by the ducheſs of Portland, who was always happy to have her company at Bulſtrode, when ſhe could obtain it, and often viſited her at her own houſe.

"Among lord P—'s papers ſhe found his memoirs, written by himſelf, in which he declared he had been guilty of ſuch actions as would have reflected very much upon his character. For which reaſon ſhe burnt them; this, however, contributed to complete the excellency of her principles, though it did not fail giving offence to the curious enquirers after anecdotes of ſo remarkable a character as that of the earl of Peterborough."

ROBINSON'S *Iſland*, in *Geography*, a ſmall iſland in the Florida ſtreams. N. lat. 24° 45'. W. long. 81° 35'.

ROBINSON *Cruſoe's Coat*, in *Botany*. See CACTUS.

ROBINSONIA, was ſo named by Scopoli, in his *Introductio ad hiſtoriam naturalem*, in honour of one, or all, of the four Robinſons, mentioned in Haller's *Bibliotheca Botanica*. The worthy author informed us, by word of mouth, that Haller's index was his uſual reſource for names to his new genera; any perſon mentioned there being, in his opinion, ſufficiently worthy of this kind of commemoration. It is pity that Robinſon Cruſo was not in the liſt, or he might have ſhared a botanical crown with Cook and Bouganville. If we muſt ſeriouſly appropriate the above honour, it would be in favour of Dr. Tancred Robinſon, a particular friend, and botanical aſſociate, of Ray.—Schreb. 337. Willd. Sp. Pl. v. 2. 999. Mart. Mill. Dict. v. 4. (Touroulia; Aubl. Guian. v. 1. 492. Juſſ. 434. Lamarck Illuſtr. t. 424.)—Claſs and order, *Icoſandria Monogynia*. Nat. Ord. uncertain, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, turbinate, with five acute teeth. *Cor.* Petals five, roundiſh, concave, ſpreading, inſerted into the calyx. *Stam.* Filaments numerous, capillary, ſwelling upwards, inſerted into the calyx beneath the petals; anthers of two oblong cells, divaricated at the baſe. *Piſt.* Germen ſuperior; ſtyle none; ſtigma oblong, ſtriated. *Peric.* Berry globoſe, ſomewhat depreſſed, marked with numerous, contiguous, longitudinal furrows, fleſhy, of ſeven cells, with membranous partitions. *Seeds* ſolitary, oblong, compreſſed, externally convex, hairy.

Eſſ. Ch. Calyx five-toothed. Petals five. Berry ſuperior, ſtriated, of ſeven cells. Seeds ſolitary, hairy.

1. R. *melianthifolia*. Willd. n. 1. (Touroulia guianenſis; Aubl. Guian. v. 1. 492. t. 194.)—Found by Aublet in the foreſts of Guiana, where the inhabitants know it by the name of Touroulia. The flowers appear in November, and the fruit is ripened in May. A large and lofty *tree*, with a wrinkled bark, and red wood; the *branches* ſpreading, quadrangular. *Leaves* oppoſite, pinnate, of about four pair, with an odd one, of elliptic-oblong, pointed, ſmooth, ſerrated leaflets, whoſe lateral veins are numerous and parallel, and their ſerratures each tipped with a briſtle. *Stipulas* acute. *Cluſters* terminal, compound, with oppoſite branches. *Flowers* tufted, nearly ſeſſile, yellow, ſmall. *Berry* an inch in diameter, reddiſh, of a pleaſant acid flavour. The *calyx* being certainly inferior, as Juſſieu determined by examination, its teeth can hardly crown the fruit, though, by Aublet's deſcription, its baſe ſeems confluent therewith.

ROBION, or ROUBION, in *Geography*, a river of France, which runs into the Rhone, a little below Montelimart.

ROBISON, JOHN, in *Biography*, an eminent Scotch mathematician and natural philoſopher, was born at Boghall, in the county of Stirling, in the year 1739. He was ſent to Glaſgow to receive his education, and was ſoon diſtinguiſhed for the rapid progreſs which he made in claſſical learning. He went, while very young, to the univerſity, where he enjoyed the benefit of the inſtructions of profeſſors Simſon, Leechman, Moore, Smith, and others. He was led to attach himſelf particularly to the mathematics, by perceiving how ſucceſsfully that ſcience was applied to ſeveral branches of natural philoſophy. Dr. Robert Simſon was his tutor in mathematics, and in his claſs Mr. Robiſon was ſoon diſtinguiſhed beyond any of his fellow ſtudents. Among other branches, Mr. Robiſon made himſelf well acquainted with the modes of algebra; but from profeſſor Simſon he derived a peculiar diſpoſition to the ſtudy of geometry, aſſigning, for a reaſon, what others have often done, who are tolerably converſant with both ſubjects, that in the longeſt demonſtration, the geometrician has clear and accurate ideas, which the moſt expert algebraiſt can very ſeldom have. Mr.

Robiſon had been deſigned, by his father, for the clerical profeſſion, but it appears he became diſſatisfied with it on account of ſome of the tenets in the eſtabliſhed creed. Accordingly, in 1757, he was candidate for the office of aſſiſtant to Dr. Dick, in the profeſſorſhip of natural philoſophy, but, being then only 19 years of age, he was deemed too young for the duties attached to that ſituation, and in the following year he went to ſea as mathematical tutor to Mr. Knowles, the eldeſt ſon of admiral Knowles. He embarked, with his pupil, on board the Neptune, of 90 guns, bound to Quebec; and, in the courſe of the voyage, Mr. Knowles being appointed lieutenant on board the Royal William, Mr. Robiſon accompanied him into that ſhip, and, at his own requeſt, was rated as midſhipman. In this ſhip he ſpent three years, which he thought the happieſt part of his life, and during this period he acquired that knowledge of the art of ſeamanſhip which qualified him to draw up the article on that ſubject in the Encyclopædia Britannica, which was underſtood to be his. While on board this veſſel, in the river St. Lawrence, he noticed a connection between the aurora borealis and the direction of the magnetic needle, which he pointed out to the gentlemen on the quarter-deck. During the ſiege of Quebec, Mr. Robiſon was ſent, with a party of ſeamen and petty officers, to reinforce the crew of the Sterling-Caſtle, which was lying before the city, and was thus enabled to ſee much ſervice both on board and on ſhore. He was likewiſe not unfrequently employed in taking ſurveys of different parts of the river. Upon the ſurrender of Quebec he returned to the Royal William, and ſpent the whole of the following year in the Bay of Biſcay, and on the coaſts of Spain and Portugal. In the year 1762, upon the expectation of future preferment from lord Anſon, then firſt commiſſioner of the admiralty, he went to Jamaica, for the purpoſe of trying Harriſon's time-keeper, and on his return to England he received the painful intelligence that his beloved pupil had, with the whole crew of the Peregrine, of which he was commander, periſhed, by the veſſel's foundering at ſea. He now felt that his proſpects of advancement in the navy were very ſlender, and determined to return to college. Very ſoon after, admiral ſir Charles Knowles confided to him the inſtruction of his younger ſon. At Glaſgow he renewed his ſtudies with great ardour, and in the year 1767, when Dr. Black was called to Edinburgh, the ſenate of the univerſity of Glaſgow, on his recommendation, appointed Mr. Robiſon his ſucceſſor, as lecturer in chemiſtry. In the year 1770, ſir Charles Knowles appointed him his official ſecretary to the court of Peterſburgh, whither the gallant admiral was going to aſſiſt in improving the Ruſſian navy. They ſet out upon their journey over land, and paſſing through Liege, they were invited to dine with the prince-biſhop: Mr. Robiſon obſerved, with ſome degree of ſurpriſe, that all the gueſts, and even the principal attendants, had about them the badges of free-maſonry; upon ſome enquiries he was induced to become a member, and during his ſtay in that city he paſſed through all the degrees, till he attained the rank of Scotch maſter. At Peterſburgh he was appointed inſpector-general of the corps of marine-cadets; an academy conſiſting of above four hundred young gentlemen and ſcholars, under the tuition of about forty teachers. His duty, in this office, conſiſted in viſiting daily every claſs of the academy; in receiving weekly reports from each maſter, concerning the diligence and progreſs of every perſon in his claſs; and in advancing, twice in every year, the young gentlemen into higher claſſes, according to their reſpective merits. Of theſe he was conſtituted the ſole judge, and againſt his deciſion there was no appeal. At this period general Kutuzoff was military-head of the academy, and held the third place in the admiralty-college. This general approved all Mr. Robiſon's plans, adopted all his meaſures, and ſupported his authority. While in this ſituation, Mr. Robiſon preſented to the admiralty-college a plan for rendering the magnificent docks at Cronſtadt of ſome uſe by means of a ſteam-engine, which was adopted and executed with ſucceſs after he had left Ruſſia. Being attached, by his office, to that iſland, he found it, particularly in winter, to be a diſmal ſolitude, where he was nearly cut off from all ſociety. On this account, having held the appointment about four years, he determined to reſign it, and to accept of an invitation from the magiſtrates and town-council of Edinburgh, to be profeſſor of natural philoſophy in their univerſity. This ſituation he filled with great honour to himſelf, as well as benefit to the ſtudents of the univerſity, till his death, which happened in 1805.

Although Dr. Robiſon laboured under a very diſtreſſing and painful diſorder during the laſt eighteen years of his life, ſtill in general his mind was active. He is well known to be author, not only of the article Seamanſhip, already mentioned, but of all the moſt important mathematical and philoſophical articles in the third edition of the Encyclopædia Britannica, and the ſupplement to that work. They were probably the ſubſtance of his lectures delivered at college, and ſeveral of them were afterwards thrown into a different form, and publiſhed under the title of "Elements of Mechanical Philoſophy." In 1797 this gentleman publiſhed a work, entitled "Proofs of a Conſpiracy againſt all the Religions and Governments of Europe, carried on in the Secret Meetings of Free-Maſons, Illuminati, and Reading Societies," a work full of declamation and abſurdity, but which, owing to the furor of the times, made a great impreſſion, and rapidly paſſed through ſeveral editions, but which, when reaſon returned to the great maſs of the people, fell into deſerved contempt. In 1803 Mr. Robiſon performed a very acceptable ſervice to the public, by giving them an edition of Dr. Black's lectures on the "Elements of Chemiſtry," in two vols. 4to.

ROBLEDA, in *Geography*, a town of Spain, in the province of Leon; 22 miles S. of Civdad Rodrigo.

ROBLINTON, a townſhip of Waſhington county, in Pennſylvania, containing 770 inhabitants.

ROBO, a town of Arabia, in the province of Yemen; 12 miles E.N.E. of Zebid.

ROBOAN. See Rubin.

ROBORANTIA, in *Medicine*, *ſtrengtheners*; or ſuch medicines as ſtrengthen the parts, and give new vigour to the conſtitution.

ROBORTELLO, Francesco, in *Biography*, an Italian man of letters, born at Udine in 1516, was the ſon of a notary and noble of that city. He was educated at Bologna, and about 1538 was invited to occupy the chair of eloquence at Lucca. In 1543 he removed to Piſa, where he held a ſimilar profeſſorſhip. In 1552 he was called to Padua to fill the chair of Greek and Latin eloquence, vacant by the death of Lazzaro Buonamici. He quitted Padua for Bologna in 1557; whence, in 1560, he was recalled by the ſenate of Venice to his chair at Padua. He died in 1567, in his 51ſt year. The univerſity gave him a ſplendid funeral, and the German nation erected a handſome monument to his memory in the church of St. Antonio. At moſt of the places of his reſidence he was involved in quarrels with his colleagues, and his writings are full of attacks upon his contemporaries. He publiſhed numerous works, among which were, "Annotations on various Authors, Greek and Latin," 1543, republiſhed in 1548, with ſeveral ſmall treatiſes;

treatiſes; a corrected edition of "Ariſtotle's Poetics," together with a paraphraſe on "Horace's Art of Poetry;" an edition of the "Tragedies of Æſchylus;" of "Ælian's Tactics," with a Latin verſion; and of "Longinus de Sublimitate," with annotations. He alſo publiſhed a valuable work "De Vita et Victu Populi Romani ſub Imperatoribus Cæſaribus Auguſtis," with ten other diſſertations on ſubjects of Roman antiquity.

ROBUR CAROLINUM, in *Aſtronomy*. See ROYAL *Oak*.

ROBUSTI, GIACOPO, in *Biography*. See TINTORETTO.

ROCA, or ROCCA, in *Geography*, a cluſter of iſlands in the Caribbean ſea, near the coaſt of South America. N. lat. 12° 20′. W. long. 66° 6′.

ROCA, *Cape*, a cape on the W. coaſt of Portugal, generally called by the Engliſh ſailors the "Rock of Liſbon." N. lat. 38° 45′. W. long. 90° 34′.

ROCA *Point*, a cape on the E. coaſt of England, in the county of Durham. N. lat. 55° 1′. W. long. 1° 21′.

ROCAB, a town of Arabia, in Hadramaut; 50 miles S.S.W. of Sahar.

ROCABERTI, JOHN THOMAS DE, in *Biography*, a Spaniſh prelate in the ſeventeenth century, was deſcended from a noble family, and born at Peſclada, on the frontiers of Catalonia, about the year 1624. He entered into the order of St. Dominic; was made provincial of Aragon in 1666; general of his order in 1670; archbiſhop of Valentia in 1676; inquiſitor-general in Spain in 1695; and twice appointed viceroy of Valentia. By his authority as general, he ſelected from the maſs of manuſcripts belonging to his order, the moſt valuable unpubliſhed labours of ſeveral of its members, which he directed to be printed, but at his own private expence. Beſides ſome devotional tracts, he publiſhed a treatiſe "De Romani Pontificis Auctoritate," 1693, in three vols. folio. This work was very favourably received in Spain and in Italy; but the ſale of it was prohibited in France, by a decree of the parliament of Paris. He ſpared no pains in procuring all the treatiſes which had been compoſed by different authors in defence of the pope's authority and infallibility, and made proviſion for their being printed in an uniform edition at Rome. This enormous collection is entitled "Bibliotheca Maxima Pontifica," &c., and conſiſts of twenty-one folio volumes. The archbiſhop died in 1699.

ROCAIBA, in *Geography*, a town of Arabia, in the province of Hedsjas; 120 miles E.N.E. of Mecca.—Alſo, a town of Arabia, in the province of Nedsjed; 17 miles E. of Mecca.

ROCAMA, in *Botany*, an Arabian name, applied by Forſkall, in his Fl. Ægypt-Arab. 71, to the Linnæan *Trianthema pentandra*, which he there eſtabliſhes as a diſtinct genus. See TRIANTHEMA.

ROCAMADOUR, in *Geography*, a town of France, in the department of the Lot; 22 miles N. of Cahors. N. lat. 44° 48′. E. long. 1° 42′.

ROCAMBOLE, a mild ſort of garlic, by ſome called Spaniſh garlic; being much of the nature of ſhalot; and well known in cookery, in quality of a ſauce. See ALLIUM.

ROCAPARTIDA, in *Geography*, an iſland in the North Pacific ocean. S. lat. 16°. W. long. 92° 14′.

ROCAS, a town of Arabia, in the province of Oman, near the ſea; 30 miles W.N.W. of Oman.

ROCAVION, a town of France, in the department of the Stura; five miles S.S.W. of Coni.

ROCCA, ANGELO, in *Biography*, a learned Italian monk and titular biſhop, was a native of Rocca Contrata, a town in the marche of Ancona, and born in the year 1545. When young he took the habit among the hermits of St. Auguſtine, and purſued his ſtudies at Rome, Venice, Perugia, and Padua. Having diſtinguiſhed himſelf by his proficiency in the various branches of literature, ſacred and profane, he was honoured with the degree of doctor of divinity by the univerſity of Padua, and afterwards acquired much celebrity as a preacher at Venice. His general appointed him to ſeveral confidential and honourable employments, and at laſt made him ſecretary to his order. After he had retained this poſt ſome years, pope Sixtus V. placed him in the Vatican in 1585, and confided to his ſuperintendance thoſe editions of the bible, the councils, and the fathers, which iſſued from the apoſtolical preſs during his pontificate. In the year 1595, pope Clement VIII., by way of reward for theſe ſervices, made him apoſtolical ſacriſtan, and titular biſhop of Tagaſté in Numidia. He collected a very large and excellent library, which he left by his will to the Auguſtinian monaſtery at Rome; but upon the expreſs condition, that it ſhould be always open for the benefit of the public. This was the firſt library formed in that city to which the public had freedom of acceſs, and it was properly called, after the name of its beneficent founder, the "Angelical Library." Rocca died in 1620, at the age of 75. He publiſhed "Bibliotheca Theologica et Scripturalis;" "Notæ in Novum Teſtamentum;" "De Patientia;" "De Cometis;" "Obſervationes in VI Libros Elegantiarum Laur. Vallæ;" "Obſervationes de Lingua Latina;" and other pieces which were collected together, and printed in two vols. folio, in the year 1719. From his manuſcripts was alſo publiſhed, in 1745, a very curious collection, entitled "Theſaurus Pontificiarum Antiquitatum, necnon Rituum ac Cæremoniarum;" in two vols. folio.

ROCCA, in *Geography*, a town of Iſtria; one mile N. of Monfalcone.—Alſo, a town of Naples, in Lavora; 19 miles N. of Sezza.—Alſo, a ſmall iſland in the Weſt Indies; 24 miles W. of Orchilla.—Alſo, a town of the Ligurian republic; nine miles S.E. of Genoa.—Alſo, a town of Italy, on the eaſt bank of lake Maggiore; 30 miles N.W. of Milan.

ROCCA, *La*, a town on the S.W. coaſt of the iſland of Canary; 15 miles S.W. of Civdad de los Palmas.

ROCCA *Albegna*, a town of Etruria; 28 miles S. of Sienna.

ROCCA *dell'Aſpro*, a town of Naples, in Principato Citra; 15 miles W.S.W. of Cangiano.

ROCCA *Bruno*, a town of France, in the department of the Maritime Alps, near the coaſt of the Mediterranean; three miles E.N.E. of Monaco.

ROCCA *Contrada*, a town of the duchy of Urbino; 24 miles E.S.E. of Urbino.

ROCCA *del Eſte*, a rocky iſlet among the Canaries; eight miles E. of Gratioſa.

ROCCA *Glorioſa*, a town of Naples, in Principato Citra; ſeven miles W. of Policaſtro.

ROCCA *Lanzone*, a town of the duchy of Parma; nine miles W.S.W. of Parma.

ROCCA *del Marino*, a town of Italy, in the Treviſan; 16 miles N. of Trevigio.

ROCCA *Minolfa*, a town of Naples, in the county of Moliſe; eight miles S. of Moliſe.

ROCCA *Menſena*, a town of Naples, in Lavora; three miles N. of Sezza.

Rocca *di Neto*, a town of Naples, in Calabria Citra; four miles S.S.W. of Strongoli.

Rocca *del Oueste*, or *West Rock*, a rocky islet among the Canaries; six miles S.W. of Alegranza.

Rocca *Romana*, a town of Naples, in Lavora; six miles N. of Capua.

Rocca *Vallé Oscura*, a town of Naples, in Abruzzo Citra; five miles S. of Sulmona.

Rocca *Vecchia*, a town of Naples, in Lavora; 14 miles N.E. of Sezza.

Rocca *Voltraia*, a town of Etruria; three miles N.E. of Volterra.

ROCCABIANCA, a town of the duchy of Parma; 15 miles N.N.W. of Parma.

ROCCABILIERE, a town of France, in the department of the Maritime Alps, and chief place of a canton, in the district of Nice. The place contains 1143, and the canton 3631 inhabitants, on a territory of 455 kiliometres, in five communes.

ROCCALANA, a town of Italy, in the country of Friuli; 16 miles N.N.W. of Friuli.

ROCCARION, a town of France, in the department of the Stura; four miles S.W. of Coni.

ROCCELLA, in *Botany*, an Italian name for that species of *Lichen*, known to our dyers under the appellation of Argol, or Orchall; for which, in dyeing red or purple, the Scottish *Lichen tartareus* is but an inadequate substitute, the colours it affords being far less permanent. See Lichen, sect. 8. n. 115.

ROCCO Rodio, in *Biography*, an ancient Neapolitan contrapuntist and writer on music. Padre Martini (Hor. della Mus. vol. i. p. 447.) places Rocco Rodio at the head of the Neapolitan school, after Tinctor. But it is difficult to ascertain the exact period when Rocco Rodio flourished. We have, however, been so fortunate as to find an edition of his precepts, to which P. Martini alludes, that was printed at Naples 1609; but this date tells us nothing, as the work had certainly appeared much earlier in another form. Battista Olifante, the editor of this edition, seems not to give the rules of Rocco Rodio in his own words, but explanations of the doctrines and examples he had left. If this exposition of the rules established by Rocco Rodio was written by himself, he must have flourished late in the sixteenth century: as Adriano Willaert and Cipriano Rore are both mentioned in the text: and both these masters were living after the year 1550. The full title is the following: "Regole di Musica di Rocco Rodio, sotto brevissime risposte ad alcuni dubij propostogli da un Cavaliero, intorno alle varie opinioni de Contrapontisti. Con la Dimostratione di tutti i Canoni sopra il Canto-fermo, con li Contraponti doppij, e rivoltati, e loro regole. Aggiontavi un' altra breve Dimostratione de dodici Tuoni regolari, finti e trasportati. Et di nuovo da Don Batt. Olifante, Aggiontivi un Trattato di Proportioni necessario, á detto Libro, e ristampato. In Napoli, MDVIIII."

The rules and examples for composing canons of all kinds are remarkably short and clear in this tract, which is so scarce, that we have never seen it in any public library or catalogue of books; and P. Martini, who mentions the work, seems never to have been in possession of it. Our copy was purchased at the sale of the late Mr. Belway's collection of music, the admirable organist of St. Martin's church.

Rocco, in *Geography*, a town of the Ligurian republic; 11 miles S.E. of Genoa.

ROCELLA, a town of Naples, on the coast of Calabria Citra, near which is a celebrated coral fishery; 10 miles N.E. of Giarau.

ROCH, Cape, a cape on the E. coast of Majorca. N. lat. 39° 40′. E. long. 3° 5′.

ROCHDALE, a market-town and parish in the hundred of Salford, and county of Lancaster, England, is situated in a valley watered by the river Roch, at the distance of 46 miles S.E. from Lancaster, and 197 N.N.W. from London. In the town, besides the parish church, there are places of worship for Presbyterians, Baptists, and Methodists. Here is a free grammar-school, founded by archbishop Parker, also an English free-school, erected and endowed by Mrs. Hardman, and several Sunday-schools. The market days are Monday and Saturday; and there are fairs annually on the 14th of May, Whit-Tuesday, and the 7th of November. The petty sessions for Rochdale and Middleton division of the hundred of Salford are holden here. This town is situated in three townships, *viz.* Castleton, Spotland, and Wardleworth. The largest portion of it is within Wardleworth. The parish is of great extent, and is divided in seven districts, or townships, *viz.* Blackenworth, Butterworth, Todmorton, Wuerdale, and the three townships above-mentioned, all of which maintain their poor separately. According to the late parliamentary returns, these united districts contained 6552 houses, and 37,224 inhabitants. The vicarage here is superior in value to any other living of a similar description in the kingdom. In the reign of Henry VIII. it was rated as low as 11*l.* 4*s.* 9½*d.*, but it has since increased to nearly a hundred and fifty times that amount. It is in the gift of the archbishop of Canterbury, to whom the tithes belong, which are let for a term of years. Nine chapels of ease are attached to the church of Rochdale, *viz.* St. Mary's in the town, Littleborough, Milnrow, Todmorton, Whitworth, Friermeer, Lydgate, Saddleworth, and Dobcross: most of which are in the patronage of the vicar. Rochdale parish is rich in the mineral products of slate, stone, and coal. It is also, and has long been, distinguished for its trade. A branch of the woollen manufacture is its staple, of which the chief articles are bays, flannels, coatings, and broad cloths; but there is likewise a considerable cotton trade carried on both in the town and its vicinity. In the township of Whitworth formerly resided Messrs. John and George Taylor, better known by the name of the Whitworth Doctors. "The fame of these rustic artists," says Dr. Aikin, "is almost equal to that of the celebrated Swiss doctor mentioned by Mr. Coxe, and has spread not only over the more immediate neighbourhood, but to remote parts of the kingdom, and even to the metropolis itself. They were chiefly noted for setting broken and dislocated bones, and for the cure of cancerous and other tumours by caustics, properly termed by themselves *keen*." Lord Byron, the poet, is lord of the manor of Rochdale, and takes his seat as an English peer under the title of baron Byron of Rochdale. At his court-leet, the officers and constables for the civil government of the parish are annually appointed.

The principal seats in this vicinity are Belfield, which formerly belonged to the Knights Templars; Foxholes, the residence of the Entwisle family; and Studley, long the property of the Holts, a memorable name in this district of the country. The house appears to have been erected by Robert Holt, esq. in the reign of Henry VIII. and consists of a centre and two wings. Whitaker, in his History of Whalley, describes it as containing within "much carving in wood, particularly a rich and beautiful screen between the hall and the parlour, with a number of crests, cyphers, and cognizances

cognizances belonging to the Holts, with other neighbouring families. It was abandoned for the warmer and more fertile situation of Castleton by Robert Holt, esq. about the year 1640."

The township of Castleton derives its name from an ancient castle which formerly reared its embattled walls within its limits, on a spot where still remains a lofty artificial mound of earth called the keep. Dr. Whitaker supposes that a castle stood here anterior to the Norman conquest, as in a record in the Harleian collection, apparently part of an inquisition taken after the death of Thomas of Lancaster, "it is described as the scite of an ancient castle long since gone to decay." A Description of the Country from thirty to forty Miles round Manchester, by J. Aikin, M. D. 4to. London 1795. Whitaker's History and Antiquities of the ancient Parish of Whalley, &c. 4to. 1806. Beauties of England and Wales, vol. ix. by John Britton, F. S. A.

ROCHDALE, a town of Pennsylvania, in Crawford county, containing 401 inhabitants.

ROCHE, a town of France, in the department of the Upper Rhine; two miles S. of Delmont.—Also, a river of America, which runs into lake Erie, N. lat. 42° 20′. W. long. 82° 53′.—Also, another which runs into the same lake, N. lat. 41° 48′. W. long. 81° 25′.

ROCHE, or *Stony River*, a river of America, which runs into the Mississippi, N. lat. 40° 50′. W. long. 91° 42′.

ROCHE, *La*, a town of France, in the department of the Leman, and chief place of a canton, in the district of Bonneville; 12 miles N.E. of Annecy. The place contains 2447, and the canton 7685 inhabitants, on a territory of 150 kiliometres, in eight communes. The town is situated near the river Bonne, and is so called from a rock near it, and lies on the declivity of a hill, in a fertile country, diversified with arable lands and meadows. It is surrounded by an ancient wall and defended with towers. The principal occupations of its inhabitants are tanning of leather and making of shoes. It contains, besides a parish church, several religious houses.—Also, a town of France, in the department of Mont Blanc; 10 miles S.E. of Monstier.

ROCHE, *La*, or *Roche en Ardennes*, or *en Famine*, a town of France, in the department of the Sambre and Meuse, belonging to the duchy of Luxemburg: formerly a well fortified town, with a castle commanding the town and ramparts, surrounded with the waters of the river Ourte, which passes through it. It is the capital of a comté, called "the comté of Ardennes," which comprehended 51 towns and villages. In 1703 it suffered very much from fire; 28 miles S. of Liege. N. lat. 50° 10′. E. long. 5° 33′.

ROCHE *l'Abeille*, *La*, a town of France, in the department of the Upper Vienne; 6 miles N. of St. Yriax.

ROCHE *des Arnauds*, *La*, a town of France, in the department of the Higher Alps; 6 miles W. of Gap.

ROCHE *Beaucourt*, *La*, a town of France, in the department of the Dordogne; 12 miles S.W. of Nontron.

ROCHE *Bernard*, *La*, a town of France, in the department of the Morbihan, and chief place of a canton, in the district of Vannes, situated on the Vilaine; 21 miles S.E. of Vannes. The place contains 6272, and the canton 10,959 inhabitants, on a territory of 212½ kiliometres, in 8 communes. N. lat. 47° 31′. W. long. 2° 12′.

ROCHE *les Beaupré*, a town of France, in the department of the Doubs; 5 miles N.E. of Besançon.

ROCHE *Blanche*, *La*, a town of France, in the department of the Puy de Dôme; 5 miles S. of Clermont.

ROCHE *Bonnet*, a small island, near the W. coast of France, in the bay of Bourg Neuf.

ROCHE *Canillac*, *La*, a town of France, in the department of the Corrèze, and chief place of a canton, in the district of Tulles; 9 miles S.E. of Tulles. The place contains 375, and the canton 6845 inhabitants, on a territory of 232½ kiliometres, in 11 communes.

ROCHE *Chalais*, *La*, a town of France, in the department of the Dordogne, on the Dronne; 15 miles S.W. of Riberac.

ROCHE *Darrien*, *La*, a town of France, in the department of the Northern Coasts, and chief place of a canton, in the district of Lannion, situated on the river Treguier; 3 miles S. of Treguier. The place contains 1102, and the canton 10,329 inhabitants, on a territory of 112½ kiliometres, in 12 communes.

ROCHE *Guyon*, *La*, a town of France, in the department of the Seine and Oise, on the Seine; 8 miles N.N.W. of Mantes.

ROCHE *Melon*, *La*, a mountain of Piedmont, near Suza, supposed to be the highest in Italy, and to be that from the eminence of which Hannibal shewed to his army the fertile country which he thus animated them to conquer.

ROCHE *Milley*, *La*, a town of France, in the department of the Nièvre; 12 miles S.E. of Moulins.

ROCHE *Reigner*, *La*, a town of France, in the department of the Upper Loire; 12 miles N. of Le Puy.

ROCHE *Serviére*, *La*, a town of France, in the department of the Vendée, and chief place of a canton, in the district of Montaign; 9 miles W.S.W. of Montaign. The place contains 425, and the canton 4542 inhabitants, on a territory of 165 kiliometres, in 8 communes.

ROCHE *sur Yon*, *La*, a town of France, in the department of the Vendée, and chief place of a canton, in the district of Montaign, situated on the Yon; 30 miles N.W. of Fontenay le Comte. The place contains 631, and the canton 8515 inhabitants, on a territory of 275 kiliometres, in 11 communes. N. lat. 46° 44′. W. long. 1° 20′.

ROCHE, *Cape de la*, a cape on the N. coast of the island of Hispaniola. N. lat. 19° 42′. W. long. 70° 35′.

ROCHEA, in *Botany*, a genus of Decandolle's, in his *Plantes Grasses*, n. 103, dedicated to the memory of Daniel de la Roche, a physician of Geneva, whose inaugural dissertation, printed at Leyden in 1766, contains descriptions and plates of many plants of the natural order of *Ensatæ*, and is often cited by writers on the genera and species of that tribe. *De Theis*.

ROCHECHOUART, in *Geography*, a town of France, and principal place of a district, in the department of the Upper Vienne; 18 miles W. of Limoges. The place contains 1440, and the canton 7872 inhabitants, on a territory of 180 kiliometres, in 7 communes.

ROCHEFORT, WILLIAM DE, in *Biography*, a modern French writer, was born in 1730, at Lyons. He had a small employment in the finances; but finding in himself a greater love to letters than to business, he went to Paris, and devoted himself to poetry and Greek literature. He composed three tragedies upon the Greek models, which had too much simplicity to please; and a comedy which was not more successful. In prose he published a "Refutation du Systeme de la Nature;" a "Critical History of the Opinions of the Ancients concerning Happiness;" and a "Complete Translation of the Plays of Sophocles;" the last named work gained him much credit by the elegance and fidelity of the version, and the judicious notes annexed to it. He then undertook the task of a complete translation of Homer's Iliad and Odyssey, of which the preliminary discourses and the notes obtained more applause than the version itself, which, however, he had splendidly printed at the royal press, in 1781, in 4to. He was a member of the Academy

Academy of Inſcriptions and Belles Lettres, to which he contributed ſeveral learned memoirs. He died in 1788, highly eſteemed for his private and ſocial virtues. Gen. Biog.

Rochefort, in *Geography*, a town of the county of Neufchatel; 5 miles S.W. of Neufchatel.—Alſo, a town of France, in the department of the Puy de Dome, and chief place of a canton, in the diſtrict of Clermont; 13 miles S.W. of Clermont. The place contains 110, and the canton 12,177 inhabitants, on a territory of 365 kiliometres, in 14 communes.—Alſo, a town of France, in the department of the Jura, and chief place of a canton, in the diſtrict of Dole, ſeated on the Doubs; 4 miles E.N.E. of Dole. The place contains 562, and the canton 6395 inhabitants, on a territory of 107½ kiliometres, in 19 communes.—Alſo, a town of France, in the department of the Sambre and Meuſe, and chief place of a canton, in the diſtrict of Marche, ſurrounded by rocks, with an ancient caſtle, ſaid to be of Roman conſtruction. The place contains 878, and the canton 5148 inhabitants, on a territory of 237½ kiliometres, in 18 communes; 33 miles S.S.W. of Liege. N. lat. 50° 9′. E. long. 5° 5′.—Alſo, a ſea-port town of France, and principal place of a diſtrict, in the department of the Lower Charente, ſeated on the Charente. The place contains 15,000, and the canton 17,842 inhabitants, on a territory of 162½ kiliometres, in 8 communes. N. lat. 45° 56′. W. long. 0° 52′. This port has excellent docks for building, careening, and refitting veſſels, and magazines well repleniſhed with naval ſtores. It has alſo a marine academy, and an hoſpital for ſeamen; but the adjacent ſalt-marſhes injure its ſalubrity. In this reſpect it has been improved by the drying of the marſhes by canals. The town was founded by Louis XIV. A.D. 1665; it is elegantly built and fortified, and contains ſeveral churches and convents. It has water ſufficient, even at low water, to float large veſſels, and they are ſheltered from all hurricanes, and alſo ſecured from all attacks of bomb-veſſels. It is alſo ſaid, that the worm, which is ſo deſtructive to ſhips' bottoms, does not affect them here. The approach to the town up the river is defended by ſeveral forts, and is about two leagues from the ſea-coaſt, five from the mouth of the river, and ſix S.E. of Rochelle.

Rochefort, *La*, a town of France, in the department of the Morbihan, and chief place of a canton, in the diſtrict of the Vannes; 16 miles E. of Vannes. The place contains 628, and the canton 9837 inhabitants, on a territory of 187½ kiliometres, in 9 communes. N. lat. 47° 42′. W. long. 2° 15′.

Rochefort, a town of France, in the department of the Seine and Oiſe; 4 miles N. of Dourdan.

Rochefort *ſur Loire*, a town of France, in the department of the Mayne and Loire, on the S. ſide of the Loire; 13 miles S.S.W. of Angers.

Rochefort *Samſon*, a town of France, in the department of the Drôme; 12 miles E.N.E. of Valence.

ROCHEFORTIA, in *Botany*, received that name from profeſſor Swartz, in commemoration of a French writer, De Rochefort, of whom we know nothing but that he publiſhed, in 1639, Hiſtoire naturelle et morale des îles Antilles de l'Amerique, with plates; a work of which a ſecond edition appeared at Rotterdam in 1665, and an Engliſh tranſlation, by J. Davies, at London in 1666.—Swartz Prodr. 4. Ind. Occ. v. 1. 551. t. 10. Schreb. 797. Willd. Sp. Pl. v. 1. 1328. Mart. Mill. Dict. v. 4.—Claſs and order, *Pentandria Digynia*. Nat. Ord. *Dumoſæ*, Linn. *Rhamni*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, inferior, in five deep, ovate, obtuſe ſegments. *Cor.* of one petal; tube ſhort, pervious; limb funnel-ſhaped, in five deep, ovate-oblong, ſpreading ſegments. *Stam.* Filaments five, inſerted into the mouth of the corolla between the ſegments, awl-ſhaped; anthers oblong. *Piſt.* Germen ſuperior, roundiſh, compreſſed; ſtyles two, awl-ſhaped; ſtigmas ſimple. *Peric.* Berry? nearly globoſe, of two cells. *Seeds* few, angular.

Eſſ. Ch. Calyx inferior, in five deep ſegments. Corolla funnel-ſhaped, pervious at the mouth. Fruit of two cells, with ſeveral ſeeds.

1. R. *cuneata*. Wedge-leaved Rochefortia. Willd. n. 1. Swartz Ind. Occ. v. 1. 552.—Leaves wedge-ſhaped, obovate, undivided.—Native of dry, ſtony, mountainous places in Jamaica. *Stem* ſhrubby, three or four feet high, erect, with round, zigzag, ſubdivided, grey *branches*, armed with a ſolitary projecting thorn, near the inſertion of each footſtalk. *Leaves* about three, rarely more, together, in alternate tufts, ſtalked, generally quite entire, ſometimes emarginate, rather rigid, ſmooth, and ſomewhat ſhining, on both ſides, of a browniſh-green, ſlightly ribbed; paler beneath. *Footſtalks* ſhort. *Flowers* ſmall, greeniſh or whitiſh, in denſe forked, cymoſe, terminal or axillary, *cluſters*, ſhorter than the leaves. *Calyx* downy, as well as the *germen* and *ſtigmas*. The *fruit* was only ſeen in an unripe ſtate by Dr. Swartz, ſo that he could not determine whether it were a berry or capſule.

2. R. *ovata*. Ovate-leaved Rochefortia. Willd. n. 2. Swartz Ind. Occ. v. 1. 554.—Leaves ovate, emarginate.—Native of buſhy ſtony places in Jamaica. A *ſhrub*, with round ſmooth *branches*. Swartz makes no mention of *thorns*. The *leaves* are alternate, ſtalked, ovate, emarginate at the ſummit, but otherwiſe entire, ſlightly villous, veiny, an inch long. *Flower-ſtalks* one-fifth only of the length of the leaves, each bearing many *flowers* in pairs. Unripe *fruit* like the foregoing.

ROCHEFOUCAULT, Francis, duke of, prince of Marſillac, in *Biography*, a well-known writer in the age of Louis XIV. was born in 1613. He diſtinguiſhed himſelf as one of the moſt brilliant young noblemen about the court, and formed a connection with the ducheſs of Longueville, which involved him in the civil war of the Fronde. At the battle of St. Antoine, in Paris, he ſignalized his courage, and received a muſket ſhot, which for ſome time deprived him of ſight. When theſe troubles were terminated, he devoted himſelf to the pleaſures of ſociety and literature. His houſe was the reſort of the beſt company at Paris, in point of talents and underſtanding, and his converſation was reliſhed by Boileau, Racine, Sevigné, and La Fayette, and the other literary characters of France. Nor did he only ſhine by his wit and vivacity; he diſplayed great firmneſs of mind under domeſtic loſſes (having had one ſon killed and another wounded at the paſſage of the Rhine), and under the pain of the gout, with which he was afflicted in his latter years. Mad. de Sevigné ſpeaks of him as "holding the firſt rank in courage, merit, tenderneſs, and good ſenſe." In Mad. Maintenon's Letters is the following portrait of the duke. "He had a happy phyſiognomy, a grand air, much wit, and little learning. He was intriguing, ſupple, and wary: I never knew a friend more ſolid, more open, or who gave better counſel. He loved to take the lead. Perſonal bravery appeared to him a folly, and ſcarcely did he diſguiſe this opinion; yet he was very brave. He preſerved till death the vivacity of his diſpoſition, which was always very agreeable, though naturally ſerious." The duke de Rochefoucault died with philoſophical tranquillity at Paris in 1680, in his 68th year. He made himſelf famous by a work entitled "Reflexions et Maximes,"

Maximes," many times printed, and tranſlated. Voltaire ſpeaks thus of it: "This little collection, written with that delicacy and fineſſe which render a ſtyle ſo captivating, had the rare merit of accuſtoming readers to think, and to give a lively and preciſe expreſſion to their thoughts." The fundamental principle of this work is, that ſelf-love is the motive of all our actions. It is therefore, perhaps, leſs the hiſtory than the ſatire of the human race: but it is a ſatire which, ſays a writer, pleaſes, becauſe it flatters malignity, and becauſe it excuſes men from the admiration of virtue, by giving it a principle in common with vice, and thereby ſtripping it of the heroiſm attributed to it. It ſeems allowed, ſays Dr. Aikin, that the writer painted very exactly the world in which he lived, but a lover of mankind will ſcarcely admit that world to have been a fair example of the ſpecies. Miſanthropes have taken pleaſure in his ſentiments, and Swift has made one of his thoughts the baſis of his moſt finiſhed piece, the poem on his own death. The duke alſo wrote "Memoires de la Regence d'Anne d'Autriche," 2 vols. 12mo. 1713, an energetic and faithful repreſentation of that ſtormy period, in which he was himſelf an actor. Gen. Biog.

Rochefoucault, *La*, in *Geography*, a town of France, in the department of the Charente, and chief place of a canton, in the diſtrict of Angouleme; 12 miles N.E. of Angouleme. The place contains 2586, and the canton 14,574 inhabitants, on a territory of 252½ kiliometres, in 17 communes. N. lat. 45° 46′. E. long. 0° 28′.

ROCHELLE, La, a ſea-port town of France, and principal place of a diſtrict, in the department of the Lower Charente, with a good harbour. The place contains in the E. and W. diviſions 18,000 inhabitants: the canton of the former has 14,636, on a territory of 77½ kiliometres, in 7 communes; and that of the latter 13,642 inhabitants, on a territory of 75 kiliometres, in 7 communes. In the middle age it was called Rupella and Portus Santonum: it was, before the revolution, the capital of Aunis, and a biſhop's ſee. It was the birth-place of Reaumur, Deſaguliers, &c. The town is conſiderable, having an academy of ſciences eſtabliſhed in 1732, an hoſpital, and two ſuburbs. It is regularly built in a marſhy ſituation; the entrance of its harbour is narrow, and is defended by two towers. The circumference of its ramparts is about three miles. Its manufactures are delft ware, glaſs, refining of ſugar, &c. and its commerce, particularly to the French colonies in Africa and America, was, before the laſt war, very conſiderable. In 1361 Rochelle was given up to the Engliſh. In the 16th century, the inhabitants joined in the reformation, fortified the town, and held out a ſiege. In 1622 Louis XIII. in order to compel them to ſurrender, ordered Fort Louis to be conſtructed at the entrance of the harbour, and in 1628 a mole was raiſed which ſurrounded it, in order to prevent the town from receiving any ſuccour by ſea. The beſieged were at length compelled by famine to ſurrender; in conſequence of which it was deprived of its privileges and its fortifications demoliſhed; but in the reign of Louis XIV. they were repaired by Vauban. N. lat. 46° 9′. W. long. 1° 3′.

Rochelle, *New*, a town of America, belonging to the ſtate of New York, in Long iſland ſound; 6 miles N.N.E. of Weſt Cheſter. N. lat. 41° 54′. W. long. 73° 46′.

Rochelle *Salt*. See Rupellensis *Sal*.

ROCHEMAURE, in *Geography*, a town of France, in the department of the Ardeche, and chief place of a canton, in the diſtrict of Privas; 9 miles S.E. of Privas. The place contains 1110, and the canton 4372 inhabitants, on a territory of 107½ kiliometres, in 8 communes.

ROCHESTER, a city in the hundred of Rocheſter, lathe of Aylesford, and county of Kent, England, is ſituated on an angle of land formed by the current of the river Medway, at the diſtance of 8½ miles N. from Maidſtone, and 29 miles E. by S. from London. According to the population cenſus of 1811, it contained, in conjunction with the adjoining town of Chatham, 3838 houſes, and 21,722 inhabitants.

Hiſtorical Events.—Rocheſter is ſaid to have been originally founded by the ancient Britons, who gave it the appellation of Dwr-bryf, which ſignifies "a ſwift ſtream," in alluſion to the rapidity of the Medway at this part of its courſe. When the Romans eſtabliſhed themſelves in Albion, it became one of their ſtipendiary ſtations, and was denominated by them Durobrivæ, or Durobrivis, afterwards contracted to Roibis. Theſe facts are evidenced by the Itinerary of Antoninus, as alſo by the Peutingerian Tables, and receive ſtrong confirmation from the frequent diſcoveries of Roman remains, which have been made at different periods within the area of the preſent city. During the government of that people, however, its hiſtory is completely barren; nor did it attain any celebrity for more than a century after the arrival of the Saxons, who altered its name to Hrof-ceaſter, whence its modern deſignation is derived. Ethelbert, king of Kent, who was converted to the Chriſtian faith A.D. 597, firſt erected a church here, and conſtituted the town a biſhop's ſee. Still, however, it was regarded chiefly as a military ſtation, and hence is ſtyled by Bede "a caſtle of the Kentiſh men." In the year 676, Ethelred, king of Mercia, pillaged Rocheſter, as did Ceadwalla, king of Weſſex, within a few years of the ſame period. The Daniſh invaders likewiſe frequently plundered it, particularly in 839, when they ſacked the city and committed many cruelties. In 885 they beſieged it again, but were effectually kept in check by the inhabitants, till the great Alfred arrived with his army, and drove them back to their ſhips. About a century afterwards, Ethelred, king of Kent, met with a ſimilar reception, and being fruſtrated in his attempt upon the city, gratified his vengeance by laying waſte all the lands belonging to the ſee. But theſe ſieges were trivial to what the inhabitants ſuffered from the Danes in 999, when the city was pillaged to the uttermoſt, and all the inhabitants who remained in it were put to death. From that period Rocheſter ſeems to have continued moſtly in poſſeſſion of the Danes till the death of Canute the Great. In the time of Edward the Confeſſor it belonged to the crown; and as part of the royal domains was ſeized by the Conqueror, by whom it was granted to his half-brother, Odo, biſhop of Baieux, on whoſe diſgrace, in 1083, it reverted to the monarch. Henry I. farmed it out to the citizens at the yearly rent of 20*l.*, which was paid by the præpoſitus or bailiff. He alſo granted to biſhop Gundulph, and to the church of Rocheſter, an annual fair to be held on the eve and day of St. Paulinus, together with various rights and immunities. In the ſame reign, on the 11th of May 1130, while Henry himſelf, the archbiſhop of Canterbury, and other prelates, and many of the nobility were at Rocheſter, moſt of its buildings were conſumed by fire. A ſimilar misfortune befell it in the year 1137, and again in April 1379. Theſe ſeveral calamities retarded the proſperity of the city; and the inteſtine commotions happening ſoon afterwards, it did not regain any great degree of conſequence till the reign of Henry III. This monarch repaired, or rebuilt, the city walls, and inveſted it beſides with a deep foſſe. In 1251 the ſame prince held a ſolemn tournament here, which was attended by moſt of the Engliſh nobility, and by a great concourſe of foreign knights. In the time of the wars be-

twcen York and Lancaſter, Rocheſter ſuffered much from the arms of the contending parties, and was more than once viſited by the plague. Henry VIII. was twice here, once in company with the emperor Charles V. and again when he came hither to meet his conſort, Ann of Cleves. During the reign of queen Mary ſeveral individuals ſuffered martyrdom here for their religious opinions. Queen Elizabeth, her ſucceſſor, lodged upwards of a week at Rocheſter; and this was the firſt city in which Charles II. was publicly received, after his reſtoration to the throne in 1660. In 1665, Rocheſter was viſited with the ſame plague, which committed ſuch dreadful havock among the inhabitants of the metropolis. From that period nothing worthy of hiſtorical record has occurred.

Municipal Government.—Rocheſter probably poſſeſſed a corporate community even in the time of the Saxons, but its nature cannot now be preciſely aſcertained. The firſt Norman monarch who granted to the inhabitants any privileges by charter, was Henry II. This prince gave them the city "in fee, or perpetual ferm, for 20*l.* ſterling *per annum*, to hold of him and his heirs for ever, with all the appurtenances, liberties, and free cuſtoms; and that they ſhould have a guild merchant, and ſeveral other privileges and immunities." Theſe advantages were ſtill further increaſed by Richard I., who directed his writ to the bailiff, and the whole hundred of Rocheſter, ordaining, "that no one, except his ſervants, ſhould purchaſe victuals in the city till the monks of St. Andrew had been firſt ſerved." This right was afterwards ſo far extended, that even the ſervants of the monarch were forbidden to make a prior purchaſe; and the monks continued to enjoy the privilege thus given till the diſſolution. Henry III. not only confirmed to the citizens all former grants, but remitted to them a portion of their annual fee-ferm, and declared they were to be "exempt from toll, laſtage, ſtallage, and murage, throughout England and the ſea-ports, and ſhould have a free market within their city, and the return of all writs whatſoever." Theſe privileges were renewed by Richard II. in 1378; by Henry VI. in 1438 and 1446; and by Edward IV., who further extended the bounds of the city, and ordained that the corporation ſhould be ſtyled "the mayor and citizens of Rocheſter." Henry VIII. was the next monarch who confirmed the privileges of Rocheſter; and his ſucceſſors, to the time of Charles I., ſeverally did the ſame. By the laſt mentioned monarch, the corporation was made to conſiſt of "a mayor, twelve aldermen, (of which latter number the mayor was to be one,) twelve aſſiſtants, or common council-men, a recorder and town-clerk, two chamberlains, a principal ſerjeant at mace, a water-bailiff, and other inferior officers." Under this charter the city is now governed; and by virtue of it, the mayor is elected annually on the Monday previous to St. Matthew's day. The mayor and citizens hold a court of admiralty once a-year, for regulating the oyſter-fiſhery in thoſe creeks and branches of the river Medway which are within their juriſdiction. Here are alſo held the county aſſiſes, alternately with Maidſtone; likewiſe the petty ſeſſions for the north diviſion of the lathe of Aylesford. The market-day is Friday, weekly; and there are two annual fairs, on the 30th of May and the 11th of December. Rocheſter ſends two members to parliament, and has done ſo ever ſince the 23d year of Edward I. The right of election is veſted in the freemen, who are about 630 in number. Many of the repreſentatives have been naval officers, diſtinguiſhed for brilliant achievements in the cauſe of their country.

Public Structures.—The buildings of a public deſcription that chiefly demand attention, are the caſtle, the cathedral, the churches, the town-hall, and the bridge, each of which is entitled to ſeparate notice.

The preſent caſtle of Rocheſter was one of thoſe founded by William the Conqueror, to keep in awe his newly acquired ſubjects; but there ſeems every reaſon to believe that a prior one exiſted on the ſame ſcite, as frequent mention is made of the "Caſtrum Roffenſe" in the Saxon annals. The Conqueror, indeed, is ſaid, by ſome hiſtorians, to have only repaired the former ſtructure. Whatever it might be, however, he committed to Odo, biſhop of Baieux, the execution of the new work, and the cuſtody of the fortreſs; but that prelate proving unworthy of his truſt, he was afterwards ſeized, and ſent as a priſoner to the caſtle of Rouen, in Normandy, where he continued till the acceſſion of William Rufus, who reſtored him to his dignities and poſſeſſions; a favour which he ſhortly after ungratefully repaid, by raiſing an inſurrection in favour of the king's brother, Robert, duke of Normandy. Rufus, upon this, laid ſiege to Rocheſter caſtle, and having forced the garriſon to ſurrender, baniſhed the biſhop from his dominions. During this ſiege the buildings ſuſtained conſiderable injury, which the king enjoined biſhop Gundulph and the prior of Rocheſter to repair, perhaps on account of their having ſhewn ſome attachment to the rebellious cauſe. Gundulph accordingly not only renovated the walls, but laid the foundation of the great ſquare tower, which yet perpetuates his name, and entitles him to rank among the moſt eminent architects of Anglo-Norman times. About twenty years after this prelate's death, the cuſtody of Rocheſter caſtle was granted to William Corboyl, then archbiſhop of Canterbury, and to his ſucceſſors; but this grant was reſumed by Henry II. on his quarrel with the celebrated Thomas à Becket. In the reign of king John, this fortreſs was ſeized and garriſoned by the rebellious barons, and having been beſieged by the king, was taken, after a reſiſtance of three months. Lewis, the dauphin of France, who came over to the aſſiſtance of the nobles, however, reduced it again in ſubjection to the barons, by whom it was held till the acceſſion of Henry III., when it was ſurrendered to the crown, and granted for life to Hubert de Burgh, earl of Kent, and juſticiary of England, who was commanded to repair the buildings. The king's favour afterwards declining, Hubert was diſpoſſeſſed; and Stephen de Segrave, John de Cobham, Nicholas de Moels, William de Say, and Robert Waleran, were, in ſucceſſion, appointed governors of the caſtles of Rocheſter and Canterbury. About the year 1264, after the king had occaſioned much diſcontent among his barons, by his refuſal to comply with the ſtatutes of Oxford, he greatly ſtrengthened the fortifications of this caſtle, and furniſhed it with every thing neceſſary to ſuſtain a ſiege. Roger de Leybourne, who was conſtituted chief conſtable, had under him John, earl of Warren and Surrey, and other noblemen. Shortly afterwards, Simon de Montfort, chief of the aſſociated barons, marched hither to beſiege the caſtle, on which occaſion ſeveral ſevere conteſts happened in this vicinity. Montfort ſucceeded in getting poſſeſſion of the city, but failed in his attacks upon the caſtle, the ſiege of which he was eventually compelled to abandon. After this event, little more occurs in the hiſtory of this caſtle, than the names of thoſe to whom its cuſtody has been entruſted. Edward IV. was the laſt monarch who paid any attention to the ſtate of its buildings, he having "repaired the walls, both of the caſtle and city, about the eleventh year of his reign." Since then they have been alike neglected, and have gradually fallen to their preſent ſtate of decay. Several

veral eſtates in this county hold of Rocheſter caſtle by the ancient tenure of caſtle-guard. On St. Andrew's day, old ſtyle, a banner is hung out at the houſe of the receiver of rents; and every tenant who does not then diſcharge his arrears, is liable to have his rent doubled, on the return of every tide of the Medway, till the whole is diſcharged.

Rocheſter caſtle ſtands at the ſouth-weſtern angle of the city, on an eminence riſing abruptly from the river Medway, which preſerves it from attack on the weſt, whilſt its ſouth, eaſt, and north ſides are defended by a broad and deep ditch. The outward walls, which formed an irregular parellelogram, 300 feet in length, were ſtrengthened by ſeveral ſquare and round towers; but theſe, as well as the walls themſelves, are now verging to a ſtate of ruin. The moſt perfect are on the eaſt ſide, and at the ſouth-eaſt angle; that at the angle was ſemicircular, and roſe boldly from the ditch, which is now almoſt filled up. The principal entrance was on the north-eaſt, and was defended by a tower-gateway, with outworks at the ſides. The keep, or great tower, already mentioned as founded by biſhop Gundulph, occupies the ſouth-eaſt portion of the caſtle area. It is of a quadrangular form, 70 feet ſquare at the baſe, and is ſo planned, that its angles correſpond with the four cardinal points of the compaſs. The walls on the outſide are built inclining inwards from the baſe, and in general meaſure twelve or thirteen feet thick. Near the centre, on each ſide, is a pilaſter buttreſs, aſcending from the baſe to the roof; and at the angles are projecting towers, three of them ſquare, and the fourth ſemi-circular, which riſe twelve feet above the roof. The entrance to this part of the caſtle was moſt difficult and intricate, and diſplayed much architectural ingenuity. "The firſt aſcent was by a flight of twelve ſteps, leading to an arched gate and covered way; beneath which a flight of ſeven ſteps led forward to a draw-bridge, that connected with the arched gateway of the entrance tower; this opened into a veſtibule, between which and the keep there were no other avenues of communication than by a third arched paſſage in the thickneſs of the wall. This latter, being the immediate inlet to the body of the keep, was defended by a maſſive gate and portcullis, the hinges and grooves of which yet remain; and in the roof are openings for the purpoſe of ſhowering down deſtruction on the aſſailants."

The interior of the keep is divided into two nearly equal parts by a ſtrong wall, with arched door-ways of communication on each floor. In the centre of this wall is a circular hole for a well of conſiderable depth, neatly wrought, and open from the bottom to the very top of the keep. This tower conſiſted of three floors, independent of the baſement ſtory; but theſe floors were removed when the caſtle was diſmantled in the reign of James I. The loweſt apartments were two dark and gloomy rooms, in which the garriſon ſtores were probably depoſited. At the north-eaſt angle is a circular winding ſtaircaſe, which aſcends to the ſummit; and near it is a ſmall arched doorway, leading to a narrow vaulted apartment underneath the little tower, ſuppoſed to have been a dungeon for criminals. The firſt floor appears to have been allotted for the accommodation of ſervants and inferior attendants; the ſecond floor contained the ſtate apartments; and the third was deſigned for a chapel, and for bed-rooms for the family. The roof of the keep is now entirely deſtroyed; but it moſt probably conſiſted of a platform on a level with the top of the wall within the parapet; the latter was about five feet high, and had embraſures about two feet wide. The four towers at the angles were raiſed another ſtory, and had alſo ſmall platforms, with parapets and embraſures. Theſe, as well as the firſt-mentioned platform, commanded a very extenſive view over the whole city, the river Medway, and the adjacent country; ſo that no enemy could approach within the diſtance of ſeveral miles without being diſcovered.

Cathedral and Priory.—The ſee of Rocheſter, though one of the ſmalleſt in England, derives conſiderable conſequence from its antiquity. It was eſtabliſhed, and a church built, as early as the year 600, by Ethelbert, king of Kent; who, at the ſame time, attached to the church a priory for ſecular canons, and dedicated it to the honour of St. Andrew. The firſt prelate of this ſee was Juſtus, a man of eminent learning and integrity, who had been ſent from Rome to aſſiſt in the converſion of the Saxons to Chriſtianity. He was inſtalled by St. Auguſtine, the apoſtle of Britain, and firſt archbiſhop of Canterbury, in the year 604, from which period the epiſcopal dignity of Rocheſter has been held in ſucceſſion by ninety-four biſhops, many of whom were eminent for their talents, piety, benevolence, and extenſive acquirements. Paulinus, the third biſhop, was reputed a ſaint, and his memory was held in high eſtimation during ſeveral centuries. Ithamar, the fourth biſhop, was the firſt Engliſhman who held a prelacy in Britain. Tobias, the ninth biſhop, is highly extolled by Bede, and other writers, for his literary attainments, and particularly for his intimate knowledge of the Greek, Latin, and Saxon languages. Theſe three prelates were all interred in the ancient cathedral, and are the only biſhops known to have been ſo honoured of all the twenty-five who preſided previous to the Conqueſt. At the era of that event the ſee appears to have been faſt verging to entire diſſolution; but its impending fate was ſoon after arreſted by Lanfranc, archbiſhop of Canterbury, who raiſed Ernoſt, a monk of Bec, in Normandy, to the biſhopric, for the avowed purpoſe of improving its affairs. That biſhop, however, died in the firſt year of his prelacy, and was ſucceeded by Gundulph, another monk of Bec, who proved a moſt active agent in the re-eſtabliſhment of the ſee. He not only recovered the alienated eſtates of the biſhopric, but, pulling down the old cathedral, he erected a ſpacious and magnificent edifice in its ſtead. He likewiſe rebuilt the priory, and placed therein twenty monks of the order of St. Benedict, upon whom he beſtowed extenſive privileges and poſſeſſions. Gundulph had for his ſucceſſor Ernulph, abbot of Peterborough; who compoſed the "Textus Roffenſis," a work replete with information on matters of antiquity. He was likewiſe diſtinguiſhed as an architect, having, beſides his works at Canterbury and Peterborough, built the dormitory, and refectory, and the chapter-houſe at Rocheſter. He was ſucceeded by John, archdeacon of Canterbury, in whoſe time the monaſtery was unfortunately deſtroyed by fire; an event which occaſioned the temporary diſperſion of the monks. On the re-erection of the priory, however, they were again collected, and, through the exertions of biſhop Aſcelin, recovered ſuch of their poſſeſſions as had been alienated by the cupidity of his predeceſſor, John, a Norman biſhop, who had obtained this ſee on the death of his nameſake above-mentioned. Aſcelin's ſucceſſor was Walter, brother to Theobald, archbiſhop of Canterbury, who was elected by the monks of Rocheſter. This biſhop aſſiſted at the coronation of Henry, eldeſt ſon of Henry III., on which account he was excommunicated by Thomas à Becket. During his prelacy, the cathedral ſuſtained heavy damages by fire. This biſhop died in 1182, and was ſucceeded by biſhop Waleran, who, as well as his ſucceſſor, Gilbert de Granville, was conſtantly engaged in litigations with the prior and monks, which were at length ſettled by ſolemn adjudication in the year 1207: notwithſtanding this, however, the monks thought proper to diſplay their hatred to biſhop Granville, by refuſing burial to his remains in the cathedral;

 and

and on being frustrated in their resistance, they hastened the interment, that it might take place before the interdict which the nation then lay under was removed. This prelate rebuilt the bishop's palace, which had been burnt down by the fire above noticed; and also erected a cloister of stone for the monks: but the re-edification of the cathedral made very slow progress, as we find it remained unfinished till the year 1240, when Richard de Wendover held the bishopric. He had been elected to the see by the monks, in opposition to the claims of patronage maintained by Edmund, archbishop of Canterbury, who appealed on the subject to the court of Rome, but without success. On his death, in 1250, Laurence de St. Martin was advanced to the episcopal dignity, and held it till 1274, when he died, and gave place to Walter de Merton, to whom his country is indebted for the foundation of Merton college, at Oxford, which is considered to be the "first literary community in this kingdom that had the sanction of a royal charter." His immediate successors were, John de Bradfield, who died in 1283; Thomas de Ingelthorpe, who died in 1291; and Thomas de Woldham, who died in 1316. On the decease of the latter, Hamo de Hethe obtained the bishopric. He was a very active prelate, and conferred considerable benefits on the priory and the church. His successor was John de Shepey, who had been a monk in the priory, and was a man of great learning and abilities. Some sermons attributed to him are still extant in New college, Oxford, and there are in the king's library two MSS. of his on legal subjects. He died in 1360, when William Witteslcy was consecrated bishop, but was soon afterwards translated to the see of Worcester. Thomas Trilleck next obtained the bishopric, and after him Thomas Brinton, confessor to king Richard II. and the fifty-first bishop of this see. Richard Young, the third in succession after him, met with great difficulties in obtaining possession of his bishopric, owing to the death, first of pope Boniface, by whose mandate he was translated from Bangor, and afterwards of his successor, pope Innocent. At length, however, he was installed, in May 1407, and held the see till 1418, when he was removed by death, and was succeeded by John Kemp, who subsequently became bishop of Chichester and of London, and archbishop of York and of Canterbury. His successor was the learned John Langdon, who was distinguished for his extensive knowledge of history and antiquities, and was author of a chronicle of England. On his death, which happened in 1434, while he was attending the council at Basil on the part of Henry VI., Thomas Brown, D.D. was elected to the vacant see. John Lowe, the fifty-ninth bishop, was provincial of the order of Augustine friars. He held the bishopric twenty-three years, and is supposed to have rebuilt the palace at Rochester. He died in 1467, and was succeeded by Thomas de Rotherham, subsequently bishop of Lincoln, lord chancellor, and archbishop of York. The next bishop of note was the unfortunate John Fisher, who was beheaded in 1535, by order of Henry VIII. for maintaining the supremacy of the pope in ecclesiastical affairs. His successor was John Hilsey, D.D. a controversial writer of considerable eminence, who died in 1538. Two years afterwards, the priory here was surrendered to the king; and in 1542 a new foundation charter was granted, by which a collegiate body was established in the church, to consist of a "dean, six prebendaries, six minor canons, a deacon and sub-deacon, six lay clerks, a master of the choristers, eight choristers, one grammar master, twenty scholars, two subsacrists, and six poor bedesmen," besides inferior officers. In the new establishment, Walter Phillips, the prior of the late convent, was made first dean of the cathedral; and Nicholas Heath, D.D. was the first reformed bishop of the see. From his time to the present period, twenty-five bishops have been advanced to the episcopal dignity of Rochester, among whom the most noted were the pious Ridley, who suffered along with bishop Latimer at Oxford; Francis Atterbury, who was exiled for treasonable correspondence in 1723; and the late bishop Horsley, one of the most erudite divines the church of England can boast of.

The situation of Rochester cathedral is at a short distance south from the High-street, and east from the castle. It is of a cruciform shape, and is divided into a nave, aisles, two transepts, and a choir, with a low tower and spire rising at the intersection of the nave and great transept. This edifice evidently appears, from the different styles of its architecture, to have been the work of different eras. The chief part of the nave and west front display the massive character of the early Norman age. The west entrance is particularly deserving of attention, and must have been, when entire, a most magnificent piece of workmanship. The arch which forms this entrance is semi-circular; and is supported on each side by several columns, two of which are cut into statues, representing king Henry I. and his queen Matilda, the patrons of the founder, bishop Gundulph. The capitals of all the columns are composed of wreathed foliage, mixed with the heads of birds, and other animals. The lintel of the door, immediately under the arch, exhibits a figure, probably designed to represent the Saviour, attended by angels, and the attributes of the four evangelists. The mouldings of the arch, and the transom-stone, are charged with varied sculpture. The remaining parts of the cathedral are comparatively plain in their exterior. Entering the nave by the western door, the massive Norman style is conspicuous in the first five columns, and half of the sixth, on each side, all of them supporting circular arches, decorated with zigzag mouldings, above which is a series of smaller arches, having over them arches, corresponding, both in size and ornament, with the larger ones beneath. Still higher are two ranges of obtuse-pointed windows, each divided into three lights. The roof is of timber, with knees supported on corbels, the fronts of which are carved into figures of angels sustaining shields, on which are painted the arms of the city, the see, and the priory of Rochester, as well as those of the archbishopric and cathedral of Canterbury. The west wall appears to have been divided into ranges of niches, some of them crowned with arches, having plain and billetted mouldings, supported on small three-quarter columns, with fluted capitals: others, having neither pillar nor capital, are decorated with zigzag mouldings, continued down the sides of the recess. The alterations made in Gundulph's design by the introduction of the present west window, are clearly to be seen in the abrupt termination of the different ranges of these niches, some of them having been cut through the centre. The two easternmost arches of the nave, on each side, exhibit a very different style of architecture to the preceding; these being in the pointed style, with deep grooved mouldings, rising from clusters of slender columns. The great tower is supported by four obtusely-pointed arches, resting on pieces of solid masonry, which are environed by slender columns of Petworth marble. The west transept is in the pointed style; but, from having been erected at different periods, the architecture is somewhat dissimilar. In the upper part of the north end is a triforium, behind which are lancet windows, each having a screen in front, divided into three arches of unequal height; the vaulting is of stone, groined, with a plain grooved moulding: several of the lesser pillars and imposts of arches are supported by corbel

corbel heads, chiefly of monks, which display a degree of strength of feature and expression, evincing an advanced state of the art of design. The south end of this transept principally varies from the other in its superior lightness: like that, it has a triforium in the upper story, with lancet windows behind screens. The roof is of timber framework, in imitation of vaulting. Under a large arch, on the west side, is an opening into the chapel of St. Mary, a structure probably erected in the reign of Henry VII. It measures forty-five feet in length, and thirty-five in breadth, and exhibits on its south and west sides five spacious windows, under obtuse arches, and divided by mullions. In this chapel the consistory court of the diocese is held; and many of the bishops are buried within it. The choir is entered from the nave by an ascent of ten steps, leading through an arch, in an unornamented stone screen, which sustains the organ and organ gallery. The style of building in this part of the church is uniform in its character; neat, lofty, and solid, though not heavy. The whole consists of two tiers of pointed arches, decorated with grooved mouldings, and resting upon slender columns of Petworth marble, with plain capitals. All the windows are lancet-shaped, and are formed of single lights, except those nearest to the altar, which are divided by mullions, and appear to have been formerly filled with painted glass. The east transept of the church has two aisles, over which are apartments, (ascended to by circular winding staircases in the wall,) in which were deposited the vestments, and sacred utensils appertaining to the altars and shrines of St. William, St. Paulinus, and others, in the choir. The northern division of this transept is still denominated St. William's chapel, from the popular saint so named, whose remains were there enshrined; and to the number and value of the oblations made at whose altar the present choir owes its origin. The crypt, which extends beneath the two last mentioned portions of the church, has been thought by some to be of Norman structure; but more intelligent antiquaries assign it to the architect of the choir and upper transept, which were built by William de Hoo, in the reign of Henry III. The pointed arches in the windows and entrances are evidences of the truth. Running parallel with the south side of the choir is the chapter-house, which contains the library, and is entered by a richly sculptured door-way. In a large hollow between the inner mouldings is a range of human heads and flowers, in alternate succession. Beyond these, and rising above each other in detached recesses to the centre of the arch, are six whole length figures, two of which are conjectured to represent Henry I. and his queen Matilda, and the others the bishops Gundulph, Ernulph, Laurence de St. Martin, and Hamo de Hethe, to the last of whom the erection of this door-way is attributed. Over these figures are smaller ones of angels, two on each side, apparently singing praises and glorifying the Saviour, who is represented standing naked under a canopy in the centre of the arch. The library, besides an excellent collection of printed books, contains several curious and valuable MSS. among which are the original copies of the Textus Roffensis and the Custumale Roffense.

Rochester cathedral extends in length from east to west 306 feet, of which 150 are included in the nave and 156 in the choir. The breadth of the nave, with the side aisles, is 75 feet, and that of the choir is nearly the same. The western transept measures 122 feet, and the eastern one 90 feet long. The width of the west front is 94 feet, and the height of the great tower 156 feet. Several of the monuments in this church are curious, both from their antiquity and their workmanship. In the south of the choir is a plain stone chest, supposed to contain the remains of bishop Gundulph, and near it is another, on the top of which is sculptured, in high relief, the figure of a bishop in pontificalibus, designed to represent Thomas de Ingelthorpe, the 44th bishop of the see. A third stone chest, of a similar description, is thought to be the tomb of bishop Laurence de St. Martin, who obtained the canonization of St. William. All these chests are constructed of Petworth marble: several others of them are dispersed throughout the cathedral. On an altar-tomb, beneath a double pointed arched canopy, variously ornamented, is a full-length portraiture of bishop Walter de Merton, whose remains are deposited beneath. Another altar-tomb, in St. William's chapel, commemorates bishop Lowe; and near it are the monuments of bishop John Warner and two others of his family. On the north side of St. Edmund's chapel, entering into the crypt, is a headless episcopal figure, supposed to have represented bishop John de Bradfield, who died in the year 1283; and in the narrow aisle leading to St. William's chapel, is a monument attributed to bishop Hamo de Hethe. The other persons who have monuments here are, Richard Watts, esq. recorder of the city, who had the honour of entertaining queen Elizabeth at his seat called Satis; John, lord Henniker, and his lady, the former of whom died in 1803, and the latter in 1792; sir Richard Head, and the Rev. Samuel Denne, the learned compiler of the "Memorials" of this cathedral, inserted in the Custumale Roffense.

Adjoining to the cathedral, on the south, are the remains of the chapter-house and cloister belonging to the priory, which exhibit a very beautiful series of Norman arches and ornaments, but in a state of great dilapidation. The door-way of the chapter-house lies under a richly ornamented arch, having on each another of equal elegance, supported on short thick columns with flowered and figured capitals, and displaying an unusual variety of mouldings, zigzag, quatrefoil, and billeted. The mouldings of the southernmost arch unite with those of a smaller arch, belonging to the cloister, and these again with the mouldings of a second highly enriched door-way, the space between the transom of which and the inner moulding exhibits the mutilated remains of an historical sculpture. An arch, rising from two three-quarter columns, and intersected by two others springing from a central column, connects this door-way with a third, likewise rich in ornaments, though less so than the others. Gundulph's tower stands on the north side of the cathedral between the transepts. The masonry of this building is extremely solid, the walls being ten feet in thickness, though the entire building is only 40 feet square. The angles are strengthened by pilaster buttresses, and the windows have semicircular arches. The precincts of this cathedral appear to have occupied nearly half the area contained within the walls of the city. There were three gates leading into them, *viz.* the Cemetery gate, St. William's gate, and the Prior's gate; the first and last of which are still remaining. Only a few traces of the offices of the monastery now exist separately, but considerable parts of their walls are incorporated into other buildings. The porter's lodge consists of a small embattled tower, with a pointed archway in the centre. The scite of the bishop's palace, erected by Gundulph, is occupied by a range of modern houses; and on that of the prior's lodge stands the present deanery.

Rochester had formerly four churches, besides the cathedral, which were dedicated to St. Nicholas, St. Margaret, St. Clement, and St. Mary, but the last is now totally demolished, and St. Clement's is only to be discovered as forming part of some houses on the north side of the High-street, near the bridge. The church of St. Nicholas was built in 1421, and consists of a nave, aisles, and a chancel, with an embattled tower at the north-west angle. The

windows

windows are large and pointed; each being divided into three lights, with crockets above. St. Margaret's church is only remarkable for its fine ſituation, on a lofty eminence, to the ſouthward of the High-ſtreet. The town-hall ſtands on the north ſide of the ſame ſtreet, and was erected about the year 1687. In the lower diviſion of this ſtructure is the city priſon; and in the higher, the hall, a large and lofty room, containing full-length portraits of king William and queen Anne, and of ſeveral perſons of diſtinction, connected with the city. The bridge over the Medway, here, was conſtructed in the reign of Richard II. by ſir Robert Knolles, and John, third baron de Cobham, who not only defrayed the expence of its erection, but alſo left a conſiderable eſtate for its repair. For height and ſtrength, this ſtructure is allowed to be ſuperior to any in England, with the exception of the bridges in the metropolis. It meaſures 560 in length, but is only 14 feet broad between the parapets. Its arches are eleven in number, but of theſe, three have been rebuilt in modern times.

The charitable inſtitutions in this city are, St. Catharine's hoſpital, a grammar-ſchool, an alms-houſe for the relief of poor travellers, and a free-ſchool. The hoſpital was founded and endowed in 1316, by Simond Potyn, who repreſented this city in ſeven parliaments, for the maintenance of twelve poor people, who have an allowance of coal, candle, and money, annually.

The grammar-ſchool was founded by king Henry VIII., for twenty ſcholars, to be called "King's ſcholars," with an upper and under maſter; together with four exhibitions to the univerſities. The alms-houſe, which ſtands on the north ſide of the High-ſtreet, was built in the reign of queen Elizabeth, the proprietor of Satis, before-mentioned, who left eſtates for its ſupport. The founder of the free-ſchool was ſir Joſeph Williamſon, knt., who died in 1701, and bequeathed 5000*l.* to be expended in the erection of a ſuitable building, and in the purchaſe of lands and tenements to maintain two maſters, and defray the incidental expences of the eſtabliſhment. The Hiſtory and Antiquities of Rocheſter and its Environs, &c. 8vo. Rocheſter, 1772. The Hiſtory and Topographical Survey of the County of Kent, by Edward Haſted, F. R. S. and S. A., Canterbury, 4 vols. folio, 1778, reprinted, &c. in 8vo. 1797. Hiſtory of Kent, by John Harris, D. D. F. R. S. folio, Lond. 1719. Regiſtrum Roffenſe, and Cuſtumale Roffenſe, by John Thorpe, D. D. A New Topographical, Hiſtorical, and Commercial Survey of Kent, by Charles Seymour, 8vo. 1776. A Topographic Survey of the County of Kent, by Richard Kilburn, 4to. Lond. 1759. Beauties of England, &c. by E. W. Brayley, vol. viii.

Rochester, a townſhip of America, in the county of Windſor and ſtate of Vermont; containing 911 inhabitants. —Alſo, a townſhip of Plymouth county, Maſſachuſetts, 52 miles S. of Boſton; containing 2954 inhabitants.—Alſo, a townſhip in Strafford county, New Hampſhire, on the W. ſide of the N. branch of Piſcataqua river; 22 miles N.W. of Portſmouth; incorporated in 1722, and containing 2118 inhabitants. One term of the court of common pleas is held annually in this town.—Alſo, a townſhip in Ulſter county, New York, extending W. to Delaware river; about 12 miles W. of Eſopus.—Alſo, a townſhip of Upper Canada, on lake St. Clair, between Tilbury and Maidſtone.

ROCHET, or Rocket, a lawn garment, worn by biſhops and abbots, reſembling a ſurplice, except in this, that the ſleeves are gathered at the wriſts; whereas the ſurplice is quite open. This was one of the ſacerdotal veſtments; and in that reſpect differed from a ſurplice in that it had no ſleeves.

Menage derives the word from the Latin *rochettus*, a diminutive of *rocchus*; uſed in writers of the lower Latin for *tunica*, and formed originally from the German *rok*. The regular canons of St. Auguſtine alſo wear rochets under their copes.

Rochets alſo denote the mantles worn on days of ceremony, by the peers ſitting in the Engliſh parliament.

Thoſe of viſcounts have two bands, or borders, and a half; thoſe of earls, three; thoſe of marquiſes, three and a half; and thoſe of dukes, four.

Rochet, the name given to a fiſh, otherwiſe called *cuculus*, and *red-gurnard*. See Gurnard.

ROCHETTA, in the *Glaſs Trade*, another name for polverine.

Rochetta, in *Geography*, a town of France, in the department of the Maritime Alps; 16 miles N.E. of Nice.

ROCHETTE, La, a town of France, in the department of Mont Blanc, and chief place of a canton, in the diſtrict of Chambery, on the Galon; 10 miles S. E. of Chambery. The place contains 855, and the canton 9092 inhabitants, on a territory of 85 kiliometres, in 18 communes.—Alſo, a town of France, in the department of the Foreſts; 4 miles S.S.E. of Dierich.

ROCHFORD, a market-town, in a hundred of the ſame name, and county of Eſſex, England, is ſeated on the bank of a ſmall rivulet, called the Broomhill, at the diſtance of 16 miles S.E. of Chelmsford, and 39 miles E. of London. The petty ſeſſions for Rochford diviſion of Eſſex are held here. The privilege of holding markets was granted to this town by king Henry III., and confirmed by Edward I. The market-houſe is a mean ſtructure of timber. The market-day is Thurſday, weekly; and there are annual fairs on Eaſter Tueſday, and the Wedneſday next after the 29th of September. None of the buildings in the town are worthy of notice. The pariſh church, which ſtands about half a mile to the weſtward, is a plain edifice, with a lofty brick tower at the weſt end. Near it ſtands Rochford-hall, the manor-houſe. It is a large and ſtately building, for ſome time ſucceſſively the ſeat and reſidence of the Rochfords, the Botelers, earls of Ormond and Wiltſhire, ſir Thomas Bullen, and Richard, lord Riche. This town gives the title of an earl to the family of Naſſau. The pariſh contains, according to the population returns of 1811, 190 houſes, and 1214 inhabitants.

The manor of this town was held by Suene at the time of the Domeſday ſurvey; and now is veſted in the Long family of Wanſtead park. A ſingular cuſtom, called the Lawleſs-court, appertains to this manor; and is ſaid to have originated in a conſpiracy againſt the lord of the manor; but detecting it, he ordained as a puniſhment, that the tenants ſhould ever afterwards aſſemble, at a certain hour of the night, on the ſame ſpot where the conſpirators met, and do homage for their lands. The place is called King's-hill, where they were to aſſemble at midnight on the firſt Wedneſday after Michaelmas day, and tranſact all their buſineſs in whiſpers, and record the minutes with coal, inſtead of pen and ink. This ridiculous cuſtom was, till lately, continued. About four miles S.W. is Hadleigh Caſtle, conſiſting of ſome bold ruins; and near it is Southend, a noted watering-place. See Southend.

Raleigh, in this vicinity, though now an inconſiderable village, was formerly a market-town, and the head of the barony of Suene, a powerful Anglo-Saxon Dane, who is reported to have built a caſtle here, of which ſome important earth-works ſtill remain. Theſe conſiſt of a mount, of an oval ſhape at the baſe, which is environed by a double ditch and rampart, and is further ſecured by addi-

tional embankments on the eaſt ſide. The principal ditch is nearly fifty feet wide, and appears to have been originally of great depth. The church of Raleigh is a handſome building, in the pointed ſtyle of architecture, and contains a very ancient tomb, of beautiful "Gothic" workmanſhip, but without any inſcription to determine the name of the perſon it was deſigned to commemorate.

About three miles to the N.W. of Rochford, on the ſummit of a hill, ſtands the remains of a very ancient church, ſuppoſed to be the ſame which Simeon Dunelmenſis ſtates to have been founded by Canute and Turkill in memory of the victory obtained by them over king Edmund Ironſide, within the adjoining pariſh of Aſſingdon or Aſhingdon. The tower is a low maſſive octagon, ſupported by ſtrong buttreſſes; and in the interior are five thick columns with ſlightly ornamented capitals, dividing the nave from a north aiſle. At Canewdon, to the eaſtward of Aſhingdon, is an ancient encampment, of an oblong form, which probable conjecture attributes to the Danes. Its area contains about ſix acres of ground. The Hiſtory and Antiquities of the County of Eſſex, by Philip Morant, M.A. 2 vols. folio, 1768, London. Beauties of England and Wales, vol. v. by E. W. Brayley and John Britton.

ROCHLITZ, a town of Saxony, in the circle of Leipſic, on the Mulda; containing three churches and a citadel, and a manufacture of cloth, ſtuffs, and linen; 20 miles S.E. of Leipſic. N. lat. 51° 8′. E. long. 12° 41′.

ROCHOIS, La, in *Biography*, one of the firſt ſingers in Lulli's famous operas, whoſe abilities were not very ſtupendous, if we may judge of them by the ſongs which he had to execute. Good voices and good action ſeem to have conſtituted the principal merit of this ſinger. Many of them were brought from remote provinces of the kingdom, before they had any knowledge of muſic, and were taught their parts by Lulli himſelf and his father-in-law, Lambert, merely by the ear. But Lulli not only taught his vocal performers to ſing, but to act; and ſometimes gave inſtructions even to the dancers. The celebrated La Rochois, we find, had no other maſter in ſinging than the opera compoſer, Lulli. Hiſt. de la Muſ. par Bonnet, t. iii. p. 207 and 209.

ROCHSBURG, in *Geography*, a town of Saxony, in the lordſhip of Schonburg; one mile E. of Penig.

ROCHSTADT, a town of Weſtphalia, in the principality of Halberſtadt; 10 miles E. of Halberſtadt.

ROCHUKE, a town of Bulgaria, ſituated on the banks of the Danube, at the foot of a hill which continues for ſeveral miles near the river, and is covered with vineyards. It is a large and populous town, about the ſize of Liverpool.

ROCITO, a town of Naples, in Capitanata; 7 miles S. of Volturara.

ROCK, in *Geology*, a large maſs of ſtone, forming part of the ſolid covering or cruſt of the globe. In common language, rocks are the bare projecting ſtony maſſes that riſe above the level of the ground or ſea; but the geologiſt denominates every bed of ſtone that compoſes the compact part of our planet a rock, whether it be elevated to view, or buried deep under the ſurface.

The compoſition, ſtructure, and arrangement of rocks compriſe a moſt important part of the natural hiſtory of the earth, which is now beginning to engage the attention of philoſophers in various parts of the world. Numerous and extended obſervations have greatly enlarged our knowledge of facts, and expoſed the fallacy of many of thoſe unfounded diſtinctions and premature generalizations, which, dignified with the name of ſyſtems, have retarded the progreſs of ſcience.

In the earlieſt periods of civilization, when ſtone began to be employed for purpoſes of architecture or ſculpture, it muſt have been immediately perceived that the rocks of different diſtricts varied greatly from each other; and often in the ſame mountain, the upper and lower rocks were obſerved to be of various kinds and qualities.

In the knowledge of the qualities which enſure durability to the labours of the architect, the ancients appear to have greatly exceeded the moderns; but they did not extend their inquiries reſpecting rocks to any other objects than thoſe of immediate utility. Nor, till about the middle of the laſt century, was the ſtructure of the external part of the earth regarded as an object deſerving the inveſtigation of men of ſcience, who confined themſelves to forming theories of the earth in their ſtudies, in preference to an active examination of nature.

About that time, Lehman, a German mineralogiſt, obſerved that certain rocks occupy the loweſt relative poſition in mountainous diſtricts, and that theſe rocks contain no remains of animals or vegetables; but in the upper rocks, numerous impreſſions and petrified relics of animals and vegetables abound. Hence he inferred, that the firſt were conſolidated before the exiſtence of organized life; and on this account, they were called primitive or primary. The latter were called ſecondary rocks, becauſe they not only contained theſe organic reliquiæ, but alſo fragments of the former rocks, and hence were ſuppoſed to be of later formation.

This diviſion into two claſſes was continued by geologiſts until the cloſe of the laſt century, when M. Werner, the celebrated profeſſor of mineralogy at Freyburg, introduced into his arrangement another claſs, called tranſition rocks, which includes thoſe rocks that are, in many of their characters, ſimilar to primary rocks, but in which ſome organic remains occaſionally occur: hence he ſuppoſed they were formed when the earth was paſſing from an uninhabitable to a habitable ſtate. The ſtratified ſecondary rocks he denominated flœtz rocks, from the German word *flœtz*, ſignifying flat, becauſe theſe rocks are generally divided into parallel ſtrata, which are not greatly inclined from an horizontal poſition. The lower of theſe rocks were called the oldeſt flœtz rocks, and the upper the newer flœtz rocks. (See Geology, where a detailed account is given of the Wernerian arrangement.) Since that article appeared, more extended obſervations have induced even the warmeſt ſupporters of the Wernerian ſyſtem to queſtion the propriety of ſome of its diſtinctions.

"The ſyſtem of claſſification introduced by Werner was formed principally from obſervations made in Saxony, and had great merit, as illuſtrating the geology of that part of Germany; but it has been objected with much reaſon to the general adoption of the terms, that they were framed to ſuit a particular theory, before a ſufficient number of facts had been collected to warrant its reception. Subſequent diſcoveries have alſo proved, that the different claſſes, into which Werner has divided rocks, have not the marked and definite characters neceſſary to conſtitute a natural ſyſtem of arrangement. Even the profeſſor who firſt introduced into this country the diviſions of tranſition and flœtz rocks, as a moſt important diſcovery of Werner, now ſtates his opinion, '*that tranſition rocks may alternate with flœtz rocks, and, therefore, that the tranſition and flœtz claſſes are not ſeparated from each other in the manner generally alleged.*' This admiſſion is the more remarkable, when we recollect the extreme confidence with which the propriety of this claſſification

claſſification was ſupported, and the ſolemn trifling often employed to determine whether certain rocks belonged to the tranſition or floetz claſſes." (Bakewell's Introduction to Geology, 2d edit.) Indeed the term primary, or primitive, is objected to by ſome geologiſts, who conſider theſe rocks as having been in a ſtate of igneous fuſion by ſubterranean fire, which gave to them their cryſtalline ſtructure; but the heat acted with leſs force on the rocks by which they are covered, hence the latter are more earthy. Nor are appearances wanting to ſupport this opinion. Well-authenticated inſtances are known of veins ſhooting from the lower into the upper rocks; and though much labour has been employed to controvert this fact, it is now undoubted. The granite of Cornwall ſends up veins into the ſuperincumbent ſchiſtus, or killas; hence it was inferred that the latter, which is conſidered as a ſecondary rock, was older than the granite or primary rock. It is evident the killas cannot be of more recent formation. Both rocks were probably contemporaneous; in which caſe, we may conceive that veins might ſhoot from the lower into the upper, previouſly to their acquiring a compact ſolid ſtate. Nor will the abſence of organic remains alone prove the prior formation of theſe rocks; for among rocks abounding in petrifactions of animals or vegetables, many beds of rock occur in which no ſuch remains are ever met with, although we are certain to find them in the ſtrata immediately above and below. We have no means of aſcertaining that the ſimilar rocks of different diſtricts were formed at the ſame time; nor can we be certain that they have not once contained organic remains, that were deſtroyed during the proceſs by which they acquired their preſent cryſtalline ſtructure. We may, however, with apparent probability, infer, that their formation was prior to the exiſtence of animals and vegetables in our planet, in its preſent ſtate; becauſe the rocks which immediately cover them contain almoſt excluſively the organic remains of zoophytes, or thoſe animals which are conſidered as forming the firſt link in the chain of animated beings.

It is only from the exiſtence of theſe organic remains, we can infer, with any certainty, that the rocks in which they occur were formed in ſucceſſion. The difference of theſe remains in the upper and lower rocks mark diſtinct epochs in the natural hiſtory of the globe. In the loweſt rocks, which have a cryſtalline granitic ſtructure, no animal or vegetable remains have ever been found; but the calcareous rocks, which immediately cover them, contain ſome few remains of zoophytes and ſhell-fiſh; and in the argillaceous ſlate rocks, alſo, we occaſionally meet with vegetable matter. In the ſand-ſtone ſtrata over theſe, the remains of vegetables are abundant. Above theſe again, in the upper calcareous ſtrata, entire fiſh are occaſionally found, with zoophytes and ſhell-fiſh, of a ſpecies different from thoſe in the lower ſtrata. In the thick beds of aluminous ſhale and clay over theſe, occur the remains of the ſhark and alligator; and in the alluvial ſoil which covers the whole, the bones of the elephant, the rhinoceros, the hippopotamus, and the maſtodonton or mammoth, and of various unknown quadrupeds, are found both in our own country, and in many parts of Europe, Aſia, and America. But neither in the upper nor lower rocks, nor in alluvial ground, have any remains of human ſkeletons been found, except where mines had formerly been worked, or in ſituations where their occurrence could be explained by recent cauſes; ſuch as inundations and volcanic operations, as on the ſhores of Guadaloupe and in the neighbourhood of Veſuvius.

We believe our own countryman, Mr. W. Smith, was the firſt perſon who obſerved that remains of diſtinct genera and ſpecies of animals were peculiar to certain ſtrata, and that the occurrence of the ſame remains was ſufficient to identify the ſame ſtratum, throughout a whole diſtrict, wherever it could be examined. The ſagacious naturaliſt M. Cuvier has applied the ſame diſcovery to illuſtrate the geology of the country round Paris, a diſtrict moſt remarkable for the number and variety of foſſile ſkeletons, and other reliquiæ which it contains. See STRATA.

It is not a little remarkable, that few of the reliquiæ, whether in the upper or lower rocks, belong to exiſting ſpecies of marine or terreſtrial animals; and the vegetable petrifactions found in northern latitudes reſemble moſt thoſe of tropical climates.

The natural hiſtory of rocks compriſes, the ſubſtances of which they are compoſed, their internal and external ſtructure, their poſition, and the order of ſucceſſion, from the loweſt rocks with which we are acquainted upwards to the ſurface—their decompoſition, and the mode of their formation. The latter is the province of ſpeculative geology, for it is only in one claſs of rocks, the volcanic, that we have any experience of their actual formation.

The mineral repoſitories peculiar to certain rocks will be deſcribed under the article VEINS, *Mineral* and *Metallic*.

The Compoſition of Rocks.—Rocks are either ſimple or compound. Thoſe rocks which are compoſed of one mineral ſubſtance, are called ſimple, ſuch as ſlate, ſerpentine, lime-ſtone, &c. although theſe minerals may be compoſed of various elementary ſubſtances. Thus clay-ſlate, or ſlate, conſiſts of ſilex and alumine, combined with oxyd of iron and carbon; but the combination is ſo intimate, as to preſent the appearance of an homogeneous ſubſtance. When two or more minerals enter into the compoſition of rocks, they are called compound. Thus granite is compoſed of quartz, felſpar, and mica, cloſely united together, but each of theſe minerals preſerves its own peculiar character. The elementary ſubſtances of which all rocks, both ſimple and compound, are formed, are, the earths ſilex, alumine, lime, magneſia, the oxyd of iron, carbon, and ſulphur. (See SILEX, ALUMINE, &c.) The newly diſcovered earths and metallic ores, except iron, rarely form the ſubſtance of rocks, but are found in the veins and fiſſures by which they are interſected.

From the above elementary ſubſtances, either ſeparately or combined, all the ſimple minerals are formed which compoſe rocks and mountains. But it may be remarked, that ſilex enters moſt largely into the compoſition of all the lower cryſtalline rocks (except granular lime-ſtones): it forms more than two-third parts of the lower cruſt of the globe.

The moſt important ſimple minerals which form rocks and mountains, are quartz, felſpar, argillaceous ſchiſt, or clay-ſlate, lime-ſtone, hornblende, ſerpentine, chlorite, mica, talc, hornſtone, jaſper, flint, bituminous ſhale, and alum-ſlate. Baſaltic or trap rocks, and lava, are ſometimes compoſed of one apparently homogeneous ſubſtance, but more frequently they preſent the appearance of compound rocks. For the characters of theſe minerals, ſee QUARTZ, FELSPAR, &c.

When two or more of theſe minerals are intermixed together, they form compound rocks; in theſe the minerals are either cloſely united together, without any viſible cement; or aggregated and held together by the intervention of another mineral ſubſtance, which ſerves as a cement, and is ſometimes called the paſte.

The Structure of Rocks, internal and external. The latter, or the ſtructure of rocks *en maſſe*, is as diſtinct from the former, as the order of architecture of a building is diſtinct from

from the form of the bricks or ſtones of which it is conſtructed. The internal ſtructure of ſimple minerals belongs properly to the department of the mineralogiſt, and that of compound rocks, with their external ſtructure, to the geologiſt. Compound rocks are either

Granitic, compoſed of grains or cryſtals, united without a cement, as in granite.

Porphyritic, conſiſting of a compact ground, in which diſtinct cryſtals are imbedded; or of a granitic ground, in which ſome of the cryſtals are much larger than the reſt.

Amygdaloidal, from the Latin *amygdala*, an almond, containing kernel-ſhaped cavities, filled with other mineral ſubſtances.

Conglomerated, compoſed of fragments, or rounded ſtones, cemented together, as in breccias and pudding-ſtone.

Granular, compoſed of ſmall grains, either cemented, or adhering, as in ſand-ſtones.

The external ſtructure of rocks is either

Stratified, compoſed of layers or ſtrata.

Tabular, in large plates: this includes the ſlaty ſtructure in the maſs.

Columnar, in regular columns or priſms.

Globular, in ſpherical maſſes.

Indeterminate, which includes all unſtratified rocks that have no determinate ſhape.

Stratified mountains, or rocks, are compoſed of layers or ſtrata lying over each other, and divided by parallel ſeams, like the leaves of a cloſed book. In the ſeams or partings which divide the ſtrata, there are frequently thin laminæ of ſoft earthy matter, but ſometimes the ſurfaces of the upper and lower ſtratum are cloſely joined, and require conſiderable force to cleave them aſunder. The layers are denominated ſtrata. See STRATA.

It has been admitted, without ſufficient evidence, that all ſtratified rocks were formed of the ſediment of turbid water, which arranged them in ſucceſſion over each other, as the muddy waves of the ocean depoſit their contents in regular layers upon the ſhore. This mode of formation is called mechanical depoſition. It has alſo been generally believed, that all rocks divided by parallel ſeams were formed mechanically by the action of water, and as ſuch layers occur occaſionally in cryſtalline rocks, it was inferred by ſome geologiſts that this was a proof that ſuch rocks had been formed by water. Thus the tabular ſtructure, which conſiſts of tables or plates of rock that have generally a vertical direction, and frequently a ſlaty cleavage, has been confounded with ſtratification: this has given riſe to much confuſion and contradiction in the deſcription of rocks; ſome geologiſts denying, and others aſſerting the ſtratification of the ſame rock. The tabular and ſlaty ſtructure of many rocks may, with as great probability, be attributed to cryſtalline arrangement, as the lamellar ſtructure of a cryſtal of felſpar, or a plate of mica. The laws of cryſtallization have but recently arreſted the attention of philoſophers, and their reſearches have been principally confined to their effects in a ſmall ſcale. The cryſtallization of mountain maſſes is equally deſerving of notice, as to this cauſe muſt we refer both their tabular, columnar, and globular ſtructure.

The columnar ſtructure conſiſts of regular columns or polyhedral priſms, and is almoſt peculiar to trap or baſaltic rocks, and to volcanic rocks: theſe ſometimes form vaſt ranges of natural columns, as in Iceland, the Lipari iſlands, the Motta in Sicily, the Giants' Cauſeway in Ireland, and at Staffa. It was long contended againſt all probability, that theſe columns were the effects of accidental rents occaſioned by the drying or ſhrinking in of the maſs; but their regularity, and (in many inſtances) the convex and concave articulations of the joints, prove that they are effects of cryſtallization. Theſe columns have been obſerved by Col. Imrie and others formed in currents of lava, that could be traced to the craters of volcanoes. Tranſactions of the Wernerian Society, vol. ii. pt. 1.

The globular ſtructure conſiſts of balls, ſometimes detached, at other times imbedded in rocks of the ſame kind. Theſe balls are frequently compoſed of concentric ſpherical layers. This ſtructure is not unfrequent in baſaltic and granitic rocks. The balls are generally harder than the rocks in which they are imbedded, and frequently retain their ſhape after the outer rock is decompoſed. Inſtances of this ſtructure occur in the baſaltic rock of Staffordſhire, called Rowley Rag. (See ROWLEY *Rag.*) Globular diſtinct concretions of granite are from one to two or more fathoms in diameter. Theſe concretions are again compoſed of curved lamellar concretions, and always include a harder central maſs. The ſpaces between the globes are filled with granite poſſeſſing leſs ſolidity, which decays more readily, and thus leaves the harder central maſſes heaped on each other, or ſtrewed about. Theſe diſtinct concretions muſt not be confounded with rolled maſſes. Beautiful examples of theſe concretions occur in the iſland of Arran, Bohemia, the Hartz, the Fichtelgebirge, and other places.

The indeterminate or amorphous ſtructure appears to be the moſt common in unſtratified rocks; but our confined and partial obſervations may frequently lead us to conclude, that rocks have no determinate ſtructure, whereas, could we aſcertain their arrangement throughout their whole extent, we might perceive that their ſtructure, viewed on a great ſcale, was as regular as that of many ſtratified rocks.

The poſition of rocks, with reſpect to each other, is an intereſting ſubject of geological inquiry, as it is ſuppoſed to determine their relative ages, and to elucidate the mode of their formation. When one rock covers another in ſuch a manner as to appear moulded upon it, having the ſame elevations and depreſſions, it is ſaid by the German geologiſts to lie in a conformable poſition. In this manner the ſchiſtoſe or ſlaty rocks frequently cover rocks and mountains of granite. Stratified rocks are alſo generally conformable to the ſhape of the lower rocks, except in ſituations where the ſtrata appear to have been broken by ſome ſubſequent convulſion of nature, which has deranged their original poſition, and occaſioned them to abut againſt each other, or has given the upper ſtrata a contrary inclination to the lower. In this caſe their poſition is ſaid to be unconformable. Where maſſes of unſtratified rocks cover other rocks, filling up the cavities, and lie without any conformity to the ſhape of the lower rocks, they are called unconformable and overlying. This poſition is common to moſt rocks of volcanic origin, and to baſaltic rocks; in the former there can be no doubt reſpecting the mode of their formation. Streams of liquid lava pouring through vaſt fiſſures and openings have covered the inequalities of the lower grounds, filling up vallies, and accumulating as the lava cooled and conſolidated, thus forming immenſe mounds and abrupt precipices: ſome geologiſts aſcribe a ſimilar formation to baſaltic and porphyritic overlying rocks.

Thoſe rocks which are commonly imbedded in other rocks, are ſaid to be ſubordinate formations; thus granular lime-ſtone, ſerpentine, and hornblende, frequently form beds in ſchiſtoſe rocks, ſuch as gneiſs, mica-ſlate, and clay-ſlate, and are then deſcribed by geologiſts as ſubordinate to the latter.

Beſide the above poſitions, the continuity of rocks is frequently broken by vertical ſeams or fiſſures filled with mineral matter different from that of the rock which they interſect.

(See VEINS, *Mineral* and *Metallic.*) These vertical seams of rock are sometimes of vast extent, and vary in width from a few inches to several hundred feet. The most obvious inference is, that the solid covering of the globe has been rent, and the mineral matter ejected in a state of fusion into the interstices. The similarity of the mineral matter in the greater part of these fissures, provincially called dykes, to that of volcanic eruptions, adds much probability to this opinion. Where these dykes occur, the original position of the rocks on each side is generally changed.

The dislocation of rocks and strata has been most noticed in mining districts, where it is not unfrequently observed, that a stratum which has extended with a regular inclination over a large track of country, is suddenly thrown down several hundred yards or more, and often sunk below the power of the miner to regain it. Sometimes the strata are thrown upwards, and a series of rocks, which exist on one side of the fracture, are entirely removed on the other, and have totally disappeared.

The change in the original position of all rocks and strata, with respect to the level of the sea, is a most important and incontrovertible fact. Whether the sea has diminished or retired into cavities in the earth, or whether the rocks and mountains have been raised by an expansive force, which has broken the solid covering of our planet, and lifted them from the watery abyss to the present elevation, are questions that may long divide the opinions of geologists; but that the summits of our highest mountains were buried for ages under the ocean cannot admit of doubt. On some of these summits, remains of marine animals are at present widely spread; indeed, many of the calcareous mountains of vast extent and height appear to be almost entirely formed of marine shells, which are not heaped together in confusion, but the upper and lower beds of rock contain remains of species distinct from each other; this proves that they were not deposited in their present situation by any sudden inundation, but have been collected in succession at distant periods of time.

In schistose mountains, considered as primary, the beds of rock have generally a vertical position. Some geologists suppose that all these beds were originally deposited horizontally, and have been subsequently elevated by some mighty convulsion of nature. Saussure, who has investigated with so much labour the structure of the Alps, has drawn this conclusion with respect to the rocks which compose Mont Blanc, and the mountains in its vicinity; but we are inclined to believe that the structure of these mountains, as described by this intelligent philosopher, may in many instances be explained in a more satisfactory manner, by considering it as the result of crystallization on a large scale, and the vertical beds of rock as plates of enormous crystals: indeed, Saussure himself appears to have been very frequently impressed with surprise at the tendency to crystalline arrangement observable in these mountain masses, which he describes as presenting regular pyramidal or rhomboidal forms. The crystalline nature of the rocks themselves, and the minerals which fill the vertical seams, point to crystallization as the great agent in the formation of these mountains, whether it took place in an aqueous solution, or when the whole was in a state of igneous fusion deep under the surface. In one situation near the great pyramids of granite, on the south-east side of the valley of Chamouni, he describes a chain of mountains seven or eight leagues in extent, in which the vertical section of the beds presents an arrangement exactly similar to that of the sticks of an opened fan. The lowest beds are nearly horizontal, but they gradually rise till they become vertical at the summit. He says, that many other instances might be cited of a similar arrangement. Now, we can scarcely conceive it possible for any overturning of the mountain to have produced such a position of the beds; but in the crystallization of minerals on a smaller scale the diverging structure is common. There is, however, one fact, which, if it can be satisfactorily ascertained, will prove the truth of Saussure's opinion, that the vertical position of some of these rocks was not their original one. In his description of the rocks in Valorsine, he says, that he found vast beds of pudding-stone in a vertical position, between schistose rocks in a similar position; the beds on one side are gneiss or mica-slate, and on the other slate and sand-stone. The bed of pudding-stone is 100 toises thick; it consists of a fine paste or cement, composed of extremely fine schistose sand-stone, with minute plates of mica, that are perfectly parallel to the seams which divide the beds.

The fragments vary in size, from that of a grain of sand, to six or seven inches in diameter; some are angular and others rounded, resembling the boulders on the shores of the lake of Geneva. These fragments and boulders are of gneiss, mica-slate, and quartz, but none are of clay-slate. Saussure has observed, that it is impossible for these rounded boulders to have been originally placed in a vertical situation. If they were formed mechanically by the action of water, like those on the borders of the lake of Geneva, this inference is undeniable; and we must farther admit with Saussure, that the mass of this mountain, which is 1181 toises above the level of the sea, has been overturned by the same revolution which has given a vertical direction to the whole; for all these beds having the same inclination and direction as that of the pudding-stone, we are compelled to grant that their original situation was the same, and that they have suffered the same change from the same cause. The only objection to this inference that can, with any probability, be urged, is, that these rounded stones may not really be water-worn boulders and pebbles, but were formed in the same manner as the bolls of basalt and granite, which are sometimes imbedded in basaltic or granitic rocks, and which are acknowledged to be the result of a tendency to crystalline arrangement.

Saussure, however, was fully convinced that they were real boulders, and his guide, on seeing a number of the same rounded fragments on the summit of a mountain in the vicinity, expressed his surprise at finding, in that elevated situation, the pebbles and boulders he was accustomed to see on the borders of the lake. The boulders, in this situation, were evidently the remains of similar beds of pudding-stone, of which the paste or cement had been decomposed and washed away.

It is observed, that secondary strata always rise towards the primitive mountains in their vicinity, which adds probability to the opinion, that the latter were forced up from great depths, and have raised with them the rocks by which they were originally covered, and which now border the primary. The disciples of Werner, however, contend, that the elevation of secondary strata is occasioned by the inclination of the rocks on which they were originally deposited, and that they have undergone no subsequent change.

Succession of Rocks.—There are certain rocks, which commonly occupy the lowest relative position in various parts of the world; the rocks which cover them are frequently arranged in a sequence, which has much similarity in distant districts.

Werner, who formed his system from observations made in

in Saxony, where the order of ſucceſſion preſented conſiderable regularity, concluded that each principal rock conſtituted what he called a univerſal formation, or was originally ſpread round the globe, and that theſe formations ſucceeded in a determinate order, encircling each other like the coats of an onion.

More recent and extended obſervations do not confirm this concluſion to the full extent to which it was carried by the German geologiſts. Of the thirteen rocks which he claſſes as primary, ſome are entirely unknown in various parts of the world, and one of them, the topaz rock, has hitherto been found only in Saxony. Many of the ſecondary rocks, which occupy a conſiderable ſpace in Europe, are no where met with in North or South America. In Aſia, we are informed by travellers, that a range of mountains, compoſed of jaſper, extends far more than a thouſand miles through the eaſtern parts of Siberia, including Gore iſland, between that country and America. A geologiſt, who reſided in Siberia, might be diſpoſed to regard jaſper as the principal rock-formation in the world, as it extends over a far greater ſpace than the diſtricts in which Werner laid the foundation of his ſyſtem; on the contrary, in many parts of Europe, jaſper is little known, nor is it even enumerated among the principal rocks of Werner.

Mr. Bakewell, in his "Introduction to Geology," admits only three principal rocks in the claſs of primary; in which arrangement he is ſupported by D'Aubuiſſon, an intelligent diſciple of Werner, who, on a recent examination of the mountains in the department of Mont Blanc, found that many of the rocks, heretofore regarded as primary, contain ſome organic remains; hence he admits of one primary formation only, which includes granite, gneiſs, and mica-ſlate.

Brongniart, a celebrated French mineralogiſt, has more recently declared his opinion, that it is no longer poſſible to admit the claſſifications eſtabliſhed by Werner. "At the time when theſe were formed, they rendered an eſſential ſervice to geology, and created the ſcience; but new obſervations muſt produce correſpondent changes in the denominations and ſyſtem of arrangement." Journal des Mines, May 1814. Without adhering to ſyſtems, further than they are ſupported by facts, we conſider granite as the loweſt rock that is generally met with in alpine diſtricts. Granite is frequently covered by a rock called gneiſs, a kind of ſlaty granite; on this occurs micaceous ſchiſt, or mica-ſlate. For the characters of theſe rocks, ſee GRANITE, GNEISS, and MICA-*Slate*.

Theſe three rocks are frequently obſerved graduating into each other, and ſometimes alternating. The ſubſtances which compoſe them appear to have been in a fluid ſtate, and to have united in various forms and proportions; and certain cauſes have given to the outer part a ſchiſtoſe or ſlaty ſtructure. The gneiſs and mica-ſlate are generally moulded over the granite, with the ſame elevations and depreſſions. Beds of other rocks, particularly of granular lime-ſtone, hornblende rock, and ſerpentine, occur occaſionally in theſe rocks, with beds and veins of metallic ores.

The higheſt mountains on the continents of Europe and Aſia are compoſed of theſe rocks. Mont Blanc is 15,680 feet above the level of the ſea.

Granite rocks are in ſome inſtances immediately covered by ſlate; and in others, ſecondary ſtratified rocks reſt upon granite, without the intervention of rocks which uſually accompany it. More commonly, mountains of ſlate, or the coarſe kind of ſlate-rock, called by the Germans grey-wacke and grey-wacke ſlate, cover the mica-ſlate and gneiſs. Immenſe beds of lime-ſtone frequently accompany this kind of ſlate, in which the remains of marine animals, principally zoophytes, appear, but different from any known exiſting ſpecies. A very thick bed of ſand-ſtone, frequently coloured red by the oxyd of iron, often accompanies the coarſe ſlate. It is called by Werner the old red ſand-ſtone, and is ſucceeded by beds of lime-ſtone, in which the organic remains of zoophytes and ſhell-fiſh are more abundant: theſe are the loweſt rocks in which metallic veins uſually occur. Over this lime-ſtone we meet with numerous ſtrata of argillaceous and ſiliceous ſand-ſtones, and ſoft ſlate or ſkale, abounding with impreſſions of vegetables, impregnated with bituminous and carbonaceous matter, and alternating frequently with beds of coal. Theſe ſecondary ſtratified rocks, called by the Germans flœtz rocks, will be more particularly deſcribed under the article STRATA.

Again, over the ſtrata containing coal, or more properly on the boundary of theſe ſtrata neareſt the ſea, we meet with calcareous ſtrata containing the remains of marine animals, but different from thoſe found in the lower rocks. Theſe calcareous ſtrata conſiſt of calcareous ſand-ſtone, roe-ſtone, and chalk. See ROE-*Stone*, and CHALK.

It is remarkable that chalk, which is extenſively ſpread over the ſouthern counties of England, and the oppoſite coaſt of France, and in many of the countries adjoining the Baltic, is unknown in North and South America, and various parts of the world. Over the chalk are found thick beds of clay and ſand; and in ſome parts of Europe there occurs over theſe a ſeries of ſtrata, containing the remains of freſh-water ſhells and quadrupeds. See STRATA, in which an account will be given of the freſh-water formation of ſtrata in the vicinity of Paris and the ſouthern parts of England. This appears to be the lateſt formation of rock that we are acquainted with, except what is taking place in our own times by volcanic fires.

It is worthy of remark, that we meet with no organic remains in the loweſt rocks we are acquainted with; that the rocks over theſe contain a few remains principally of marine animals; that the rocks which immediately cover the marine remains, or the coal ſeries, abound in vegetable impreſſions and carbonaceous matter; but we rarely meet with animal remains of any kind in theſe ſtrata, until we approach nearer the ſea-ſhore, when other calcareous ſtrata occur again, containing, almoſt excluſively, the remains of marine animals, but different from thoſe in the lower rocks. Theſe latter ſtrata conſiſt of calcareous ſand-ſtone, roe-ſtone, and chalk. See ROE-*Stone*.

Beſide the rocks, in which ſome order of ſuperpoſition may frequently be traced, there are other rocks which are thrown over them, apparently by ſome great convulſion of nature which has broken the ſurface of the globe, and forced them into their preſent poſition, without any regular order of ſucceſſion. Theſe rocks conſiſt of porphyry, ſienite, trap, or baſalt. From the nature of theſe rocks, and the ſimilarity of their poſition with that of volcanic rocks, many philoſophers have attributed the ſame mode of formation to both, and ſuppoſe that the former have been orignally currents of lavas formed in remote ages.

Humboldt, who has made more extended obſervations on volcanoes than any philoſopher who has preceded him, ſays, that in the ſubſtances which have been ejected during volcanic eruptions, a gradation may be traced from the more ancient to thoſe of more recent date, and that the latter have always a nearer reſemblance to the lavas ejected at the preſent time. If this obſervation be correct, it will probably lead to the con-

cluſion, that rocks of porphyry, ſienite, trap, baſalt, and lava, had all a ſimilar mode of formation, as they agree in ſo many characters of compoſition and ſtructure. See VOLCANO, VOLCANIC *Products*, TRAP, and SIENITE.

As Mont Blanc in Switzerland is the higheſt mountain on the continent of Europe or Aſia that has been examined by any eminent mineralogiſt, we ſhall give a ſhort account of its ſtructure, and the rocks which compoſe its ſummit, as deſcribed by Sauſſure, who aſcended it in 1786, and who had devoted many years to the ſtudy of the rocks in its vicinity. Theſe rocks, ſituated nearly 2400 fathoms above the ſea, are intereſting, as being the moſt elevated that have been obſerved by naturaliſts; and the ſcarcity of rock ſpecimens, brought from great elevations, renders his account the more deſerving of notice. A more numerous collection of ſuch ſpecimens from various parts of the globe would throw much light on this department of ſcience.

After having gained the higheſt point of the mountain, "the firſt thing which ſtruck me," ſays Sauſſure, "in the entire view of the high mountainous ſummits which I had under my eyes from the ſummit of Mont Blanc, (the higheſt of them all,) was the kind of diſorder which prevailed in their diſpoſition. When we contemplate the range, of which Mont Blanc forms a part, from leſs conſiderable elevations, it appears as if theſe coloſſal mountains were ſituated in a line, and formed a chain; but this appearance vaniſhes entirely from the bird's-eye view which is here preſented. The mountains to the north of Mont Blanc, in Savoy and Switzerland, are indeed united among themſelves, ſo as to form mountain chains, but the primitive mountains do not preſent this appearance. They are diſtributed in great maſſes, or in groups of various ſtrange forms, detached from each other, which appear at leaſt but accidentally united, without any regularity. Thus on the eaſt, the lofty peaks called les Aiguilles de Chamouni, the mountains of Argentiere, of Courtes, and of Taleul, form one triangular group, almoſt detached from Mont Blanc, and only connected with it at the baſe by a narrow ridge.

"On the ſouth-eaſt likewiſe, mount Zuc, La Rogne, and the other primitive mountains to the north of the ſummit of l'Allée Blanche, form a group nearly triangular, ſeparated from Mont Blanc by the valley of the glacier of Miage, and which is only connected with Mont Blanc by the baſe of the mountains which cloſe that glacier to the north.

"Mont Blanc itſelf forms a maſs almoſt iſolated, the different parts of which are not in the ſame line, and have no relation of ſituation with the other groups.

"On caſting my eyes ſtill further, I confirmed the ſame obſervation. The primitive mountains of Switzerland and Italy, which I had ſufficiently near to be under my eyes, preſented only ſeparated maſſes, or detached groups, without order or regularity. Notwithſtanding this irregularity in the forms and diſtributions of the grand maſſes, I obſerved certain important reſemblances in the ſtructure of their parts. All that I diſtinctly ſaw, appeared compoſed of plates (*feuillets*), arranged in the ſame manner nearly from north-eaſt to ſouth-weſt. I had particular pleaſure in obſerving the ſame ſtructure in the Aiguille du Midi, which I had formerly endeavoured but in vain to ſtudy, being prevented by the inacceſſible walls of granite that ſurround the baſe. I had a view of the Aiguille du Midi on the ſecond day of my aſcent, and never loſt ſight of it as I proceeded. I aſſured myſelf that it is entirely compoſed of magnificent plates of granite, perpendicular to the horizon, and directed from north-eaſt to ſouth-weſt. Three of theſe plates, ſeparated from each other, form the ſummit, decreaſing gradually in height from the ſouthern face, on the ſide of the Col du Géant.

"When ſeen from the baſe, theſe plates had the appearance of being bent, like the leaves of an artichoke; but this muſt be an optical illuſion, for all thoſe which I could now ſee diſtinctly appeared ſtraight; and if there were any exceptions, they were only local, and of ſmall extent.

"This great phenomenon of the vertical poſition of the plates can only be explained, by admitting a great overturning of the whole maſs, which has lifted them from their original horizontal poſition.

"Another queſtion, which I wanted anxiouſly to reſolve, was alſo now anſwered. Theſe great plates of rock preſerved the ſame nature and quality at the ſummit as at the baſe, where I had ſo frequently examined them. This obſervation proves a remarkable property in mountains with vertical beds: each bed preſerves the ſame nature from the bottom to the top.

"From this magnificent obſervatory I could compriſe in one view the whole of that great phenomenon—which I had before contemplated but in parts—the elevation of the beds forming the mountains on the ſide of Mont Blanc. On whichever part I turned my eyes, I ſaw the ſecondary chains of mountains, and even the primitive of the ſecond order, raiſing their beds againſt Mont Blanc, and the high ſummits in its vicinity. Such were the mountains on the north of Repeſoir, of Paſſy, of Servoz, and Le Buet; on the ſouth, the Col du Ferret, Great St. Bernard, and thoſe of the chain of Cremont, more remote, and beyond the mountainous chains, whoſe eſcarpments turn to Mont Blanc. We ſaw others, whoſe eſcarpments were turned in a contrary direction. Theſe appearances are in perfect accordance with the theory which ſuppoſes that the cruſt of the globe has been broken, and the beds of rock raiſed from their horizontal poſition. It follows from hence, that the horizontal diſtance from the bottom of the valley of Chamouni (if that were once the ancient ſurface of the globe) ſhould have ſome correſpondence with the height of Mont Blanc; and that this diſtance is nearly the thickneſs of the ſtony cruſt, which has been broken and elevated; and that, conſequently, Mont Blanc, which actually riſes about a league above the ſurface, was in its original poſition buried two leagues beneath it."

The naked rocks on the ſummit, which form two kinds of arretes or creſts of a dark colour, are of granite. The felſpar in this granite is white, inclining to grey, green, or reddiſh: when expoſed to the flame of the blowpipe, it yields a colourleſs tranſparent glaſs, but full of bubbles. The felſpar is ſometimes intermixed with a kind of earthy ſteatite. The quartz in this granite is ſemi-tranſparent and whitiſh, and appears rather unctuous in the fracture. Very minute fragments were rounded by the flame of the blow-pipe: it is, therefore, more fuſible than rock-cryſtal. Theſe granites are alſo intermixed with green and black hornblende, and with chlorite, which ſeems to ſupply the place of mica, as the latter ſcarcely appears, and only in minute ſpangles. In ſome places, theſe granites graduate into irregularly ſchiſtoſe rocks, compoſed of quartz and felſpar, whoſe ſeams are filled with a brown argillaceous and ferruginous earth, that melts into a black glaſs. The granite on the actual ſummit is compoſed, like the above, of quartz, felſpar, and hornblende or ſteatite. Felſpar conſtitutes about three-fourths of the maſs: the hornblende and ſteatite form too ſmall a portion to be eſtimated, the quartz forming nearly the whole of the remaining fourth part. On the northern ſummit, beſides the above ſpecies of granite, he met

met with a kind of trap rock, compoſed of minute cryſtals of white felſpar and hornblende. On the ſouthern ſummit he alſo found rocks of petroſilex (hornſtone), of a pearl-grey colour. It is deſerving notice, that the definition of theſe granites, as given by Sauſſure, would, according to the Wernerian ſyſtem, bring them under the denomination of ſecondary granites; though ſurely, if any granite can properly be conſidered as primary, it is that of Mont Blanc, and the mountains in its immediate vicinity.

The following extract from profeſſor Jameſon's Geognoſy compriſes a ſhort view of the order of ſucceſſion of rocks, as laid down by the German geologiſts; with obſervations on the ſucceſſion of the rocks of Saxony and Hanover, deſcribed in the quaint language peculiar to the ſchool of Freyburg.

"In the primitive claſs of rocks, we obſerve ſeveral rocks always diſpoſed in conformable and unbroken ſtratification, and in which the newer and newer ſtrata have always a lower and lower level. Gneiſs, mica-ſlate, and clay-ſlate, are of this kind. The granite ſtretches under them uninterruptedly, and ſometimes riſes through them, or juts up in the form of ſingle caps or great maſſes; ſo that the gneiſs and other rocks are diſpoſed on its ſurface, ſometimes in a concave, ſometimes in a convex direction, ſometimes ſaddle-ſhaped, and frequently mantle-ſhaped. It is evident from theſe relations of the ſtrata, that granite will frequently form the greateſt heights on the ſurface of the globe.

"Porphyry has a very different kind of ſtratification from the preceding rocks. It occurs ſometimes broken, ſometimes unbroken. When broken, it preſents caps, upfillings, and ſhield-ſhaped ſtratification. When unbroken, it forms widely extended maſſes: its poſition is unconformable, and overlying.

"Grey-wacke occurs ſometimes in a conformable, ſometimes in an unconformable poſition; alſo in caps, upfillings, and ſhield-ſhaped, and frequently mantle-ſhaped, ſtrata, ſurrounding the older mountains.

"The lime-ſtone and ſand-ſtone formations are uſually diſpoſed in a mantle-ſhape, round the older formation; ſometimes they are broken, but more frequently unbroken. They are very common and widely diſtributed formations.

"Coal, again, ſhews a very peculiar character: its original extent is not conſiderable; it even appears interrupted, or broken; but its internal characters ſhew that its preſent apparently broken appearance is its original one. It occurs commonly in trough and baſin-ſhaped hollows, and its ſtrata have conſequently a concave direction.

"The rocks of the neweſt floetz-trap formation are diſtinguiſhed from the older by their unconformable, overlying, and broken ſtratification. In theſe reſpects they nearly agree with porphyry. When the continuity of the formation is broken, it occurs in caps, upfillings, and rarely ſhield-ſhaped.

"The deſcription we have now given of the ſucceſſion and ſtructure of the different claſſes of rocks, will enable us to inveſtigate the ſtructure of the whole mountain groups. We ſhall illuſtrate this by a very ſhort deſcription of two well-known tracks of country, the Hartz, and the Saxon Erzgebirge, or metalliferous mountains.

"*Deſcription of the Hartz.*—An immenſe maſs of granite forms the centre of this country; it riſes through the other ſtrata, and is elevated a conſiderable height above them all, forming the famous mountain—the Brocken. Mantle-ſhaped ſtrata of clay-ſlate are wrapped around this central maſs. It is worthy of remark, that gneiſs and mica-ſlate, two of the moſt conſiderable of the older formations, are wanting in this country. To the clay-ſlate ſucceeds tranſition lime-ſtone, then grey-wacke, and grey-wacke ſlate; and the whole of theſe are wrapped around the granite in mantle-ſhaped ſtrata, and invariably with lower and lower outgoings, correſponding to the newer and newer ſtrata. The floetz rocks that immediately ſucceed the tranſition ſurround them in mantle-ſhaped ſtrata. Immediately on the neweſt of the tranſition rocks reſts the oldeſt of the floetz, the old red ſand-ſtone; to this ſucceeds the other floetz formation, in the following order, according to their relative age:—firſt floetz lime-ſtone, firſt floetz gypſum; ſecond or variegated ſand-ſtone, ſecond or newer floetz gypſum, ſecond floetz lime-ſtone. Theſe floetz rocks are the links that connect the tranſition with the alluvial, the next claſs of rocks. Theſe are found in the loweſt ſituations. We have thus, from granite to the alluvial formation, all the ſeries marked with a diminiſhing level, in proportion to the newneſs of the ſtrata.

"*Deſcription of the Saxon Erzgebirge.*—The mine diſtrict of the electorate of Saxony has a baſis of granite which riſes through the ſuper-incumbent rocks in the different places at Altenberg, Johanngeorgenſtadz, and Bobriſch, on the road leading from Freyberg to Dreſden. The newer formations, *viz.* gneiſs, mica-ſlate, topaz-rock, and clay-ſlate, are wrapped around the granite in mantle-ſhaped ſtrata, and the diminiſhing levels of the outgoings correſpond to the newneſs of the formations. Over theſe we meet with other primitive formations that overlie the older formations, and their continuity is partly broken, and partly unbroken; here are porphyry, ſienite, newer granite, quartz, and ſerpentine. Still lower down we meet with tranſition rocks, of which the lime-ſtone appears at Kalk-grun and Wildenfels; the amygdaloid at Voghtland; and the grey-wacke and grey-wacke ſlate near Freyberg. Still lower down, and often covering the preceding formations, we find ſand-ſtone and lime-ſtone; and in ſeveral places, as at Hainchen, Pottchappel near Dreſden, and Zwickau, there are depoſitions of the coal formation. Laſtly, the neweſt floetz-trap formation covers all the others in unconformable, overlying, and very broken ſtratification."

Decompoſition of Rocks.—Where rocks riſe above the ſurface, and are expoſed to the action of air and moiſture, they are liable to decompoſition and diſintegration. The former conſiſts in the ſeparation of the conſtituent parts, the latter in the ſeparation of the integrant parts: the one may be compared to the moulding of the ſtones of which a building is conſtructed, the other to the diſjointing and diſlocation of the ſtones in a ſound ſtate, when a building is thrown down. Both theſe proceſſes frequently take place in the ſame rock.

The diſintegration of rocks is ſometimes rapidly effected by earthquakes, lightning, and the immediate action of ſubterranean fires. It is, however, to the more conſtant operations of moiſture and change of temperature, that the deſtruction of rocks and mountains may be principally attributed; but no well-authenticated obſervations have yet been made to determine the extent of theſe effects during a given period of time. It has been vaguely ſtated, that the height of the Pyrenées is diminiſhing about one foot in a century; hence it was calculated that a million years would be required to level the rocky boundary which ſeparates France and Spain. It is obvious that a lapſe of many centuries would be required to verify ſuch a concluſion; and though the decompoſition and diſintegration of rocks are, in many ſituations, ſufficiently rapid to be obſervable during the ſhort period of a ſingle life, yet, in other ſituations,

rocks

rocks prefent the fame unvarying outline for ages, and preferve their angular fharpnefs, which is either natural, or, in fome inftances, the effect of art. Thus, the blocks of granite remaining in the quarries at Sienna, in Upper Egypt, have all the impreffions of the tools with which they were worked during the latter period of the Roman empire; and the bafaltic rocks formed by the extinct volcanoes of Auvergne are fo compact, as to prefent, at this day, the appearance of trickling lava fuddenly congealed, though the period of their formation was prior to the record of authentic hiftory. The caufes of difintegration are, the viciffitudes of the atmofphere, change of temperature, and the abforption and congelation of water. The fudden dilation or contraction produced by the expanfion and congelation of water, is alone fufficient to rend the ftrongeft rocks when it enters their fiffures. In Greenland the rocks are faid, from this caufe, frequently to burft with a noife like thunder. The external caufes of decompofition are, principally, water and oxygen. Mineral fubftances, containing fulphur or metallic matter capable of a higher degree of oxygenation, abforb oxygen from water, or the atmofphere. To this caufe the decompofition of ftones, containing pyrites, is to be attributed. Calces of iron, moderately oxygenated, are the moft general caufe of decompofition; they act by abforbing a greater portion of oxygen, by which they gradually fwell, and are difunited from the other conftituent parts of the ftone in whofe compofition they enter. When leaft oxygenated, their colour is black, or dark brown; and in fome inftances, when combined with alumine, or magnefia, greenifh-grey; the alumine, as it becomes more oxygenated, turns to a purple-red and orange, and finally a pale yellowifh-brown; the magnefia becomes at firft blue, then purple and red. Iron, in its metallic ftate, or, at leaft, when but flightly oxygenated, alfo decompofes water; but if expofed to the air, it becomes further oxygenated, and the compound into which it enters gradually withers, as Dr. Higgins obferved, in imitating pozzolana. Higgins, on Cements, 124.

Stones, into whofe compofition calces of iron, highly oxygenated, feem originally to have entered, are faid, by Mr. Kirwan, to decompofe with great difficulty, of which he inftances red jafper; but perhaps the more perfect vitrification of thefe minerals may be the caufe of their durability.

Calcareous rocks are liable to the decompofing effects of water, partly mechanical and partly chemical. Carbonate of lime is infoluble in water, except when aided by carbonic acid; but as this exifts more or lefs in almoft all water, it acts flowly upon lime-ftones, particularly on thofe of a loofe texture. Potafh and foda enter alfo into the compofition of many rocks; and to the exiftence of potafh in felfpar, one of the conftituents of granite, the decompofition of granite rocks may be generally attributed.

From the combination of fome extraneous mineral fubftance with rocks, remarkably rapid inftances of the decompofition of rocks are fometimes known to take place. According to Dolomieu, all the houfes of Malta are built of a fine grained lime-ftone of a loofe and foft texture, but which hardens by expofure to the air. There is a circumftance which haftens its deftruction and reduces it to powder, namely, when it is wetted by fea-water; after this it never dries, but is covered by a faline efflorefcence, and a cruft is formed fome tenths of an inch thick, mixed with common falt, nitre, and nitrate of lime. Under this cruft the ftone moulders to duft, the cruft falls off, and other crufts are fucceffively formed, until the whole ftone is deftroyed. A fingle drop of fea-water is fufficient to produce the germ of deftruction, which gradually increafes and fpreads, like a caries, through the whole mafs of ftone; nor does it ftop there, but after fome time affects all the neighbouring ftones in the wall. The ftones moft fubject to this decay are thofe that contain moft magnefia; thofe that are finer grained, and of a clofer texture, refift it. Notwithftanding the fpeculations of Dolomieu and Mr. Kirwan on the caufe of this uncommon property in the ftone of Malta, we conceive that a fatisfactory explanation is ftill wanting.

We have before ftated, that water is the principal agent in the gradual deftruction of rocks, but fometimes entire mountains are fuddenly levelled by fubterranean currents, which work their paffage through fiffures and cavities, and filently prepare the caufes of the moft alarming cataftrophes in alpine diftricts. In proportion to the elevation and abruptnefs of rocks, thefe cataftrophes are more frequent and extended. In the cantons of Switzerland numerous inftances of this kind are on record, and one, which we fhall fubfequently notice, occurred in our own times.

The town of Pleurs, about a league from Chavennes, containing about 2200 inhabitants, and numerous fplendid palaces, was fuddenly buried under a mountain on the 25th of Auguft, 1618.

On the fame evening an inhabitant, who entered the town, advifed his neighbours to leave the place, faying, he had feen the mountains cleaving, but could obtain no credit; his daughter, whom he had perfuaded to depart with him, returned to lock up fome valuables, and was overwhelmed with all the other inhabitants in one common ruin. Mr. Coxe fays vineyards, chefnut trees, and houfes, now cover the fpot where this unfortunate town once ftood.

On the 23d of September, 1714, a great part of the mountain Diableret fell in between two and three o'clock in the afternoon, and buried more than 100 huts, and a confiderable part of the valley. Thofe who faw this difafter fay that it happened in a moment, and at the fame time whirling clouds of duft arofe fuddenly, which darkened the air like a fudden night.

In 1751, a mountain fell down, fituated near Paffy, between Salenches and Servoz. Sauffure fays, the noife was fo dreadful, and fo thick and dark a cloud of duft arofe, that many perfons fuppofed that the world was at an end. Intelligence was received at Turin, that a terrible volcano had broken forth in thefe mountains: in confequence of which the king fent the celebrated naturalift, Vitaliano Donati, to verify the report, who gives the following account of the event. "I hurried with extreme pleafure to examine fo extraordinary a phenomenon. After having travelled four days and four nights without halting, I came in front of a mountain all covered with fmoke, and from which were inceffantly detached, both by day and night, large maffes of ftone with a noife perfectly like that of thunder, or of a large battery of cannon, but louder and more terrible. The peafants had all retired from the vicinity, and did not dare to look at the ruin, but at the diftance of two miles, or even farther. All the neighbouring hills were covered with a duft much refembling afhes. All faid they had feen at intervals a fmoke, which was red during the day, and accompanied with flames at night. I attentively examined the fmoke, but neither perceived flames nor any fmell of fulphur. Nor did the rivulets I examined with care, prefent the leaft appearance of fulphuric matter. Thus perfuaded, I entered the fmoke, and though quite alone, went to the brink of the abyfs, where I faw a large rock darted down, and obferved that the fmoke was only duft raifed by the fall of the rocks, the caufe of which I

foon

ſoon after ſought for and diſcovered.—A great part of the mountain ſituated above that which had fallen was compoſed of earth and ſtones, not diſpoſed in beds, but confuſedly heaped together. I thus perceived that the mountain had been ſubject to ſimilar falls, which had left the large rock that fell this year without a ſupport, and with a conſiderable projection. This rock was compoſed of horizontal beds, of which the lower were of ſlate, or rather of fragile ſchiſtoſe ſtone of little conſiſtency, while the two beds beneath theſe were of marble like that of Porto Venere, but full of fiſſures, which croſſed the beds. The fifth bed was wholly compoſed of ſlate in vertical plates, entirely diſunited; this bed formed all the upper part of the fallen mountain. Upon the ſame level ſummit were three lakes, the waters of which penetrated conſtantly through the fiſſures of the beds of rock, and decompoſed their ſupports. The ſnow, which had fallen in Savoy in greater abundance than had ever been ſeen in the memory of man, increaſed the effect, and the united waters occaſioned the fall of three million cubic fathoms of rock, a maſs ſufficient to form a large mountain."

On the 2d of September 1806, at five in the evening, the Knippenhoul rock, which formed the ſummit of mount Roſenberg, was on a ſudden detached from its ſituation; and at the ſame time part of the mountain, about 280 feet thick on the eaſt ſide, and ſeveral feet thick on the weſt, gave way, and fell into the valley which ſeparates the lake of Zug from that of Lauwertz. One part of the mountain fell into the lake of Lauwertz, which cauſed ſuch an agitation in the waters of the lake, that they overthrew a number of houſes, chapels, mills, &c. along the northern ſhore. Upwards of 1000 perſons were the victims of this calamity. A ſociety of thirteen travellers were on the road from Arth to Schwetz; nine who walked firſt periſhed, the other four eſcaped. In this convulſion enormous pieces of rock were carried through the air to prodigious diſtances. The lake of Lauwertz has loſt about a quarter of its extent. That rich plain, before ſo beautiful, now preſents a mountain of 100 feet in height, $1\frac{1}{2}$ league in length, and as much in breadth. The villages of Goldau and Rothen, conſiſting of 115 houſes; that of Buſingen, of 126; and that of Kuſlock, have totally diſappeared. Of Lauwertz, which had 25 houſes, there remain ten buildings, all much damaged. Twenty years previouſly, general Pfyffer predicted this cataſtrophe, from the knowledge he had of the nature of the mountain. A profeſſor of Schwitz ſaid, that above Spietsſleu there was a lake of water which had undermined the rock for ſeveral years, and that below there was a cavern of great depth, where the waters were ingulphed. The quantity of water which had fallen during the preceding years haſtened the cataſtrophe, and the rains of ſome preceding weeks decided it. On the 10th, eight hundred perſons were employed in digging for the bodies of thoſe who were deſtroyed by the falling of the mountain. In forming a channel to draw off the waters, between thirty and forty labourers were ſwallowed up by a torrent of muddy water which broke in upon them ſuddenly. Annual Regiſter, 1806, page 449.

In the mountainous parts of North Wales, Cumberland, and Weſtmoreland, ſimilar effects, on a diminutive ſcale, are taking place; and the ſcattered maſſes of rock, ſpread widely over the ſides and feet of the hills, prove that they have once had a greater elevation.

By the decay of rocks and mountains, new and productive ſoils are formed to renovate the ſurface of the globe, and fit it for the ſupport of vegetable and animal life; and it has been remarked that thoſe rocks which form the moſt fertile ſoils, are preciſely thoſe which decompoſe with the greateſt rapidity, whilſt thoſe which are unfavourable to vegetation reſiſt, for ages, the effects of atmoſpheric influence. It can ſcarcely be denied that this beneficent proviſion of the Author of nature, is ordained to repair the conſtant waſte and change which are taking place on the ſurface.

> "Nec ſpecies ſua cuique manet, rerumque novatrix
> Ex aliis alias reparat natura figuras." Ovid.

The formation of rocks, or the proceſs by which they acquired their preſent form and conſiſtence, may, perhaps, ever remain a ſubject of uncertain ſpeculation, as no analogous formations are now taking place, except in one claſs of rocks, the volcanic.

Some geologiſts contend that all the ſolid materials in the mineral kingdom were once in a ſtate of aqueous ſolution, from which rocks and ſtrata were formed, partly by chemical precipitation, and partly by ſediment; the lower cryſtalline rocks being entirely chemical products, the intermediate or tranſition partly chemical and partly mechanical depoſitions; and the upper rocks and ſtrata principally mechanical, or formed of ſediment or the fragments of former rocks. It has been objected to this hypotheſis, that neither the elementary ſubſtances, nor the compounds of which rocks are formed, are ſoluble in water. In reply to this it has been contended, that though the ſubſtances called elementary are inſoluble, in all probability there was a time when they exiſted in a more ſimple uncombined ſtate; and that the more ſimple elements were once ſoluble in water, though the preſent ſubſtances called elementary are not ſo; in the ſame manner as very ſoluble ſubſtances are known to become nearly inſoluble by chemical union with each other, of which we have an inſtance in the tartareous acid and potaſh, which are both very ſoluble, but when united in certain proportions, they form a ſalt that can only be diſſolved in twenty times its weight of water.

According to theſe geologiſts, the quantity of water which once covered the whole globe muſt have been much greater than at preſent; but in what manner it has been diminiſhed they do not attempt to explain.

Other geologiſts ſuppoſe that moſt of the rocks, whether ſtratified or not, were formed of the ſand, or ſediment, waſhed down from former continents, and that they have acquired their preſent ſtructure and hardneſs from the action of a central fire, which they believe to exiſt conſtantly in our planet, but which is called into greater activity at certain periods by laws with which we are unacquainted. According to the ſyſtem of theſe philoſophers, the preſent continents were raiſed from the bottom of the ocean by the action of the ſame fire, and the rocks of baſalt and porphyry were forced through, and ſpread over, the ſurface in a ſtate of fuſion, like currents of lava from active volcanoes. It muſt be admitted, that the only inſtances we have of the formation of rocks, in our own times, are from the agency of fire; and that ſome of the lavas preſent the cryſtalline internal ſtructure, or contain imbedded cryſtals as perfect as thoſe found in primary rocks. It is foreign to the purpoſe of this article to diſcuſs the probabilities of thoſe two theories which have acquired the names of the Neptunian and Plutonian, for an account of which, ſee EARTH. The deſcent of ſtony maſſes from the atmoſphere, ſometimes of great ſize and weight, is now fully proved; and the formation of theſe ſtones, from the concretion of gaſeous matter, may probably throw ſome light ultimately on the moſt abſtruſe queſtions in geology, and lead to new, and more correct, views of the nature of our planet. Perhaps the different primary beds of ſtone, that environ the globe, were formed by ſimilar concretions from an atmoſphere of vaſt extent. Of one thing

thing we are certain, that the formation of many of the ſecondary ſtrata was ſubſequent to the exiſtence of animal and vegetable life; were it not ſo, their remains could not be enveloped in them. Another fact is not leſs certain, that many of theſe beds were depoſited very gradually, and form a medium in a ſtate of perfect tranquillity: this is proved by the extremely delicate unbroken fibres and ſpines of ſome of the organic remains which could not have been preſerved entire, had the particles of the ſtony matter, by which they are covered and imbedded, been of conſiderable ſize, or had they been depoſited in a tumultuous element. See STRATA.

Rocks, beſide furniſhing the metallic ores, and materials for architecture, have the moſt important uſes in the phyſical conſtitution of the globe, not only as forming the ſolid baſes or ſkeletons on which iſlands and continents are conſtructed, but theſe elevations and inequalities are abſolutely neceſſary to ſupply the dry land with pure and running ſtreams, and to drain the ſuperfluity of moiſture in rainy ſeaſons, which would otherwiſe form ſtagnant and putrid pools, infecting the air with death: without theſe rocky elevations the earth muſt remain a ſolitary deſert, fitted only for the abode of reptiles and amphibious animals. Thus, by the very irregularity and confuſion which ſeem to prevail in the diſpoſition of the fractured ſurface of the globe, it is rendered ſalubrious and productive, and prepared to ſatisfy the wants, and gratify the various inclinations and inſtincts, of its numerous inhabitants.

ROCK, in *Agriculture*, a ſtony ſubſtance of different kinds, that frequently affords much interruption to tillage, and is highly injurious as a ſubſtratum, that occaſionally upholds water, and prevents its paſſing downwards. Where this laſt is the caſe, they are moſtly of the cloſe, hard, compact kind. They may likewiſe be hurtful in other ways, as by covering the ſurface of graſs-land, and by occupying lands which might otherwiſe produce uſeful plants. Their effects, as non-conductors of water, depends upon their qualities, in ſome meaſure, as well as upon that of the beds of earthy matter in which they are ſituated, and will be more fully conſidered in ſpeaking of SPRING-*draining*. The rocky beds of free-ſtone, blue-ſtone, and lime-ſtone, as well as thoſe of ſome other ſorts, exiſt in very different ſtates, in different parts of the kingdom; and are, on that account, more or leſs favourable to the purpoſes of huſbandry, in the ground by which they are covered.

Rocks of particular kinds are not unfrequently inſtrumental, in their decompoſitions, in contributing to the formation of land or ſoil. Thoſe lands or ſoils which ariſe, in ſome degree, from the decompoſition of rocks of the ſand-ſtone and granite kinds, are for the moſt part of the thin, poor, hungry deſcription; continuing for very great lengths of time, in many caſes, with but very ſlight coverings of vegetable matter or plants of the graſſy ſort upon them. But thoſe proceeding, in ſome meaſure, from the decompoſition and mouldering down of rocks of the lime-ſtone, chalk, and ſome other kinds, are in general well and cloſely beſet with plants of the permanent graſs kind, and give, when broken up, deep rich earthy beds, for the nouriſhment and ſupport of different ſorts of vegetables as crops.

Where lands are ſituated immediately upon beds or layers of rocks or ſtones, they moſtly become dry, and ſuitable for the purpoſes of vegetation, much ſooner than where they are depoſited upon an under-ſoil of a clayey or marly nature. This approach of the rocky ſtrata towards the ſurface-beds of land or ſoil, is probably one great cauſe of the fertility of land in moiſt or wet climates, ſuch as thoſe of ſome parts of this country, as many of the more northern diſtricts, and moſt parts of Ireland.

The rocks and ſtrata of other kinds, from the decompoſitions of which land or ſoils have been formed, as well as thoſe which conſtitute the more internal parts of the globe itſelf, have a certain order and arrangement, which is not altogether uſeleſs to the inquiring farmer; eſpecially as ſtrata of the rocky nature, which are very different in their kinds, not unfrequently happen to be aſſociated together; and thoſe which are placed directly below the layers of land or ſoil contain materials, which may, in many caſes, be of utility in ameliorating them. But the general view of the nature, compoſition, and poſition of rocks, whether of the primary or ſecondary kind, as well as of other natural ſtrata of a ſimilar deſcription, properly belongs to the general head of *rock*; which ſee. See alſo SOIL and SUBSOIL.

ROCK, in *Ornamental Gardening*, a ſubſtance or body, which is of much utility in producing effect in the forming and laying out the grounds of country reſidences. It is ſuggeſted by Mr. Loudon, that, though in reality theſe can neither be created, increaſed, nor taken away, yet that ſeveral operations may be effected with them, which ſeem of the ſame nature, and conſequently to be of much importance in landſcape. They may, it is ſuppoſed, be either *ſhewn*, *concealed*, or rendered more *characteriſtic*. They may be ſhewn with more and better effect, by taking away earth from about them, and forming breaks and abruptneſſes in the ſurface of the ground where they are. This may, it is ſaid, be accompliſhed in many different ways; but that thoſe methods are to be preferred, which are moſt effectual in ſhewing a perpendicular ſurface, or upright front of rock; as it is not only the grandeſt manner of ſeeing them that can be contrived, but, at the ſame time, the moſt economical and conſiſtent with the good management of the land; no horizontal ſurface of any conſequence, whether of the wood or paſture kind, being to any material extent deſtroyed. Rocks appear in this way in a great many ſituations, in different parts of the country, in the ornamental grounds of reſidences.

It is alſo further ſuggeſted, that rocks may be ſhewn by removing of wood, either alone, or in connection with ground. This practice, it is ſuppoſed, would often have a fine effect on the ſides of hills, mountains, and ſteeps, as well as upon the banks of rivers and lakes; in the laſt of which caſes, it would frequently be aſſiſted in connection with the removal of water, which can often be effected with eaſe: as, for inſtance, when a lake has an outlet, or when the channel of a river has conſiderable declivity. In all caſes where rocks are to be ſhewn, it is conſtantly the moſt preferable to exhibit erect, projecting, or at leaſt nearly perpendicular ſurfaces; as other kinds never occur in nature, except under the ſurface of water, or in barren deſerts: for although they were originally, or after convulſions of nature, left wholly naked, yet by time and circumſtances they have gradually become clothed on their upper ſurfaces by an earthy matter and vegetable productions.

Rocks may be concealed, it is imagined, either completely, or in a partial manner, and by any one or the whole of the materials which ſhew them. Complete concealment is, however, it is thought, rarely deſireable, except in caſes where the rocks are of the barren or diſagreeable kind; as in the inſtance of a perfectly naked ſurface of rocks, or ſmall naked angular fragments of them ſtaring through ground of uniform or ſimple ſurface: in the former of which caſes, they ſhould be covered with earth; and in the latter, be blown out of the ground by means of gunpowder,

powder, or dug out of it in other ways, as is frequently the cafe in forming and laying out ornamented grounds.

But partial concealment may often take place in circumftances of this kind, and is, it is fuppofed, beft effected by wood; and in cafe the form of the part or parts, which appear, be in the grand ftyle, and the concealment accomplifhed in a judicious manner, the imagination, which is ever ready to magnify the extent or power of indiftinct objects, will, it is fuppofed, conceive the reft to be much more noble, than if they had been of forms capable of being advantageoufly difclofed. Partial concealment may likewife fometimes be effected by earth or water, and even by buildings; in all of which, the general principles are the fame, it is fuppofed.

It is ftated, that in rendering rocks more characteriftic, the firft requifite is to attend to their general characters: thefe may either be grand, terrific, fanciful, or romantic and picturefque. Grandeur here confifts, it is fuppofed, commonly in the breadth of light and fhade, or the height of the maffes; and may be heightened by increafing thefe, either by removing fmall parts of the rock itfelf, or by clearing away the appertaining matters, which tend to conceal or injure the principal maffes. Romantic or terrific rocks may, it is thought, fometimes be improved by concealment or difclofure, but rarely by increafing their character. And thofe of picturefque beauty may often be operated upon with fuccefs, either by giving more breadth, variety, or intricacy to the rocks themfelves; or by covering them with vegetation; or planting trees before them, to effect variety or harmony; or bufhes and creepers above them, to hang over and produce fhade and intricacy. An excefs of intricacy is, however, fuggefted, as dangerous, and as tending more than any other quality to make a rock trifling. Crags are faid to be frequently trifling on this account, as well as the rock in different fituations. In fhort, the management of rocks, it is imagined, is yet very little, if at all, underftood in this country. In many parts they are indeed feen fhewn, but in fuch a way as that they appear little better than upright maffes of red earth. The fubject is unqueftionably deferving of more attention than it has hitherto met with, from the defigners of ornamented grounds.

Rock-*Work*, any fort of work or defign, which is formed of the parts or fragments of rocks, or large ftones, in gardens or pleafure-grounds.

All works of this nature fhould be contrived in fuch a manner, as to harmonize as much as poffible with the peculiarities of the fituations or places in which they are made. See Rock and Stone.

They were formerly much more common, in both thefe fituations, than they are at prefent.

Rock *Alum*. See Alum.

Rock-*Butter*, in *Mineralogy*, a faline mineral, formed in the fiffures of rocks of alum-flate. It occurs both maffive and ftalactitical, and fometimes pulverulent. It has a greyifh-white or a ftraw-yellow colour, and a fweetifh and fomewhat acidulous aftringent tafte, like alum. It is indeed a kind of native alum. The feel is fomewhat greafy, from which and its colour it has received its name.

Rock-*Cork*, *Suber Montanum*, a flexible and fomewhat elaftic mineral, found in mineral veins. It is fometimes maffive, and fometimes in laminæ or plates: thefe have been called rock-leather and rock-flefh. The common colour is a yellowifh-grey of various fhades: it is fometimes a yellowifh-brown and cream-colour. It has a fibrous ftructure, and but little luftre. The fractured furface is delicately uneven. This mineral is opaque, and very foft, yielding to the nail. It breaks with great difficulty, and cracks when handled: it is fo light as to fwim on water, and is almoft infufible in the flame of the blowpipe.

The conftituent parts, as given by Bergmann, are,

Silex	56.2
Magnefia	26.1
Alumine	2
Lime	12.7
Iron	3
	100

Rock-cork approaches in its nature to afbeftus, from which it differs principally by the promifcuous arrangement of the fibres.

Rock-*Cryftal*, the pureft variety of cryftallized quartz. (See Quartz.) This ftone is fometimes employed in jewellery, and is differently named, according to the places from whence it is procured, as Briftol ftone, Scotch pebbles, &c.

Rock-*Fifh*, a common Englifh name for the *gobius marinus*, or fea-gudgeon. See Gobius *Niger*.

Rock *Germander*, in *Botany*, a fpecies of *veronica*; which fee.

Rock-*Oil*. See Petroleum.

Rock-*Ouzel*, in *Ornithology*. See *Ring* Ouzel, and Amzel.

Rock-*Rofe*, in *Botany*. See Cistus.

Rock-*Salt*, in *Mineralogy* and *Geology*, a natural falt, of the fame kind as common table falt. This ufeful mineral forms large beds and maffes in many parts of the world, and even compofes entire mountains. It occurs in large columnar or in fpheroidal concretions, and alfo cryftallized in cubes. Rock-falt is fubdivided by Werner into two kinds, foliated and fibrous. The more common colours of foliated rock-falt are, white, grey, reddifh-brown, and red; but fometimes it is violet, fky-blue, and green, and is more or lefs tranfparent or pellucid: it breaks into cubical fragments, which have a vitreous luftre: the ftructure is indiftinctly foliated. In fibrous rock-falt the fibres are generally fmall and curved; in other refpects it differs little from the former. The tafte of both is like that of common falt. The red varieties are coloured by earthy matter and oxyd of iron; the white and tranfparent are extremely pure, being compofed almoft entirely of muriatic acid and foda, or, according to Davy, of chlorine and fodium. In the pureft kind alfo, there is fcarcely any trace of water of cryftallization. According to Henry, pure tranfparent rock-falt, calcined for half an hour in a low red heat, equal to four or five degrees of Wedgewood's pyrometer, loft abfolutely nothing of its weight. It is remarkable, alfo, that if free from any adventitious moifture, it may be fuddenly and ftrongly heated with fcarcely any of that found called decrepitation, which is produced by a fimilar treatment of all the varieties of manufactured common falt. The fpecific gravity of the pureft fpecimens of rock-falt is about 2.170, of the lefs pure about 2.130.

Rock-falt is widely diftributed over the globe; it appears principally in the lower fecondary ftrata. It is moft frequently accompanied with fulphate of lime or gypfum, and by beds of clay impregnated with falt. Befide the beds of rock-falt which are known, numerous brine-fprings in various parts of the world atteft the exiftence of this mineral deep under the furface, as it is evident thefe fprings percolate beds of falt, or ftrata impregnated with it. Several brine-fprings have recently been difcovered in the deep coal-mines of

of Northumberland and Durham. In the coal-mines near Ashby-de-la-Zouch, in Leicestershire, there are springs of brine 245 yards below the surface; and though these springs are in the centre of the island, they are 140 yards below the level of the sea. How much deeper their source may be, has not been ascertained.

The most obvious hypothesis respecting the formation of rock-salt is, the one which supposes that it was deposited from the sea, or by the deficcation of salt lakes which formerly covered the present continents. Against this it has been objected, that the composition of rock-salt is much more pure than the contents of sea-water, which contains a quantity both of muriate and sulphate of magnesia, sulphate of soda, and of sulphate of lime. Rock-salt is also found at great heights above the present level of the sea. These objections will, in a considerable degree, be invalidated by the consideration that whatever impurities there may be in sea-water, if the process of evaporation go on very slowly the salt will be crystallized nearly pure. Of this we have an instance in the species of salt made at Lymington, in Hampshire, called *salt cat*, which is gradually formed in the course of ten or twelve days, by spontaneous evaporation of the liquor which drains from the common salt. This salt is so pure (though evaporated from the most impure part, the mother water, or residue of sea-water), that 1000 parts contain only 12 of foreign impurities, or little more than one *per cent*. Thus if the deficcation of lakes or basins filled with salt water were very gradual, as it must be, except in the vicinity of subterranean fires, the muriate of soda or rock-salt would be crystallized before the other salts, which being more deliquescent might be separated and washed away. In this manner the sulphate of lime or gypsum, which exists in sea-water, and accompanies rock-salt, may also have been deposited, and being nearly insoluble would remain.

The occurrence of rock-salt deep under the earth, or high above the level of the sea, can scarcely form an objection to its formation from sea-water; for it is admitted by all geologists, and is proved by undoubted facts, that the ocean once covered our present continents. Now by whatever process the dry land was raised above the sea, whether by the elevation of the former, or the depression of the beds of the latter, extensive hollows and closed vallies must have formed lakes of salt water, from which the salt might be deposited by evaporation. Some of these vallies or hollows would occur in elevated situations. With respect to the beds of rock-salt placed under other strata, however difficult it may be to explain the formation of the secondary strata, the existence of organic remains in them prove that each stratum was once the uppermost part of the globe, and the strata by which it is covered were deposited upon it in successive and probably at distant periods. Nor is the difficulty greater with respect to the strata covering rock-salt, than the strata covering coal and beds of coal-shale abounding in vegetable impressions. No organic remains have indeed been discovered in the strata over the rock-salt of Cheshire, but they are commonly met with at greater depths over the rock-salt beds in Poland, and in other parts of Europe. The occurrence of rock-salt at the sides or feet of extensive mountainous chains, may perhaps illustrate its formation, as it is probable these extensive chains once formed the boundaries of inland seas or lakes, when the relative level of the ocean and our continents was very different from the present.

Rock-salt is not mined in any part of our island, except Cheshire, though it was bored through at Droitwich; and it exists, in all probability, in many of the western counties through which the red sand-rock extends. We have proofs of its existence from the brine-springs at Droitwitch, in Worcestershire, at Lemington in Warwickshire, and at Ashby Wolds, in Leicestershire; and also in the counties of Northumberland and Durham, on the eastern side of England. The springs at Droitwitch furnish a brine as strong as those of Cheshire. A description of the rock-salt of Cheshire being given as an article of rural economy, we shall proceed to give a short account of the most important repositories of this useful mineral in other parts of the world.

Salt is very abundant in Africa; all the plains and sandy deserts are impregnated with salt, and the greater part of the springs in these deserts are so saline, that it is not possible to drink the water. To the south of Abyssinia, at the feet of the mountains which separate that country from that of the Gallas negroes, salt exists in dry and solid masses. The summit of the mountains which border the desert to the west of Cairo, presents an immense plain covered with a mass of salt. According to Horneman it is spread over so large a track of surface, that no eye can reach its termination in one direction; its breadth extends several miles. To the west of the desert of Sahara are the great salt rocks of Tegaza, on the south-east frontier of the desert of Zuenziga, a little distance from Cape Blanc. They are worked by the Moors. These salt mines furnish the white and coloured salt, which is carried by caravans to Casnah and Tombuctoo, to supply the Negro states; for it does not appear that there are any salt mines in Negro land properly called. The mines of salt spread in that part of Africa which the ancients called Libya, have been well indicated by Herodotus, and it is in this country that he has described buildings constructed of rock-salt, like those in Caramania and Arabia. Other salt mines, according to Park, are found on the southern frontier of the great desert Sahara. Their produce is also sold to the Negroes on the borders of the Niger and the Jolibe. In the kingdom of Tunis, mount Had Delfa is entirely composed of very compact salt of a red and violet colour. The lake des Marques, and the plains near it, also contain much salt. There are mines of rock-salt in the country of Bamba, in the kingdom of Congo. On all the western coast of Africa there are salt lakes and marshes. In the neighbourhood of the Cape of Good Hope, and in Caffraria, rock-salt is less common; but there are salt lakes to the east of the Cape, on the frontiers of Caffraria, which contain at the bottom beds of salt variously coloured.

Salt lakes exist in the Cape Verde islands, and natural salt-marshes, particularly in Bona Vista.

Spain is the only country in the south of Europe which contains extensive repositories of rock-salt in considerable masses above the surface. It is found there in elevated situations, forming entire hills: brine-springs also issue from the feet of the mountains which traverse that country. According to the description of Mr. Bowles, the repository of rock-salt which lies between Caparoso and the river Ebro, is in a chain of hills which extend from east to west. These hills are composed of lime-stone, mingled with gypsum, the chain extending more than two leagues. In the most elevated part is situated the village of Valtierra, on a slope towards the middle of which is found a bed of rock-salt. It may be about 400 paces long, and 80 wide. The salt is contained in a bed of about five feet in thickness.

"I examined," he adds, "with attention those beds of salt; I compared them with the layers of earth and gypsum in which it is imbedded; I found the outside layer to be composed of gypsum; and, immediately afterwards, I met with two

two inches of white ſalt, ſucceeded by two inches of ſtony ſalt, and a layer of earth. I found others alternately compoſed of earth and ſalt to the very bottom of the mine, which is of gypſum, undulated like the other layers. The layers of ſaline rock are of a duſky blue, thoſe of ſalt are white.

"This mine is conſiderably elevated above the ſea, for you aſcend continually all the way from Bayonne.

"The ſecond hill is that of Cardona, in Catalonia, near the mountain of Montſerrat, ſixteen leagues to the N.W. of Barcelona, and a few leagues from the Pyrenees.

"The village of Cardona is ſituated at the foot of a rock of ſalt, which, from the ſides of the river Cardonere, ſeems nearly mural. This rock is a block of maſſive ſalt, which riſes from the earth about four or five hundred feet, without crevices, chaſms, or layers. No gypſum is found near it. This block is about a league in circumference; and its elevation is equal to that of the ſurrounding mountains: as its depth is not known, it is impoſſible to ſay on what it reſts.

"In general, the ſalt, from the top to the bottom, is white, though ſome parts are red; ſome is alſo found of a fine blue. There are alſo in Spain other repoſitories of rock-ſalt and ſaline ſprings. In La Mancha, at Almengranilla, there is a maſs of ſalt ſimilar to that of Cardona; it is ſeventy yards in diameter, mixed with ſulphate of lime, and covered with the ſame ſtone, including cryſtals of red quartz; above which are ſiliceous pudding-ſtones, and a ſtratum of carbonate of lime."

The mines of rock-ſalt that are wrought at Poza, near Burgos, in Caſtille, are remarkably ſituated, being placed in a vaſt crater. A French traveller, M. Fernandez, found pumice-ſtones, puzzolana, and other volcanic productions there.

Rock-ſalt is likewiſe found near Aranjuez and Ocanna, in the tranſition hills between Sierra Morena and Madrid.

On the north ſide of the Pyrenées no beds of rock-ſalt have been diſcovered, but numerous brine-ſprings occur, particularly at Salies: in the department of the Lower Pyrenées the ſoil is calcareous, and ſulphate of lime is found in the neighbourhood of the ſpring.

There are ſalt-ſpring at Salies, to the ſouth of Thouloufe. alſo at Salins and Montmorat, in the department of the Jura; in the firſt of theſe the water contains fifteen *per cent.* of ſalt.

There are about twenty brine-ſprings in the department of La Meurthe, which contain, on the average, thirteen *per cent.* of ſalt. Theſe ſprings are at no great diſtance from each other; ſome are at the foot of the chain of Jura, the others at the foot of the Voſges: the product of theſe brine-ſprings ſupplies Switzerland with ſalt. There are ſalt-ſprings in the department of Mont Blanc, in the midſt of the Higher Alps. In the ſame department, near St. Maurice, there is a ſalt-rock near the region of perpetual ſnow, which is probably the higheſt ſituation in Europe where this mineral occurs. The rock conſiſts of gypſum, intermixed or impregnated with ſalt, which is extracted by ſolution in water; the inſoluble part remains porous and light. Various brine-ſprings alſo occur in other parts of France.

Though there are numerous brine-ſprings in the north of Germany, no beds of rock-ſalt appear on the ſurface, until we approach the circle of Auſtria and the neighbouring countries. The range of ſalt-rocks commences at Halle, in the Tyrol, paſſes through Reichenthal in Bavaria, and continues to Hallein in Salzburgh, Halſtadt, Iſchel, and Ebenſel, in Auſtria, and terminates at Auſſe in Styria. The ſalt at Halle is worked in a peculiar manner: parallel galleries are run into the rock, in theſe dykes are formed, and water is let into them, where it remains from five to twelve months. When the water is ſaturated, it is drawn off in pipes, and the ſolution is evaporated.

On comparing the geological ſituation of the greater part of the beds of rock-ſalt and brine-ſprings, it will be ſeen that they occur moſt frequently at the foot of high mountainous chains. The mines of rock-ſalt in Tranſylvania, Upper Hungary, Moldavia, and Poland, may be cited in further proof of this. Theſe mines are numerous, and very important from their extent, and the vaſt maſſes of ſalt they contain. They are found along the chain of the Carpathian mountains, and ſpread nearly in an equal degree on each ſide of the chain accompanying theſe mountains to the extent of more than two hundred leagues, from Wieliczka in Poland, towards the north, to Fokſzian or Rymnick in Moldavia, to the ſouth.

The ſtrip of land that contains the ſalt-rock or brine-ſprings, is near forty leagues broad in ſome parts. In it may be reckoned about ſixteen mines, that are worked for ſalt; forty-three indications of mines that have never been wrought; and four hundred and twenty, or four hundred and thirty, brine-ſprings.

The moſt remarkable of theſe commence in the north-eaſt, and extend in a ſoutherly direction, including thoſe of Wieliczka, Bochnia, and Samber, in Poland; and ſome brine-ſprings in Buchovina and Moldavia, particularly near Ockna. On the ſouth-weſt of the chain, following the ſame direction, are thoſe of Sowar, near Eperies, in Upper Hungary; of Marmaroſch, in Hungary; of Dees, Torda, Paraid, and Viſackna, near Hermanſtadt, in Tranſylvania, &c.

The ſalt-mines of Wieliczka, near Cracow, and thoſe of Bothnia, which appear to be a branch of them, have become celebrated from the accounts given of them by almoſt every traveller who has viſited that country; many of their deſcriptions are too highly coloured. They are, indeed, very ancient, having been worked ever ſince the year 1251; but have nothing to diſtinguiſh them above others, except the extent of the works in the beds of rock-ſalt, the dimenſions of which ſtill remain unknown. The ground that covers the rock-ſalt is compoſed, like that over moſt other ſalt-mines, of alternate ſtrata of ſand, pebbles, and marle, including large blocks of ſalt. You go down to theſe mines by ſix ſhafts, of four or five yards in diameter. Various ſtructures have been formed in the body of the ſalt itſelf. We find there a ſtable, chambers, and chapels, all the parts of which, as pillars, altars, and ſtatues, are of ſalt. The ſhafts and galleries are perfectly dry, ſo that you are more incommoded by duſt than dirt. There are ſprings, however, both of ſalt water and of freſh in theſe mines. It appears that the air is not ſo foul in them as in moſt ſalt mines; but the workmen do not reſide in them, as ſome have aſſerted. In certain parts of the mine, hydrogen gas ſometimes collects and explodes.

The ſalt is cut out in little aſcending ſteps. It is formed into parallelepipedons, weighing about eighty or a hundred pounds, or into cylinders, which are put into caſks. This mine produces about ſix thouſand tons of ſalt every year.

According to the deſcription of Dr. Townſon, the ſalt in the upper mines does not form continuous ſtrata, or rocks, but exiſts in immenſe detached blocks or maſſes, imbedded in marle. He gives the following account of the ſtrata which cover the ſalt.

	Yards.
Vegetable foil - - - - -	4
Sandy clay - - - - -	10
Fine ſand effervefcing with acids - -	7
Marle with ſand, containing fragments of ſand-ſtone	18
Sand-ſtone - - - - -	2
Marle mixed with ſalt, in ſmall particles and cubes	40

At the depth of forty yards in this marle the ſalt is found. The blocks of this mineral are of ſuch a ſize, that in paſſing through the galleries formed in them, ſometimes the upper, and ſometimes the lower end only of a block may be ſeen; but often, though the galleries are three or four yards high, the breadth can only be obſerved, and even in ſome places the blocks of ſalt form the ſides of the gallery for fifteen or twenty yards. Theſe blocks compoſe the upper bed of ſalt, and from them the whole of what is called the green ſalt is obtained. This ſalt, which is of a greeniſh or blackiſh hue, owes its colour to numerous fine particles of a ſubſtance which ſeems to be of the nature of argillaceous ſchiſtus ſcattered through it. This variety of ſalt, on account of its impurity, is retained in the country for home conſumption. In this marle, alſo, blocks of ſand-ſtone are ſometimes found imbedded, and the marle itſelf is ſtrongly impregnated with ſalt. Lower down there is another bed of ſalt, called ſzybicker ſalt, which is in ſome places two or three yards thick; it is of a purer quality than the former, and is exported to foreign countries. This variety of ſalt-rock is diſpoſed in very extenſive beds. The mine has been driven in one place twelve hundred yards, from eaſt to weſt, and four hundred from north to ſouth; ſalt being ſtill found there. The utmoſt extent is yet unknown. The nature of the ſtratum beneath the ſzybicker ſalt has not been aſcertained; for the miners, being apprehenſive of increaſing the quantity of water, have never proceeded to a great depth in this ſtratum. The greateſt depth of the mine is two hundred and forty yards. It does not appear that the remains of organized bodies have been found in great abundance in the ſtrata connected with the ſalt-rocks now deſcribed. None have been obſerved, according to Dr. Townſon's information, in the ſzybicker ſalt, or the lower ſtrata; but ſome have been ſeen in the marle which envelopes the block of green ſalt; ſuch as bivalve ſhells, at the depth of ſeventy-two yards; crabs' claws, at the depth of eighty yards; and charred coal, mixed with ſalt and gypſum, at the great depth of two hundred yards.

From the circumſtance of maſs being formerly celebrated in theſe mines two or three times a week, it has been ſaid that the workmen, to the amount of five hundred, live conſtantly below ground. They do not, however, continue longer than their hours of working. To keep the mines dry, the ſalt water is drawn up in leathern ſacks, and is thrown away; the ſmall quantity of freſh water which they afford is reſerved for the uſe of the horſes which are employed in the ſubterraneous operations. At the time Mr. Townſon viſited them, twenty-four horſes were conſtantly kept below ground.

In the mine of Bochnia the ſalt preſents itſelf in a ſtratum at once, and not in detached pieces. The ſtrata of clay, as well as thoſe of ſalt, are undulated, and not of an uniform thickneſs. The ſalt is ſometimes brown, at others reddiſh, and at others tranſparent. The different coloured ſalt is not arranged in parallel layers. The ſtrata dip at an angle of about forty degrees with the horizon. Dr. Townſon informs us that very beautiful ſpecimens of fibrous muriate of ſoda are found in it.

At Thorda the maſs of ſalt is divided into horizontal but undulated ſtrata. Theſe ſtrata are about eight or ten inches thick. The loweſt are the moſt undulated.

Near Ockna, in Moldavia, there is a hill of rock-ſalt, in many parts of which the ſalt appears expoſed to view.

The mines on the ſouth-eaſt of the Carpathian chain appear more numerous, and are diſperſed through a greater ſpace of ground than thoſe on the north-eaſt. They are in general very near the ſurface. Some of thoſe in Tranſylvania are ſo to ſuch a degree, that perſons are appointed to cover the ſalt with turf, when it is waſhed bare by the rain. Theſe maſſes, however, are ſo thick, that their bottom has never been found. They are not worked to the depth of more than a hundred and ſeventy or eighty yards, becauſe the extraction of the ſalt becomes then too expenſive. In the county of Marmaroſch they have been wrought to the depth of upward of two hundred yards. Theſe mines contain likewiſe a great deal of petroleum, and the ground in which they are contained is every where furrowed by rivers. The mud interpoſed between the water of theſe and the ſalt, is imagined to prevent the ſalt from being diſſolved by them.

At Paraid, in Tranſylvania, there is a valley, the bottom and ſides of which are of pure ſalt. Walls of ſalt appear there ſixty or ſeventy yards high.

The mine of Eperies is three hundred and ſixty yards deep.

In the ſalt mines of Marmaroſch, water has been found included in the ſubſtance of the ſalt-rock.

The mines of the ſouth-weſt of the Carpathian mountains are generally wrought by means of ſhafts. There are at leaſt two to each mine; one for the workmen, the other for drawing up the ſalt. The ſalt is cut out in aſcending ſteps, which produces empty ſpaces, of a conical form, in the midſt of the ſtrata. The ladders reach perpendicularly to the bottom of this conical ſpace: ſo that within it they ſtand perfectly detached. Thus the greater part of the body of ſalt is extracted, leaving empty ſpaces, which are conical, and which communicate with one another by means of galleries. It has been thought, that, in order to leave leſs ſalt, it would be better to give theſe ſpaces the ſhape of a parabola. The ſalt is ſo plentiful, that the miners are paid only for ſuch pieces as weigh upwards of eighty pounds, the others being rejected as uſeleſs. When the workmen are incommoded by water, it is drawn up in leathern bags, to be emptied out of the mine.

The Tranſylvanians and Moldavians extract ſalt from their brine-ſprings, by throwing the water on wood fires, as the Gauls and Germans did in former times.

No ſalt-mine, or brine-ſpring, is known either in Sweden, or in Norway.

There are a great number of both, and particularly of ſalt lakes, in Ruſſia. Among theſe is the ſalt lake of Tor, towards the northern extremity of Little Tartary.

There are ſimilar ſalt lakes in the Crimea.

At Balachna, on the banks of the Wolga, are ſome very rich brine-ſprings.

In Ruſſia, in Aſia, we find the brine-ſprings of Permia, of which there are a great number at the foot of the mountains of Poyas.

About eighty verſts from Yena Tayeoſka, in the deſart between the Wolga and the Uralian mountains, there is a mine of rock-ſalt.

In the government of Aſtracan, to the north of the Caſpian ſea, in the environs of Orenburgh, and in the country of the Baſhkirians, ſalt lakes are very common, and the water evaporating during the ſummer, the ſalt appears

appears cryſtallized on their ſurface, and round their borders. When this water is highly concentrated, it has a deep red colour. The ſalt formed in them has often the ſame hue; and when this is the caſe, it diffuſes a very perceptible violet ſmell.

One of theſe is the ſalt lake of Elton, above Aſtracan, in the re-entering angle formed by the Wolga. The Kalmucks called it the Golden lake, becauſe of its red appearance, when the ſun ſhines on it.

The lake of Bogdo, ſituate near this, yields a perfectly white ſalt, free from ſulphate of magneſia, and preferred to that of lake Elton.

Near Aſtracan, too, is the mine of Iletzki, celebrated for the quantity of ſalt it furniſhes. The ſalt lies at no great depth, and reſts on a very hard clay. The ſoil above it is ſandy, and full of holes, containing water ſaturated with ſalt.

In Siberia there is a mine of rock-ſalt on the right bank of the Kaptendoi; and on that of the Kawda are fourteen brine-ſprings. Others are found in the government of Kolivan, and in the environs of Irkutſk, near the lake Baikal, in the centre of Aſiatic Ruſſia. Laſtly, the country near the Caſpian ſea is ſo impregnated with muriate of ſoda, that in the environs of Gourief, the fogs and dew that ſettle on people's clothes, and on plants, are ſaline. Pallas.

Among the Mongul Tartars, the ſoil is ſo thoroughly penetrated with muriate of ſoda, that the people lixiviate it, and evaporate the ſolution to obtain ſalt.

That part of China, which borders on Tartary, contains ſalt-mines, and the ground is ſtrongly impregnated with ſalt.

Salt is found in the ſame manner throughout almoſt the whole table-land of Great Tartary, Thibet, Hindooſtan, and particularly Perſia, where very extenſive plains are ſeen covered with a ſaline efflorescence. The iſle of Ormus, at the mouth of the Perſian gulf, appears, according to the accounts of travellers, to be one large rock of ſalt. This ſubſtance is alſo found in ſolid maſſes near Balach, on the eaſtern ſide of Perſia. In the deſart of Caramania, according to Chardin, rock-ſalt is ſo abundant, and the atmoſphere ſo dry, that the inhabitants uſe it for building their houſes. It is found in the neighbourhood of Iſpahan, and in the mountains to the north of that city.

The repoſitories of rock-ſalt in America are leſs known. According to Ulloa and others, it is found in vaſt quantities in the elevated deſarts of Peru, at the extraordinary height of 10,000 feet, or more, above the preſent level of the ſea. It is extremely hard, forming ſolid continuous rocks of a dull violet colour.

The mountain of Xaragua, in the iſland of St. Domingo, affords ſalt; and in the ſame iſland there is a very remarkable ſalt lake, about 22 leagues in circumference, called Henriquelle. The water, which is inhabited by lizards, alligators, and land-tortoiſes, all of a large ſize, is deep, clear, bitter, ſalt, and of a diſagreeable ſmell. Near the middle of the lake is an iſland, about ſix miles long and three broad, well ſtocked with goats, whence it has the name of Cabrito iſland; and in this iſland is a ſpring of freſh water.

Salt lakes occur in other of the Weſt India iſlands. In North America, weſt of the Alleghany mountains, in the ſtate of Kentucky, are numerous repoſitories of rock-ſalt and brine-ſprings: theſe are called *licks*, where the elks and buffaloes formerly repaired in herds, to lick the ſoil impregnated with rock-ſalt. On the weſtern ſide of the great river Miſſouri, a chain of mountains extends 80 miles in length, and 45 in breadth, and of conſiderable height: it conſiſts of pure rock-ſalt, barely covered with earth, but without any tree or ſhrub. Further weſt, in California, ſalt is found in a very pure ſtate, in large and ſolid maſſes.

From the preceding account it will be ſeen that this moſt uſeful mineral is found in every quarter of the globe; and in many parts it exiſts in maſſes of immenſe ſize and extent, compared with the rock-ſalt in our own iſland, in the county of Cheſter. Such, however, is the ſuperior induſtry of our inhabitants, that the quantity annually exported from that county alone greatly exceeds that procured from any other diſtrict in the known world, being not leſs than 140,000 tons, the produce of the ſalt-rock and brine-ſpring; while the celebrated mines at Wieliczka, in Poland, are ſtated to yield only about 6000 or 7000 tons. Where rock-ſalt is white or colourleſs, it is immediately applicable to all uſeful purpoſes; but when mixed with earthy matter, it is rendered pure by the ſimple proceſs of ſolution in water. The liquor is afterwards drawn off into pans, leaving the inſoluble part behind; and the water is then evaporated either by the natural warmth of the climate, or by fires. See SALT.

ROCK-*Salt*, in *Rural Economy*, that ſort of foſſile, rocky, ſaline material, which is dug out of the bowels of the earth, from different depths, in ſome parts of this and other countries, where it exiſts in layers of different thickneſſes. The beds of this kind of ſalt, which are found in the county of Cheſter, are highly intereſting and important to the country, whether conſidered as affording an article of manufacture and commerce, or as forming a ſource of revenue. The diſcovery of the beds or ſtrata of this ſort of matter, in this diſtrict, is, however, of no very remote date, as will be ſeen under the head of ROCK-*Salt Pits*; but the layers are pretty numerous, and of conſiderable extent, differing greatly in their purity, though, in many inſtances, requiring a greater or leſs degree of preparation before the ſalt can be uſed.

It is remarked by the writer of the account of the Agriculture of Cheſhire, that, from ſome experiments made on different ſpecimens of rock-ſalt, it would appear that the tranſparent kind of it is an almoſt pure muriate of ſoda, which contains no admixture of either earth or earthy ſalts; and that the colour of the leſs tranſparent and brown ſpecimens is derived from the earth that enters, in greater or leſs proportions, into their compoſitions. That on 480 grains of tranſparent rock-ſalt being diſſolved in four ounces of diſtilled water, there was, firſt, no precipitate let fall, on the addition of carbonate of potaſh. Secondly, no alteration was produced by this ſolution on blue vegetable juices. Thirdly, on the addition of a few drops of tincture of galls, a ſlight purple tinge was given to the ſolution; and after ſtanding ſome hours, there was a brown ſediment at the bottom of the veſſel. Fourthly, on the addition of muriate of barytes, there was no precipitate thrown down. From the firſt of theſe trials, it is ſuppoſed that rock-ſalt has no muriate of lime, or muriate of magneſia, combined with it; from the ſecond, that it has no uncombined acid or alkali; from the third, that it contains ſome portion of iron; and from the fourth, or laſt, that there is no ſulphate of lime contained in it.

And that, on examining different ſpecimens of the leſs tranſparent, and the brown rock-ſalt, with the ſame reagents as in the above trials, it was found that theſe conſiſted of muriate of ſoda, or ſea-ſalt, in combination with a certain proportion of earth, varying in quantity from one to thirty *per cent.*; alſo, that the earth was wholly the argillaceous or common clay; but that ſome of the ſpecimens contained a few grains of ſulphate of lime, in 480 of thoſe of the rock-ſalt.

The beds of this ſalt are now well known to be the principal

cipal cauſe of the ſalt-brine ſprings in this county; and, in connection with ſome other circumſtances, to have a great ſhare in cauſing the vaſt differences in their ſtrength, in different places. See SALT-*Brine Springs*.

This is a ſtrong ſort of ſalt, which is found uſeful for a variety of domeſtic purpoſes, according to the different manner in which it is prepared, or the difference in the ſize of the particles or cryſtals of which it is compoſed, as will be more fully ſhewn under the head SALT.

Although rock-ſalt is found in various parts of the above diſtrict, there are no pits of it wrought at preſent, except in the vicinity of Northwich. And part of the inferior rock-ſalt, which is procured there, is, it is ſaid, uſed at ſome of the refineries in that neighbourhood; and a further quantity ſent down the river Weaver, for the ſupply of the refineries at Frodſham, in the ſame county, and thoſe on the banks of the Merſey, in Lancaſhire. The purer rock-ſalt, or that which is called in general Pruſſian rock, is carried by the ſame conveyance to the port of Liverpool; whence, according to the above writer, it is exported chiefly to Ireland, and the ports of the Baltic. The annual quantity of rock-ſalt ſent down the firſt of the above rivers is found, on the average of the laſt ten years, to be 51,109 tons. But in this, it is obſerved, is included what is uſed at the Frodſham and Lancaſhire refineries, which may probably be about one-third of the whole. And it is added, that it appears, from the report of the committee of the houſe of commons, appointed to inquire into the laws reſpecting the ſalt duties, printed in June 1801, that,

in 1798	were exported	20,162	tons of rock-ſalt.
1799		33,913	
1800		34,939	

Of this quantity,

in 1798,	-	-	16,095
1799,	-	-	22,374
1800,	-	-	19,663

tons

were ſent to different ports in Ireland: the remainder was principally exported to Denmark, Ruſſia, Sweden, Pruſſia, and Germany. However, a ſmall quantity went to Guernſey, Jerſey, and the Weſt Indies.

This ſhews, in a ſtriking manner, the great utility and advantage of this article in a manufacturing and trading point of view, as well as in other ways.

In regard to the original formation of the beds or ſtrata of rock-ſalt, in this and other countries, different theories, opinions, and conjectures, have been formed and propoſed; but it is one of thoſe geological queſtions which is extremely embarraſſing in its nature, and very difficult in its ſolution. Mr. Holland has, however, in the above work, ingeniouſly ſtated ſeveral ſuppoſitions on the ſubject, and the objections to which they are expoſed. It is remarked, that wherever rock-ſalt is met with, ſulphate of lime ſeems to be very generally diſcovered in mixture with the earthy ſtrata above it. And the writer of the "Memoire ſur le Ser Marin," in the 11th volume of the Annals of Chemiſtry, it is added, informs us, that this is the caſe in Poland, Tranſylvania, and Hungary; alſo, that there is commonly a layer of gypſum betwixt the ſtrata of ſtone and the bed of ſalt. This gypſeous layer is of different colours, and is found cryſtallized, ſtriated, and mixed with marine ſhells. The gypſum above the beds of rock-ſalt in Cheſhire is, in like manner, found cryſtallized and ſtriated; but no marine exuviæ, or organic remains, it is obſerved, are ever met with in any of the ſtrata. Nor does gypſum accompany it, as is uſual in other places, as near Cordova, in Spain, where rock-ſalt forms a mountain 500 feet in height, and three miles in circumference, as noticed by Kirwan and Townſhend. Jars, the author of the "Voyages Metallurgiques," who, it is aſſerted, has given the moſt particular account we have of the upper ſtratum of rock-ſalt about Northwich, remarks, that "it appears to have been depoſited by layers or beds of ſeveral colours;" and that "theſe layers of ſalt are in ſuch a poſition, as to lead us to believe that the depoſition of it was made in waves, ſimilar to thoſe which are formed on the ſea-coaſt."

This, Mr. Holland ſays, coincides with an opinion ſuggeſted by Mr. Stanley, a friend of his, in regard to the probable origin of the beds of rock-ſalt, now in exiſtence in this diſtrict; who ſtates that rock-ſalt is there found in ſeveral ſtrata, one above the other, with intermediate beds of indurated clay, in the vallies of the Weaver, and thoſe of the other rivers and brooks emptying themſelves into it; but that it has never been found ſo near the ſurface, as to be above the level of the ſea, or beneath any ſolid rock. If beds of rock-ſalt are to be conſidered as ſo many depoſits of ſalt from ſea-water, we muſt ſuppoſe the ſea, at ſome former period, to have occupied the vallies in this county; and that, from time to time, the communications were interrupted between theſe vallies (then deeper than they are now) and the ſea. Earthquakes, or accumulations of ſand in the eſtuaries of the Merſey and the Dee, might, it is contended, have cauſed the interruptions. Whenever the ſea-water in the vallies became ſeparated from the ſea, the ſalt contained in it would ſubſide, by the natural proceſs of evaporation. This, it is ſuppoſed, would the more eaſily have taken place, if, by any ſubterraneous fermentation, the ground below the water ſhould have been heated. To account for a greater accumulation of ſalt than the ſea-water filling all the loweſt parts of the diſtrict would contain, we muſt ſuppoſe, it is ſaid, that the obſtruction interpoſed between the vallies and the ſea had been repeatedly broken down, and renewed again. Tides, unuſually high, might occaſionally overcome the reſiſtance of the accumulated ſand; and if the intervals between the inundations were only of ſhort duration, a ſubſidence of ſalt might take place, equal to the formation of the thickeſt ſtratum of the rock-ſalt now exiſting. Long intervals between the inundations would admit of an accumulation of clay, and other earthy particles, over the ſalt thus depoſited; and in this manner would be formed a new baſis for another ſtratum of rock-ſalt to repoſe upon. Thus, it is thought, the regular and aſtoniſhing exiſtence of the ſalt ſtrata may be accounted for, without neceſſarily ſuppoſing them coeval with the original formation of the earth: but to confirm the theory, it is ſuggeſted that much obſervation and cloſe inquiry into the natural hiſtory of the county would be required.

Mr. Holland, however, juſtly thinks that there are many objections to the theory which ſuppoſes the beds of rock-ſalt, in this diſtrict, to have been formed by depoſition from the waters of the ſea; ſome of which he ſtates rather for the ſake of promoting diſcuſſion and inquiry, than of affording any very decided opinion on a matter of ſo much doubt, uncertainty, and obſcurity. Though on making a perpendicular ſection of the upper bed of rock-ſalt, an irregular ſtratification, ſuch as noticed by Jars, may, he ſays, by frequent accurate examination, be obſerved, the general appearance of the ſides of the openings, whence the rock-ſalt is taken, is that of a confuſed and irregular red maſs; in which ſome portions of ſalt have a greater, others a leſs, proportionate admixture of earth; while, here and there, they may be ſeen perfectly pure and tranſparent. He, therefore, aſks, is it likely that this irregularity and confu-

ſion

ſion would have exiſted, had the beds of rock-ſalt in this diſtrict been formed by the evaporation of ſea-water inundating the land at certain intervals of time, as the above theory ſuppoſes? On the contrary, ſays he, would it not be natural to expect from reaſonings, *à priori*, that the ſalt, thus depoſited from ſea-water, would be diſpoſed in layers perfectly regular, and differing from one another merely in thickneſs, or a few other circumſtances of inferior moment?

Another fact which, it is ſuppoſed, invalidates, in ſome meaſure, the notion that the rock-ſalt has been depoſited from the waters of the ſea, is the great diſproportion of quantity, ſhewn by analyſis to exiſt, between the earthy ſalts contained in the brine of this diſtrict, and thoſe held in ſolution by ſea-water; the ratio here being as one to ten, or the proportion which the earthy ſalts bear to the pure muriate of ſoda in ſea-water is ten times greater than that which prevails in the Cheſhire brine. The aſcertaining of this fact proves, it is ſuppoſed, that the rock-ſalt (from the ſolution of which the brine is formed) is combined with a much ſmaller proportion of earthy ſalts than exiſts in ſea-water; a circumſtance difficult to be accounted for, on the ſuppoſition that the beds of this ſubſtance were formed by the evaporation of the ſea-water, occupying the vallies and loweſt parts of the land. It muſt be noticed, however, as worthy of attention, that the earthy ſalts, intermixed with the rock-ſalt in the above diſtrict, are the ſame which are held in ſolution by ſea-water, being principally muriated magneſia and ſulphate of lime.

There is, however, a ſtill ſtronger proof, it is ſuppoſed, againſt the notion that the beds of rock-ſalt in this county are depoſitions from the ſea-water, in the circumſtance that no marine exuviæ have ever been diſcovered in the ſtrata. This, it is imagined, would almoſt indubitably have been the caſe, had the land been covered with ſea-water during a period of ſufficient length for the depoſition of beds of ſalt of ſuch prodigious thickneſs; and the fact, that no ſuch exuviæ do actually exiſt, is ſuppoſed in itſelf ſufficient to induce a ſuſpicion that the theory in queſtion cannot be well founded. Other objections too, it is obſerved, offer themſelves to its validity; ſuch as the enormous depth of ſea-water neceſſary to the production of a body of rock-ſalt forty yards in thickneſs; the difficulty, if not impoſſibility, on ſuch principles, of accounting for the formation of the ſingular inſulated mountain of rock-ſalt at Cordova, in Spain; with others of a more trivial nature, which will readily preſent themſelves in this inquiry.

It is, however, at the ſame time candidly acknowledged, that there are many facts and circumſtances of actual obſervation, that confer a ſtrong degree of plauſibility on the opinion, againſt which it has been contended. The certainty that the ſurface of the county was at ſome former period much lower than it is at preſent, and the diminution of the thickneſs of the ſtrata of rock-ſalt in proportion as they recede from the ſea, are circumſtances which undoubtedly range themſelves on this ſide of the queſtion: and, upon the whole, it is thought, that it may be doubted whether the theory, which regards the beds of rock-ſalt as depoſits from ſea-water, does not accord more exactly with exiſting appearances, than any other which has been adduced on the matter.

It is ſuppoſed that many things, which at firſt ſeem objections, may be obviated by a reference to the principles of the Huttonian theory of the earth, and the excellent illuſtrations of it by profeſſor Playfair. However, in the preſent ſtate of our knowledge, any opinion formed on the matter muſt, it is imagined, from its very nature, be purely theoretical. See Rock-*Salt Pits*.

Rock-*Salt Pits*, ſuch pits, ſhafts, mines, or openings, as are dug or made in any other manner in the ground, for the purpoſe of getting and raiſing rock-ſalt from them. Pits of this ſort are met with in many parts of the county of Cheſter, which are wrought to very conſiderable extents, and are of great importance to the intereſts of the diſtrict in many different ways, as well as to the nation in general, as may be ſeen under the head Rock-*Salt*.

According to the ſtatement of Mr. Holland, in his Agricultural Survey of the above county, the firſt bed and pit of ſalt-rock was found and wrought in Marbury, at a ſmall diſtance from the town of Northwich, at the depth of about thirty yards from the ſurface, in the year 1670, when ſearching for coal. The bed was thirty yards in thickneſs, and reſted upon a ſtratum or layer of hard clay. In conſequence of this diſcovery, other ſimilar attempts were made; and on ſinking ſhafts or pits any where in the vicinity of it within the ſpace of half a mile, it was found to exiſt at about the ſame depth from the ſurface of the earth, when not prevented from being dug down to by brine-ſprings or thoſe of common water. This continued the only place in which it was found until the year 1779, when this ſort of rock was again met with in ſearching for brine in the neighbourhood of Lawton, at the depth of about forty-two yards, but only of the thickneſs of about four feet; there being beneath it a bed of indurated clay ten yards in thickneſs, which being penetrated through, a ſecond ſtratum of rock-ſalt was diſcovered twelve feet in thickneſs; and on continuing the ſinking of the pit, another layer of indurated clay, fifteen yards in thickneſs, was paſſed through; below which appeared a third ſtratum of rock-ſalt, which was ſunk into not leſs than twenty-four yards; the loweſt fourteen yards, being the pureſt, or the leaſt mixed with other ſubſtances, were the only parts that were wrought.

Until this period, in the neighbourhood of Northwich, no attempts had, however, been made to ſink pits in order to find a lower ſtratum of rock-ſalt; as the one which had been firſt met with was ſo thick, and furniſhed ſuch an abundant ſupply for every demand, there could be no other inducement to this than the expectation of meeting with a ſtratum, at a greater depth, which might contain a leſs admixture of earthy matters. It would ſeem, too, that the fear of meeting with ſprings below, which might impede the working out of the materials from the pits, and even render this wholly impracticable, prevented the proprietors of them from ſinking deeper. As, however, no inconvenience or interruption of this nature had occurred, on ſinking through different alternate ſtrata of rock-ſalt and clay at Lawton; and it had been found that there was a lower ſtratum of rock-ſalt there, which was more pure than thoſe nearer the ſurface, the owners of one of the works or pits in this vicinity were induced, a little time after the trials at Lawton, as in 1781, to ſink deeper than had yet been done, and to paſs through the bed or body of indurated clay lying underneath the rock-ſalt, which had been ſo long known and wrought. This indurated clayey material was found to be from ten to eleven yards in thickneſs; and immediately beneath it a ſecond ſtratum of rock-ſalt was met with, the upper part of which differed little in purity from that of the higher ſtratum or layer of rock; but on penetrating into it to the extent of from twenty to twenty-five yards, it was there found to be much more pure and free from earthy admixture.

ture. But it continued to have this increaſed degree of purity for four or five yards only; while, for fourteen yards ſtill lower, to which depth the pit or ſhaft was ſunk, the proportion of earthy matter was again as large as in the upper part of the ſtratum. It was therefore, on this account, thought uſeleſs to ſink the pit to any greater depth. Many other proprietors of pits, ſhafts, or mines, in the ſame neighbourhood, it is ſtated, followed the example which had been thus ſet them; and penetrated through the bed of indurated clay lying beneath the upper ſtratum of rock-ſalt. A ſecond ſtratum of rock-ſalt was conſtantly met with below this; and on paſſing down into it, the ſame order of diſpoſition as to purity was obſerved, as in the pit or mine in which it had been firſt noticed and examined; and the ſame has been found to prevail in all the pits, ſhafts, works, and mines, which have ſince been ſunk in the ſame vicinity.

It is further noticed, that there is great uniformity in the ſtrata which are paſſed through in ſinking pits for rock-ſalt or brine; and that they very generally conſiſt of clay and ſulphate of lime mixed in various proportions; that of the latter ſomewhat increaſing as the pit, ſhaft, or work approaches the rock or brine. The workmen diſtinguiſh the clay by the appellation of *metal*, giving it the name of red, brown, or blue metal, according to its colour; and the ſulphate of lime by that of *plaiſter*. See Quarry.

The ſtrata formed by theſe are, in general, cloſe and compact; allowing very little freſh water to paſs through them. In ſome places, however, they are broken and porous: and they admit ſo much freſh water into the pit or work, that whenever they have been met with, it has been uſual to diſcontinue any attempts to paſs through them in ſinking the pits. In theſe places the workmen call the metal *ſaggy*. It was thought not only impracticable to overcome a water, which vulgar prejudice had magnified into a great ſtream running under ground; but it was believed, even if the ſinking could be continued below this, that the water could not be kept out of the pit, ſhaft, or work, and that it would either weaken the brine ſo as to deſtroy its value, or would find its way into the cavity of any rock, pit, or mine which might be found below it. Later experience, it is ſaid, has proved, that theſe ideas were not altogether well founded. A few years ago an attempt was made in Witton to paſs through this porous ſtratum, in order to get to the brine. It was met with about twenty-eight yards from the ſurface; the thickneſs of it was about thirteen feet; and the quantity of water, which was forced through it into the pit or ſhaft, was three hundred and ſixty gallons a minute. By means of a ſteam-engine, the ſinkers were enabled to paſs through this water; to fix a gauge or curb a few yards below it, in a ſtratum of indurated clay; and thence to bring up a wooden frame, ſupporting a wall of puddled earth twelve inches thick, by which the acceſs of the freſh water into the pit or ſhaft was in a great degree prevented, and an opportunity given to paſs down to the brine below. A ſhaft was afterwards ſunk through this porous ſtratum, for the purpoſe of obtaining rock-ſalt; which object was, after a ſhort time, defeated, by the influx of brine into the ſhaft at the ſurface of the upper ſtratum of rock-ſalt; an accident originating in a cauſe completely diſtinct from the freſh water in the porous ſtratum or bed. An exact ſection of the different ſtrata ſunk through in reaching the ſecond bed of rock-ſalt in the pit at Witton, near Northwich, is given by Mr. Holland in the above report; and all the ſtrata in the neighbourhood of the laſt town are ſuppoſed to have nearly a ſimilar diſpoſition. The inclination of them in the pit or ſhaft at the above place was from north-weſt to ſouth-eaſt; and the dip about one yard in nine. The ſtratum through which the freſh water flowed is ſhewn, and the level it found, it is ſaid, was ſixteen yards from the ſurface, which, it is remarked, nearly correſponds with that of the brock below. The line of ſeparation between the loweſt ſtratum of earth, and the firſt of rock-ſalt, is very exactly defined; they are perfectly diſtinct, and do not at all run into each other. It is farther noticed, that in carrying a horizontal tunnel for one hundred yards along the upper ſtratum of rock-ſalt, this was found to be irregular and unequal on its ſurface; the irregularities in a great meaſure correſponding with thoſe on the ſurface of the ground above.

The higheſt bed or body of rock-ſalt in the pits near Northwich is the thickeſt in thoſe ſituated the moſt to the north-eaſt, gradually declining in thickneſs towards the ſouth-weſt, ſo as to loſe one-ſixth of it in the courſe of about a mile. It decreaſes from about thirty yards in thoſe the fartheſt to the north-eaſt, to about twenty-five in that the moſt to the ſouth-weſt.

A ſingular appearance is remarked to preſent itſelf on making a horizontal ſection of the ſtratum of rock-ſalt in the pits: on the whole of the ſurface made by ſuch a ſection, various figures, it is ſaid, may be obſerved, differing in form and ſize, ſome of them being nearly circular, others approaching more to an oval form, while in many an irregular pentagon may be traced. Some of them are not more than two or three feet in diameter; others are ten or twelve feet. The lines which form the boundaries of theſe figures are white, and from two to five or ſix inches wide. On examining theſe appearances, they are found, it is ſaid, to be owing to the rock-ſalt, in the white lines forming the diviſions of the figures, being perfectly pure, and free from earthy admixture. When combined with the ſalt, having earth in various proportions mixed with it, a general effect is produced, it is ſaid, not very diſtantly reſembling moſaic work. This diſpoſition is uniformly obſerved, it is ſaid, throughout the whole thickneſs of the ſtratum of rock-ſalt; and that in whatever part of it ſuch a ſection as the above is made, ſimilar appearances are met with. To what cauſe it has been owing that the rock-ſalt has been depoſited in this ſingular manner, it is thought difficult to conceive. The whole ſtratum of rock-ſalt may, it is ſuppoſed, be compared to a maſs of baſaltic columns; the lines of ſeparation in each pillar being marked by the pure and tranſparent white ſalt. Theſe appearances, it is noticed, afford ſeveral grounds for inferences favourable to the theory of the earth mentioned under the head rock-ſalt, to the illuſtrator of it. See Rock-*Salt*.

It is likewiſe further obſerved, that the diviſion betwixt the lower portion of the upper bed of rock-ſalt, and the indurated clay or ſtone beneath it, in pits of this kind, is as exactly defined, as that between the upper portion of it and the earth above. That in paſſing through this ſtone ſmall veins of rock-ſalt are met with, here and there running in it, in various directions; and that wherever there has been any little crevice in it, it is found filled up with rock-ſalt, to which the clay and oxyd of iron have given a deep red tinge. The thickneſs of this ſtratum of ſtone is ſaid to be uniformly found to be from ten to eleven yards; and the lower part of it is as diſtinct from the ſecond bed of rock-ſalt, as its upper part is from the firſt: alſo that its termination is equally abrupt or ſudden.

And that the perpendicular ſection of the ſecond bed of rock-ſalt varies little from that of the upper bed, till it has been penetrated about twenty yards from the ſurface, when it aſſumes a more ſtratified appearance, and is here found, as already noticed, to have a much ſmaller proportion of earth combined with the muriate of ſoda. A ſection of this ſtratum, ſimilar to the above, diſplays the ſame figured appearance in the roof of the pit, as that of the upper ſtratum.

In the very inſtructive report mentioned above, the writer has given a coloured repreſentation of the roofing of a rock-ſalt pit, and another of the part where the lower ſurface of the upper bed of rock-ſalt joins the inferior clayey or other ſtrata. Theſe, as well as other matters in that work, are particularly worthy of the attention of the inquirer on this ſubject.

But though beds of this ſort of material have been occaſionally met with in ſome other parts of the ſame diſtrict, they have not been wrought, principally on account of the want of water carriage: as the working of thoſe pits at Lawton was ſoon diſcontinued, it is now only from the pits in the neighbourhood of the town of Northwich that rock-ſalt is procured. At this time there are ten or twelve in number; at all of which the rock is wrought in the lower ſtratum or bed only. The pits or ſhafts are for the moſt part ſquare, and built or formed with timber; but there is one at the diſtance of about a mile from the town of Northwich, which is of a circular form, and built in brick-work.

In regard to the manner of working the pits or mines, there is nothing of any very great intereſt or moment to be noticed. By means of boring and blaſting the rocky ſtratum, and the uſe of wedges with the different mechanical inſtruments employed in mining, the ſalt-rock is ſeparated, ſo as to be raiſed in large maſſes, which vary in form and purity. However, before any conſiderable extenſion of the workings in the pits, in any particular direction, takes place, care is taken to make ſure of a good ſafe open roofing for the cavity which is to be formed in getting out the rock. In doing this the workmen make uſe of pointed implements of the common pick kind, working the materials out in an horizontal manner, ſo as to form an excavation in the rock, and making it in as ſimple a way as poſſible, or as the work will admit. In conſequence, however, of its being ſituated a few feet above the purer part of the ſtratum, the rock which is obtained during this proceſs is commonly of inferior quality, and is, for the moſt part, made uſe of in the refineries. The depth of the workings from the excavations or roofings, it is remarked, depends in a great meaſure upon the nature of the ſtratum, and the proportion of it occupied by the rock of the purer quality, or, as it is termed, *Pruſſian rock*. Fifteen or ſixteen feet may perhaps, however, be taken, it is thought, as the average depth of the workings in the pits. The cavity thus formed preſents a ſtriking appearance; and when illuminated by candles fixed in the rock, the effect, it is aſſerted, is highly brilliant. In ſome of the pits or ſhafts, the excavated roofs are ſupported and kept up by pillars eight or ten yards ſquare, which are in general arranged with a degree of irregularity: others are worked out in aiſles; the choice here however ſeems to be wholly arbitrary, depending on the men who are employed in the work. Until theſe few late years, horſe labour was wholly employed in raiſing rock-ſalt from the pits and ſhafts about the town of Northwich; but this method has now, in ſome meaſure, given way to the beſt kind of ſteam-engine, which has been ſubſtituted in its ſtead, in many of them with very great advantage. In others, however, horſe labour is ſtill continued to be made uſe of for this purpoſe. The men who are employed in working the rock-ſalt pits, have their pay by the quantity of the material which they raiſe, having in general ſomewhat leſs than half a crown for the ton weight, they finding tools and every thing elſe neceſſary for the work.

Rock-*Fiſh Creek*, in *Geography*, a river of Virginia, which runs into James river. At the mouth of this river is a precipice, hanging over a navigable part of the river, formed of marble, variegated with red, blue, and purple. N. lat. 37° 37′. W. long. 78° 54′.

Rock-*Caſtle River*, a river of Kentucky, which runs into the Cumberland, N. lat. 36° 43′. W. long. 84° 14′.

Rock *Point*. See Punta *de Calenduras*.—Alſo, a cape on the N. coaſt of the iſland of Cumbava. S. lat. 8° 8′. E. long. 118° 35′.

Rock *River*, a river of America, which runs into lake Michigan, N. lat. 37° 37′. W. long. 83° 35′.

Rock *Town*, a town of Africa, on the Grain Coaſt. N. lat. 4° 35′. W. long. 7° 50′.

ROCKAWAY, a ſmall poſt-town of America, in Morris county, New Jerſey, on the S. ſide of a river of the ſame name; 15 miles N. by W. from Morriſtown.

ROCKBENT, a townſhip of Pennſylvania, in Lancaſter county, containing 1026 inhabitants.

ROCKBRIDGE, a mountainous county of Virginia, bounded N. by Auguſta, and S. by James river, which divides it from Botetourt county. It contains 10,318 inhabitants. The famous natural bridge is in this country. Here is an uſeful academy, for twenty to forty ſtudents, liberally endowed by the late general Waſhington, and called, after him, "Waſhington Academy." The chief town is Lexington.

ROCKCASTLE, a county of Kentucky, containing 1731 inhabitants.

ROCKEN, a cape on the S. coaſt of the Iſle of Wight. N. lat. 50° 34′. W. long. 1° 13′.

ROCKENBACH, a town of Germany, in the principality of Culmbach; 5 miles N. of Neuſtadt.

ROCKENHAUSEN, a town of France, in the department of Mont Tonnerre, and chief place of a canton, in the diſtrict of Kaiſerſlautern; 10 miles N. of it. The place contains 940, and the canton 5129 inhabitants, in 17 communes.

ROCKENHOF, a town of Germany, in the territory of Nuremberg; 8 miles N.N.E. of Nuremberg.

ROCKET, in *Pyrotechny*, an artificial fire-work, conſiſting of a cylindrical caſe of paper, filled with a compoſition of certain combuſtible ingredients; which being tied on a ſtick, mounts into the air to a conſiderable height, and there burſts.

The rocket has a great part in all fire-works of entertainment, being not only uſed ſingly, but ſometimes alſo as an ingredient in others.

Beſides the rocket here defined, which is properly called the *ſky-rocket*, there is another, which, from the ſphere it moves in, *viz.* the water, is denominated *water-rocket*. For the mechaniſm, preparation, &c. of each of them, we refer to the article Pyrotechny.

Dr. Pemberton, in his Chemiſtry, p. 209, &c. has given the following conciſe account of rockets. A rocket (he ſays) is a hollow cylinder, uſually made of paper, of a thickneſs equal to about one-ſixth of its diameter within, and filled with gunpowder, or ſome like compoſition. If a rocket

a rocket be made of great bigneſs, intended for a ſignal in war, or ſuch like uſe, its caſe may be made of a more ſolid material.

Near one end the caſe of the rocket is drawn in, till its diameter be reduced to one-half of the whole internal diameter. This place is uſually called the choke. The moſt approved length of the caſe, from the choke, is about ſix times its internal diameter, to be filled with gunpowder; if the rocket be ſmall, beat into fine duſt, and rammed in with as even ſtrokes as can be, that the powder be uniformly compreſſed. In great rockets, the charge is uſually a little weakened by adding to the gunpowder a ſmall portion of charcoal and of ſulphur.

To the end of the rocket is added a cylindrical cavity, not above half the length of the rocket from its choke in height, and of ſuch a diameter, that, together with the materials put into it, it may not exceed the weight of the reſt of the rocket. Theſe materials, beſides ſome corn powder to burſt the caſe, conſiſts of ſome compoſition, that may give the appearance of ſtars, a ſhower of fire, or the like.

Theſe fiery ſhowers may be made of ſaw-duſt, boiled in water, ſtrongly impregnated with nitre, and while wet rolled among gunpowder in duſt; or by gunpowder mixed with melted brimſtone, and when cold, groſsly beaten.

Theſe ſtars are a mixture of gunpowder, nitre, ſulphur, antimony, camphor, and the like combuſtible materials, moiſtened with a ſolution of ſome gum, in order to form pellets of a convenient ſize. Theſe pellets are to be covered over with thread, well ſoaked in a ſtrong ſolution of nitre, and while wet rolled in gunpowder. To charge the rocket with larger balls, any of the aforeſaid ingredients (of which nitre, in a ſufficient quantity, muſt always be one) may be mixed with turpentine, melted pitch, or roſin, and tow ſteeped in it. In this way larger balls may be formed, which ſhould be covered over with thread, prepared as juſt now deſcribed.

It is neceſſary for giving the rocket a ſufficient degree of motion, that the powder within the rocket be bored with a tapering cavity from the choke. At the choke this cavity muſt be as wide as the choke itſelf; at the farther end it need not be more than one-half that width. The length of this bore muſt be but one inner diameter of the rocket ſhort of the whole height to which the rocket is rammed. The uſe of this bore is to increaſe the ſurface, that takes fire at once; that a greater body of fire may iſſue out of the mouth of the rocket. For from the vehemence with which the fire iſſues out, the rocket receives its motion. Rockets are uſed in all fire-works that have motion, except ſuch as are thrown into the air after the manner of bombs. When the rocket is deſigned to mount upwards, a ſtick, eight or nine times the length of the rocket, is tied to it, ſufficient to poiſe the rocket at an inch or two from its mouth.

Rockets, *Sky, Theory of the Flight of.* Mariotte takes the riſe of rockets to be owing to the impulſe or reſiſtance of the air againſt the flame. Dr. Deſaguliers accounts for it otherwiſe, as we ſhall ſtate in the next article, with remarks upon the theory. We ſhall here add, that the ſtick is attached to keep it perpendicular; for if the rocket ſhould begin to tumble, moving round a point in the choke, as being the common centre of gravity of rocket and ſtick, there would be ſo much friction againſt the air, by the ſtick between the centre and the point, and the point would beat againſt the air with ſo much velocity, that the re-action of the medium would reſtore it to its perpendicularity. When the compoſition is burnt out, and the impulſe upwards is ceaſed, the common centre of gravity is brought lower towards the middle of the ſtick; by which means the velocity of the point of the ſtick is decreaſed. and that of the point of the rocket is increaſed; ſo that the whole will tumble down, with the rocket end foremoſt.

All the while the rocket burns, the common centre of gravity is ſhifting and getting downwards, and ſtill the faſter and the lower as the ſtick is lighter; ſo that it ſometimes begins to tumble before it be burnt out: but when, the ſtick being a little too heavy, the weight of the rocket bears a leſs proportion to that of the ſtick, the common centre of gravity will not get ſo low, but that the rocket will riſe ſtraight, though not ſo faſt.

Mr. Robins, conſidering the great uſe that may be made of rockets, in determining the poſition of diſtant places, and in giving ſignals for naval and military purpoſes, procured ſome, with a view of aſcertaining the height to which they riſe, and the diſtance at which they may be ſeen. The greateſt part of them did not riſe to above 400 yards, one to about 500, and one to 600 yards nearly. The greateſt diſtance at which theſe were obſerved, was from 35 to 38 miles. Others were fired at a different time; one of which roſe to 690 yards; and it was obſerved, that the largeſt, which were about $2\frac{1}{2}$ inches in diameter, roſe the higheſt. In ſome ſubſequent experiments, conducted by M. Da Coſta, Mr. Banks, &c. it was found that of two rockets, of about $3\frac{1}{2}$ inches diameter, one roſe to about 833, and the other to 915 yards. In another trial, a rocket of 4 inches diameter roſe to 1190 yards. In other experiments, a rocket of $1\frac{1}{2}$ inch roſe to 743 yards; one of 2 inches to 659; one of $2\frac{1}{2}$ inches to 880; another of the ſame ſize to 1071; one of 3 inches to 1254; one of $3\frac{1}{2}$ inches to 1109; and one of 4 inches roſe to near 700 yards, and, turning, fell to the ground before it went out. Beſides theſe, there was one of the rockets of 24 inches in diameter, which roſe to 784 yards, and another of the ſame ſize to 833 yards. From theſe experiments it is inferred, that rockets from $2\frac{1}{2}$ to $3\frac{1}{2}$ inches in diameter are ſufficient to anſwer all the purpoſes for which they are intended; and they may be made to riſe to a height, and to afford a light capable of being ſeen to conſiderably greater diſtances than thoſe juſt mentioned. The manufacture of large rockets is expenſive; and they are more uncertain than thoſe of a ſmaller ſize. Phil. Tranſ. vol. xlvi. p. 578, &c. or Robins's Math. Tracts. vol. i. p. 317, &c.

To prevent miſchief from the fall of the rocket-ſticks, which are ſometimes very heavy, they now bore the ſticks of large rockets, and fill them with powder, that they may ſhiver in the air before they fall. See Fire-*Works*.

Rockets, *Congreve's*, a new ſpecies of war rockets, being thus called from the name of their inventor, ſir William Congreve. They differ from the common rocket, as well in their magnitude and conſtruction, as in the powerful nature of their compoſition; which is ſuch, that without the incumbrance of any ordnance, (the rocket containing the propelling power wholly within itſelf,) balls, ſhells, caſe-ſhot, and carcaſſes, may be projected to the diſtance of from 1000 to 3000 yards, which renders them a moſt efficacious ſpecies of artillery; as they may not only be employed in every caſe, and for every purpoſe, of the uſual light and heavy ordnance, but they are available alſo in a variety of inſtances, in which the nature of the ground or other

other impediments prevent the effectual introduction of that arm.

These rockets are of various dimensions, as well in length as in calibre, and are differently armed according as they are intended for the field, or for bombardment and conflagration; carrying, in the first instance, either shells or case-shot, which may be exploded at any part of their flight, spreading death and destruction amongst the columns of the enemy; and in the second, where they are intended for the destruction of buildings, shipping, stores, &c. they are armed with a peculiar species of composition, which never fails of destroying every combustible material with which it comes in contact.

The latter are called *carcass-rockets*, and were first used at Boulogne, their powers having been previously demonstrated in some experiments made at Woolwich by sir William Congreve, in the presence of Mr. Pitt and several of the cabinet ministers, in the month of September 1805. Sir Sidney Smith was ordered to command the expedition intended for this purpose; but from the lateness of the season, it being near the end of November before the preparations were completed, nothing was done that year. In 1806 sir William Congreve renewed his proposition for the attack of Boulogne by rockets, which was ordered to be put in execution after lord Moira, at that time master-general of the ordnance, and lord Howick, first lord of the admiralty, had satisfied themselves of the efficacious nature of the weapons, from other experiments made again at Woolwich for that purpose. The attack was accordingly made under the command of commodore Owen, late in October 1806; having been put off during the summer months, in consequence of the negociations for peace, at that time pending between the courts of England and France.

From this delay, however, instead of being conducted upon the grand scale at first intended, it became a mere desultory attack, in which not more than 200 rockets were fired. The town, however, was set on fire by the first discharge, and continued burning for near two days: it was supposed also that some shipping were destroyed, but the greater part of the rockets certainly went over the basin into the town.

After this, their first introduction as a military weapon, the carcass-rockets have been used in almost every expedition, and in nearly all under the immediate inspection of their inventor. Their reputation was completely established at Copenhagen, where they did incredible execution: after the siege, they were ordered by lord Chatham, the master-general of the ordnance, to be reported upon by a committee of field officers of artillery, who had witnessed their effect in that bombardment, and who pronounced them to be "*a powerful auxiliary to the present system of artillery.*" Indeed the powers of this weapon are now established upon the best of all testimonies, the best of all criterions, the testimony of the enemy; a striking instance of which occurred at the siege of Flushing, where general Monnet, the French commandant, made a formal remonstrance to lord Chatham respecting the use of them in that bombardment; than which no better fact need be recorded of the effect they must have produced. If such, therefore, be the acknowledged power of the weapon in such an early stage of its progress, and only when a handful, as it were, were used, merely by way of experiment, under the inventor, with not more than twenty or thirty men to assist him, what may not be expected, when regularly organized in the service, and generally combined with the other implements of bombardment?

At present we have spoken only of the carcass-rockets; it is not, however, in bombardment only that this species of artillery may be advantageously employed; their powers in the field having been demonstrated to be equally irresistible. The crown prince of Sweden was the first general who bore testimony to their effects in this service; a small corps of rocketeers, under the command of Capt. Bogue of the royal artillery, having been attached to this division of the allied armies; and who, in the ever memorable battle of Leipsic, while yet the fate of empires was suspended in fearful equilibrium, gloriously maintained the honour of the British arms, and incontrovertibly established the reputation of the rocket-system.

They were afterwards employed with great effect when the British army, under the command of the duke of Wellington, crossed the Adour; and, had the war continued, we should, in all probability, have seen them as commonly in active service in the field as the other artillery. In consequence of these successes, and a variety of other instances, which our limits will not allow us to enumerate, his royal highness the prince regent commanded the formation of a rocket corps, which took place on the 1st of January 1814, by augmentation to the regiment of royal artillery, as proposed by lord Mulgrave, master-general of the ordnance.

Having thus given a sketch of the history, improvement, and introduction of the rocket-system of artillery, we shall proceed to give such explanation of the nature and application of the weapon in different species of attack and defence, as may be consistent with the general interest of the service; such only being suffered to transpire; for, the military rocket being exclusively an English weapon, all the more minute and important particulars, both of construction and composition, are very properly kept a profound secret, being probably known in complete detail by no person except the inventor himself.

The general form of all the different kinds of rockets, for whatever service they may be designed, is cylindrical, being formed in strong metallic cases, and armed, as we have before stated, either with carcass composition for bombardment and conflagration, or with shells and case-shot for field-service. They are, however, of various weights and dimensions, from the eight-inch carcass, or explosion rocket, weighing nearly three hundred weight, to the six-pound shell-rocket, which is the smallest size used in the field. The sticks which are employed for regulating their flight are also of different lengths, according to the size and service of the rocket; and which, for the convenience of carriage, are stowed apart from the rocket, and so contrived as to consist of two or more parts, which are connected to it, and to each other, when requisite, with the utmost expedition.

Rocket ammunition is divided into three classes, *heavy*, *medium*, and *light*; the former including all those of above 42lbs., which are denominated according to their calibre, as eight-inch, seven-inch, six-inch, &c. rockets; the medium include all those from the 42lb. to the 24lb. rocket; and the light, from the 18-pounder to the 6-pounder inclusive.

The carcass-rockets are armed with strong iron conical heads, containing a composition as hard and solid as iron itself, and which, when once inflamed, bids defiance to any human effort to extinguish it; and consequently involves, in an inextinguishable flame, every combustible material with which it comes in contact. The 42-pounder and 32-pounder carcass-rockets, are those which have hitherto been chiefly employed in bombardments: the penetration of the 32lb. carcass-rocket in common ground is nine feet; and in

in ſome inſtances where they have been employed, they have been known to pierce through ſeveral floors, and through the ſides of houſes: this is the ſmalleſt rocket uſed in bombardment, and the largeſt employed in the field; the more uſual ſize for the latter ſervice being the 24, 18, 12, and 6-pounders.

The ranges of the eight-inch, ſeven-inch, and ſix-inch rockets, are from 2000 to 2500 yards; and the quantity of combuſtible matter, or burſting powder, from 25lbs. to 50lbs.; and from their weight combined with leſs diameter, they poſſeſs a greater power of penetration than the heavieſt ſhells, and are therefore equally efficient for the deſtruction of bomb-proofs, or the demolition of ſtrong buildings; ſo that the facility of application, on which the inventor has hitherto reſted the merit of the rocket-ſyſtem, is not its only excellence; for it thus appears, that it actually will propel heavier maſſes than can be done by any other means, that is to ſay, maſſes, to project which, it would ſcarcely be poſſible to caſt, much leſs to tranſport, mortars of ſufficient magnitude. The largeſt rocket that has yet been conſtructed, has not, we believe, exceeded three hundred weight; but ſir William Congreve ſeems to have in contemplation others of much ſuperior magnitude, weighing from half a ton to a ton weight, which being driven in very ſtrong caſt-iron caſes, may poſſeſs ſuch force, that, when fired along trenches cut to the foot of the glacis, from the neareſt point of the third parallel, againſt the revetement of any fortreſs, even unimpaired by a canonnade, it ſhall, by its maſs and form, pierce the ſame; and, having pierced it, ſhall with one exploſion of ſeveral barrels of powder, with which it is loaded, blow ſuch portion of the maſonry into the ditch, as may, with very few rounds, complete a practicable breach.

The 42 and 32-pounders are thoſe, as we have before ſtated, which have hitherto been principally uſed in bombardment, and which, for the general purpoſes of that ſervice, are found quite ſufficient, as they will convey from 7lbs. to 10lbs. of combuſtible matter each, and have a range of upwards of 3000 yards.

The 32-pounder rocket may be conſidered as the medium rocket, being the ſmalleſt uſed in bombardment as a carcaſs or exploſion rocket, and the largeſt uſed with ſhot or ſhell in the field; but as the 24-pounder is very nearly equal to it in all its applications in the latter ſervice, being quite equal to the propelling of the Cohorn ſhell, or 12-pounder ſhot, it is, from the ſaving in weight, generally preferred to the 32-pounder.

The 18-pounder, which is the firſt of the light nature of rockets, is armed with a 9lb. ſhot or ſhell; the 12-pounder with a 6lb. ditto; the 9-pounder with a grenade; and the 6-pounder with a 3lb. ſhot or ſhell. From the 24-pounder to the 9-pounder rocket incluſive, a deſcription of caſe-ſhot rocket is formed of each nature, armed with a quantity of muſket or carbine balls, put into the top of the cylinder of the rocket.

The following table preſents a general view of the ranges, elevations, and other particulars of ſeveral of the moſt uſual deſcriptions of Congreve rockets.

Nature of Ammunition.	Armed with	Extreme Range.	Elevation for extreme Range.
42-Pounder carcaſs-rockets	Carcaſſes { large, 18lbs. of combuſtible matter; ſmall, 12lbs. ditto	Yards. 3500	Elevation for extreme range not leſs than 60°
42-Pounder ſhell-rockets	Shells { $5\frac{1}{2}$-inch; 12-pounder ſpherical		
32-Pounder carcaſs-rockets	Carcaſſes { large, 18lbs. of combuſtible matter	2000	60°
	medium, 12lbs. = 13-inch carcaſs	2500	60° to 55°
	ſmall, 8lbs. = 10-inch ditto	3000	55°
32-Pounder ſhell-rockets	Shells, 9-pounder ſpherical	3000	50°
32-Pounder caſe-ſhot rockets	Caſe-ſhot { large, containing 200 carbine balls	2500	55°
	ſmall, 100 ditto	3000	50°
32-Pounder exploſion rockets	Strong iron cones, containing from 5lbs. to 12lbs. of powder, to burſt by fuzees	from 2500 to 3000	55°
12-Pounder caſe-ſhot rockets	Caſe-ſhot { large, 72 carbine balls	2000	45°
	ſmall, 48 ditto	2500	45°

Note. The mean velocity of any rocket is to that of its equivalent ſhell in about the ratio of 8 to 9, the ranges being the ſame.

From the preceding table it will be ſeen, that the 32-pounder carcaſs-rocket will range 3000 yards, with the ſame quantity of combuſtible matter as that contained in the 10-inch ſpherical carcaſs; and 2500 yards, with the ſame quantity as that of the 13-inch ſpherical carcaſs. It will be ſeen alſo, that the 12-pounder caſe-ſhot rocket, which is ſo portable that it may be uſed with the facility of muſquetry, has a range nearly double that of field artillery, carrying as many bullets as the 6-pounder ſpherical caſe: add to which, that from the nature of the conſtruction of the rocket, theſe bullets are projected from it in any part of its track, with an increaſe of velocity, whereby its operation becomes frequently moſt deſtructive at that point where any different ſpecies of ammunition ceaſes to be effective.

Of this deſcription of caſe-ſhot rocket, 100 infantry ſoldiers will carry into action, in any ſituation where muſquetry can act, 300 rounds, and 10 frames for diſcharging them; from each of which, four rounds may be fired in a minute. And of the ſame deſcription of caſe-ſhot for the uſe of cavalry, four horſes will carry 72 rounds, and four frames; from which may be fired 16 rounds in a minute; each horſe not having more than the ordinary burden of a dragoon's horſe.

The rockets uſed by the cavalry are, however, now deſigned to be the 12-pounders, armed with a 6-pounder ſhell or caſe-ſhot; each horſe carrying four of theſe rockets.

Every third man, beſides his portion of ammunition, has, in addition, to carry the chamber from which the rockets are diſcharged. This chamber, however, weighs but

but ſix pounds, and is, therefore, but little additional burden; ſo that the rockets may be diſcharged parallel to the ſurface, and as near to it as poſſible.

The weight of ammunition carried by the troop horſe, with the full complement going into action, is ſuch, that the horſe is fully equal to any ordinary operations. But in long marches, ſmall tumbrils are provided for carrying a part of the ammunition; which leaves the horſe, in travelling, one ſtone four pounds of ammunition to carry, a burden of two ſtone leſs in line of march than that of the heavy dragoon's or artillery-man's horſe: to which we may further add, that as the rocketeer has no heavy duty to perform, no guns to ſponge, nor any to limber up or unlimber, he may, upon an average, be a lighter man by three ſtone than is required for an artillery-man, who has conſtantly the above duties to perform; a difference amounting, within a few pounds, to the whole weight of the ammunition carried by the men even in action.

A ſubdiviſion of rocket cavalry conſiſts of 24 horſes and 20 men, four of the horſes being employed in carrying the ammunition for the ſubdiviſion. Each of theſe ammunition horſes carries 18 rockets and rocket-ſticks, and a proportion of ſmall ſtores, weighing in all, including ſaddle, ſaddle-bags, &c. 19 ſtone; ſo that theſe 20 men will carry into action 152 rounds of 12-pound ſhell or caſe-ſhot, and ſix chambers, or *bouches à feù;* from which, without any extraordinary exertion, 80 rounds of 6-pound ammunition may be diſcharged in three minutes.

It is obvious that the combined celerity and quantity of the diſcharge of ammunition of this deſcription of artillery cannot be equalled, or even approached, taking in view the means and nature of the ammunition employed, by any other ſyſtem. The univerſality, alſo, of the operation, not being encumbered with wheel-carriages, muſt be duly appreciated; as, in fact, it can proceed not only wherever cavalry can act, but even wherever infantry can get into action, as has been already ſtated.

The heavier ſpecies of rockets, as the 32-pounder or 24-pounder, as alſo the 18 and 12-pounders, are ſometimes carried in cars of a peculiar deſcription, which not only convey the ammunition, but are contrived alſo to diſcharge each two rockets in a volley, from a double iron-plate trough, which is of the ſame length as the boxes for the ſticks, and travels between them; but which, being moveable, may, when the car is unlimbered, be ſhifted into its fighting poſition at any angle from the ground ranges, or point blank, up to 45°, without being detached from the carriage. The limbers are always ſuppoſed to be in the rear. The rockets are fired with a port-fire and long ſtick: two men will fight the light car, and four men the heavy one.

At preſent we have confined our remarks to rocket cavalry: it is obvious, however, that they may, with equal facility, be accommodated to the uſe of infantry. In this caſe, one man in ten, or any greater proportion, carries a frame of very ſimple conſtruction, ſtanding on three legs, like a theodolite, when ſpread; and which cloſes ſimilarly, for the convenience of carrying. It is mounted at top with an open cradle, from which the rockets are diſcharged, either for ground ranges, or at any required elevation. The reſt of the men carry each three rounds of ammunition, which for this ſervice is propoſed to be either 12-pounder ſhell-rockets, or the 12-pounder rocket caſe-ſhot; each round equal to the 6-pound caſe, and ranging 2500 yards; ſo that 100 men will bring into action, in any ſituation where muſquetry can be uſed, nearly 300 rounds of this deſcription of artillery, which ranges at 45°, nearly double thoſe of light field ordnance.

When the rockets are employed in bombardments, they are diſcharged from frames of a different conſtruction; the rockets employed in this ſervice being larger than thoſe uſed for the field: they are, however, equally ſimple, and the diſcharges may be made with great rapidity. In many caſes, however, the frames are diſpenſed with, and the rockets are thrown from a battery erected for that purpoſe. The great advantage of this ſyſtem is, that as it diſpenſes with apparatus, where there is time for forming a work of this ſort, of conſiderable length, the quantity of fire that may be thrown in a given time is limited only by the length of the work; one of 200 feet in length being ſufficient for firing 100 rockets in a volley, and ſo on for any greater length; or an inceſſant and heavy fire may, by ſuch a battery, be kept up from one flank to the other, by replacing the rockets as faſt as they are fired in ſucceſſion.

Another uſe is for the defence of a paſs, or for covering the retreat of an army, by placing any number, hundreds or thouſands, of 32 or 24-pounder ſhell-rockets, or 32-pounders armed with 18-pounder ſhot, limited as to quantity only by the importance of the object which is to be obtained; as, by this means, the moſt extenſive deſtruction, even amounting to annihilation, may be carried amongſt the ranks of an advancing enemy, and that with the expoſure of ſcarcely an individual. For this purpoſe, the rockets are laid in batteries of 100 or 500 in a row, according to the extent of ground to be protected; ſo that one man is in fact alone ſufficient to fire the whole in ſucceſſion, beginning with that neareſt to the enemy, as ſoon as he ſhall perceive him near enough to warrant his firing. Where the batteries are very extenſive, each battery may be ſubdivided into ſmaller ones; ſo that the whole, or any part, or particular diviſion, may be fired, according to the number and poſition of the enemy advancing.

A ſimilar application of the rocket artillery is as follows: a low work is thrown up for the defence of a poſt, or of a chain of poſts, conſiſting merely of as much earth and turf as is ſufficient for forming the ſides of ſhallow embraſures, for large rockets, placed from two to three feet apart, or nearer; from which the rockets are ſuppoſed to be diſcharged independently, by a certain number of artillerymen, employed to keep up the fire according to the neceſſity of the caſe. In this manner, ſuch an inceſſant fire may be maintained as would be next to impoſſible for an advancing enemy to paſs through, not only from the quantity, weight, and deſtructive nature of the ammunition, but from the cloſeneſs of its lines, and its contiguity to the ground. The larger kind of theſe rockets are alſo equally applicable to the attack and defence of fortified places. They may alſo be employed by infantry againſt an attack from cavalry: they may be even carried by a ſtorming party into the place, by which the parapet may be ſcoured of the enemy, any ſtreet or paſſage enfiladed; or thrown occaſionally into the town, as well to diſtract the attention of the garriſon, as to ſerve as an index to each of the ſtorming diviſions, as to the ſituation and progreſs of each party. In fact, there is no limit to their application, being as general and extenſive as that of gunpowder itſelf.

In naval warfare the rocket-ſyſtem likewiſe poſſeſſes peculiar advantages; for in conſequence of there being no re-action in theſe projectiles on the point of diſcharge, rockets, carrying the quantity of combuſtible matter, as, by the ordinary ſyſtem, would require to be thrown from the largeſt mortars, and from ſhips of very heavy tonnage, may be

be ufed in the fmalleft boats of the navy; and the 12-pounder, and 18-pounder, have been frequently fired from four-oared gigs; and it fhould alfo be remarked, that rockets of the above weight will ricochet in the water remarkably well at low angles; they may alfo be employed to facilitate the capture of a fhip by boarding, by being thrown, by hand, into the ports, &c. by the boarding party, as foon as they get along-fide, as the confufion and deftruction which will thence inevitably enfue, cannot but facilitate the performance of this dangerous duty. Thefe rockets are alfo peculiarly adapted to add to the dreadful effects of fire-fhips; for, according to the prefent fyftem, it is not improbable that a number of fire-fhips may pafs harmlefsly through an enemy's fleet, by the exertion of their crews in towing them clear, whereas, if they were fupplied each by a fufficient number of rockets, fuch an extenfive and devaftating fire would be fpread in every direction, as to involve every veffel of the enemy in that deftructive element. After the above ftatement, little need be faid in reference to the general utility and importance of the rocket-fyftem. It will be fufficient to obferve, that it confifts, firft, in their being a fpecies of projectiles of the moft deftructive kind, which, containing in themfelves the propelling power, difpenfes with the ufe of heavy ordnance, and confequently offers great facilities to the movement of an army. 2dly. The extenfive nature of the fire that may be kept up, by a few men, againft any important point. 3dly. It may be employed in a variety of cafes in which the ufual artillery, from the nature of the ground, or other impediments, cannot be rendered effective; and laftly, in naval bombardments, in confequence of its trifling re-action, it may be thrown from cutters and fmall boats, and therefore from points which could never be approached by the veffels ufually employed in that fervice.

It may alfo not be amifs to obferve, that in point of expence the rocket likewife poffeffes the advantage. The 32-pounder carcafs-rocket cofts only 1*l.* 1*s.* 11*d.* complete, in every refpect, for fervice; whereas its equivalent, the 10-inch fpherical carcafs, with the charge of powder neceffary to convey it 3000 yards, which power is contained in the rocket, cofts 1*l.* 2*s.* 7*d.*, independent of any charge for the mortar, mortar-bed, platform, difference of tranfport, &c. &c. attaching to the fpherical carcafs, and not to the rocket, which actually requires no apparatus whatever to ufe it in a bombardment, and has, therefore, no charge attaching to it, beyond the firft coft, but that of tranfport; and a veffel of 300 tons will carry 5000 of them at leaft. It is alfo further to be obferved, that the above 1*l.* 1*s.* 11*d.* fuppofes the whole conftruction to be effected by manual labour: by introducing machinery, which we underftand is about to be done, the expence of the 32-pounder carcafs-rocket will be reduced to 18*s.*, or even to 16*s.*, by ufing bamboo inftead of the ufual ftick, which is but about three-fourths of the expence of the 10-inch fpherical carcafs, independent of all the other charges of tranfport, &c. attending the latter.

But the comparifon, as to expence, is ftill more in favour of the rocket, when compared with the larger nature of carcaffes. The 13-inch fpherical carcafs cofts 1*l.* 17*s.* 11½*d.*, to throw it 2500 yards, while its equivalent rocket cofts but 1*l.* 5*s.* 0*d.*, being a faving, on the firft coft, of 12*s.* 11½*d.*, and a fimilar proportion of faving runs through the whole fyftem.

Rocket *Light Ball*, alfo invented by fir William Congreve, is a fpecies of light ball thrown into the air by means of one of his rockets; where, having reached the fummit of the rocket's afcent, it is detached from it by an explofion, and remains fufpended in the air by a fmall parachute, to which it is connected by a chain. Thus, in lieu of the tranfient momentary gleam obtained by the common light ball, a permanent and brilliant light is obtained, and fufpended in the air for five minutes at leaft, fo as to afford time and light fufficient to obferve the motions of an enemy either on fhore or at fea; where it is particularly ufeful in chafing, or for giving diftant and more extenfive night fignals. It is to be obferved, that nothing of this kind can be obtained by the projectile force of either guns or mortars, becaufe the explofion infallibly deftroys any conftruction that could be made to produce the fufpenfion in the air.

Floating Rocket Carcafs.—This is another of the inventor's applications of his rocket, and of the parachute; for the purpofe of conveying combuftible matter to diftances far beyond the range of any known projectile force; at the fame time that it is cheap, fimple, and portable. The floating carcafs, like the light ball, is thrown into the air attached to a rocket, from which being liberated at its greateft altitude, and fufpended to a fmall parachute, it is driven forward by the wind, and will, in a moderate breeze, afford ranges at leaft double thofe of the common carcafs; and may, therefore, for naval purpofes, from a blockading fquadron, be thrown in great quantities, by a fair wind, againft any fleet or arfenal, without the fmalleft rifk, or without approaching within range either of guns or mortars. Thus, in the blockade, a few years back, of the Ruffian fleet at Baltic fort, it might have been continually ufed, at all events, with great profpect of fuccefs, and certainly where no other means of annoyance could be applied. The rocket containing this carcafs is not larger than the 32-pounder carcafs-rocket; and the whole expence, added to the rocket, does not exceed five fhillings; nor are the approaches of the carcafs itfelf neceffarily vifible by night, as it may be fo arranged, as not to inflame till fome time after it has fettled. It is evidently, therefore, capable of becoming a very haraffing weapon, with a great chance of doing as much mifchief as any other carcafs amongft large fleets and flotillas, by lodging unperceived in the rigging, or lighting on extenfive arfenals, in fituations where no other means of annoyance whatever exifts.

Rockets, *Theory of the Motion of.* The theory of the flight of rockets differs very effentially from that of the ufual projectiles. In the latter, the body is launched into fpace with a certain and determinate velocity; and by rejecting the refiftance of the air, a moft beautiful theory is eftablifhed, poffeffing great fimplicity and generality, and which is, therefore, highly intereftting to the fpeculative mathematician, notwithftanding it is of little or no ufe to the practical artillerift. In order to render the theory ufeful in the latter fenfe, a great variety of experiments have been made to afcertain the effect of the air's refiftance, which is not at all confidered in the former cafe, the initial velocity of the ball, the ftrength of fired gunpowder, &c. &c.; yet after all, it muft be acknowledged that very little has been gained, and the practitioner is ftill much more guided by his own experience, than by any light that has been thrown upon the fubject from long and intricate mathematical theories.

The motion of rockets is more complicated than that of common projectiles, partaking, in fact, of all the anomalies that attend the accelerated motion arifing from the rocket compofition, and the uniform motion of the rocket-cafe, after the compofition is expended; and as little or no advan-

tage

tage has yet been gained from the experiments that have been made with cannon, even where the angle of elevation and the initial velocity of the ball were both accurately known, it ſeems totally uſeleſs to look for any aſſiſtance from mathematical inveſtigations, with reſpect to determining the ranges, &c. of military rockets: becauſe if we could determine with the greateſt accuracy the point, poſition, and velocity of the rocket, at the moment when the compoſition was expended, the remaining part of its track would ſtill be ſubject to all the inequalities attending on common projectiles.

If we confine our inveſtigations only to that motion which has place during the time the compoſition is burning, it is not improbable that much light might be thrown on the ſubject from a well arranged courſe of experiments; and that their motion might be reduced to preciſe rules, in ſeveral applications of the rocket-ſyſtem, particularly in the caſes we have mentioned, where they are intended to be uſed as a kind of battering-train.

The great impediment in gunnery to the exact determination of the momentum of any given ball, when projected with a given velocity, and from a given diſtance, is the reſiſtance of the air; becauſe it can only be found from experiment at certain diſtances, and it is difficult from a few partial caſes to infer a general law. That the reſiſtance of the air to the ſame ball is as ſome function of the velocity, there can be no doubt; but we much queſtion whether that determined by Dr. Hutton, *viz.* $r = .00002576\,v^2 - .00388\,v$, although the moſt accurate of any yet found, is as correct as could be wiſhed. Indeed, when we conſider the infinitude of different forms under which the function of a ſingle variable may appear, it ſeems much too confined a ſcale to attempt to reduce it to the ſimple form $a\,v^2 + b\,v$; *viz.* to limit the dimenſion of the function, and attempt every accommodation by means of the co-efficients a and b. With regard to the rocket, the caſe is very different: the very medium, which in the former inſtance is the great impediment to an accurate theory, is here the principal agent in producing the motion; and moreover, we are here, from the nature of the weapon, enabled to aſcertain all the ſucceſſive energies of the propelling power, and the reſiſting force, which, in the other caſe, are only determinable at two or three different diſtances: on which account, it is to be preſumed that more advantage may be here expected to be gained from experiment, than in the caſes above referred to.

Inſtead of a ball impinging on the balliſtic pendulum, at the diſtance of 60 or 100 yards, as practiſed in gunnery experiments, a rocket might be fixed to the ſame pendulum, and its whole energy obſerved with the greateſt accuracy; or, in caſe ſuch experiment ſhould be thought inconcluſive, for want of that partial vacuum which has place behind the rocket when in flight, it might be attached to ſome wheel, or revolving body, and its ſucceſſive energies meaſured by the motion of ſome weight attached to the revolving axis of the machine. This is a moſt important advantage attending experiments on the momentum of rockets, which it is impoſſible to accommodate to other projectiles.

We are not aware, however, that any ſuch experiments have yet been undertaken; and, therefore, all our inveſtigations on the flight, momentum, &c. of rockets muſt neceſſarily be hypothetical. In fact, we have two diſtinct theories of the motion of rockets, the one by Mariotte, and the other by Deſaguliers; the latter attributing their motion to the momentum of combuſtion, and the other to the elaſtic nature of the gas generated by the combuſtion and the reſiſtance of the air. Deſaguliers illuſtrates his hypotheſis as follows: "Conceive the rocket to have no vent at the choke, and to be ſet on fire; the conſequence will be, either that the rocket will burſt in the weakeſt place, or if all its parts be equally ſtrong, and able to ſuſtain the impulſe of the flame, the rocket would burn out immoveable. Now as the force of the flame is equable, ſuppoſe its action downwards, or that upwards ſufficient to lift 40 pounds; as theſe forces are equal, but their directions contrary, they will deſtroy each other's action. Imagine then the rocket opened at the choke; by this means, the action of the flame downwards is taken away, and there remains a force equal to 40 pounds acting upwards, to carry up the rocket and ſtick." Although there is ſome ingenuity and plauſibility in the above reaſoning, we are by no means inclined to admit its accuracy. The action of the flame or gas within the rocket, when cloſed, as ſuppoſed above, we conceive to ariſe wholly from the elaſtic nature of the gas, and the re-action it experiences againſt the ends and ſides of the rocket-caſe; the whole of which ceaſes, as ſoon as a free vent is given to the flame; and, therefore, if a rocket could be fired in a vacuum, as the flame would, in that caſe, experience no reſiſtance, there would be no re-action, and conſequently no motion would enſue. In order to ſubmit the above ſuppoſition to experiment, take a ſtrong piece of whale-bone, and bend it into the form of a bow, by means of a bit of thread or ſilk faſtened to each extremity: then if this bow be ſuſpended by its middle, and two pieces of board, or two books, be ſet up on their edges, each touching one end of the bow, and the ſtring by which it is bent be cut, both books will, from the elaſtic nature of the whale-bone, be thrown down with conſiderable force. Now repeat the experiment, but ſet up only one book, leaving the other end of the bow entirely free; then cut the ſtring as before, and it will be found that, for want of the re-action of the other book, no effect, or very little, is produced on the ſtanding book: it may be a little diſturbed, but it will not fall. This we conſider to be a very ſimilar caſe to the action of the gas on the rocket, when ſhut up and opened, as ſuppoſed by Deſaguliers; and if ſo, it ſhews very diſtinctly the inaccuracy of his hypotheſis.

As a mere matter of mathematical inveſtigation, it certainly reduces the theory to the moſt ſimple form; becauſe here it is not eſſential, ſo far as regards the propelling power, what may be the velocity of the rocket; which power is, therefore, ſuppoſed uniform during the whole time of combuſtion: whereas, in Mariotte's theory, which attributes the motion of the rocket to the reſiſtance or re-action of the air, the propelling force will decreaſe as the velocity increaſes, in conſequence of the partial vacuum left behind the rocket in its flight; ſo that the velocity becomes, as it were, both a *datum* and *quæſitum;* and the correct ſolution of the problem neceſſarily involves the integration of partial differences of the higheſt orders.

We muſt confeſs that we feel no inclination to meet the problem under this formidable ſhape, unleſs we had a good ſet of experiments on which to reſt our firſt premiſes, and from which, therefore, ſome uſeful concluſions might be expected to be deduced. We ſhall, therefore, in what follows, avail ourſelves of a few problems relative to the motion and flight of rockets in non-reſiſting mediums, as given by Mr. Moore of the Royal Military Academy, in his Treatiſe on the Motion and Flight of Rockets; who, we preſume for want of experiments, has adopted the hypotheſis of Deſaguliers, by ſuppoſing the motion of the rocket to ariſe from the momentum of the ignited compoſition. We ſhall alſo ſuppoſe the rocket and ſtick perfectly free the moment after being fired; for, without this, it is obvious that the angle

of elevation of the rocket's direction, and that of its actual discharge, will be essentially different. The first motion of the rocket, like all other motions not produced by a great momentary impulse, is slow; and before the stick is clear of the frame, gravity has been acting upon the rocket, and depressed it below its natural position, while the stick is prevented from being equally depressed, by the top of the frame; so that the angle of projection is in fact considerably less than the angle of the frame, or slope of the rocket's first position. In consequence of this, the rocket has the appearance of falling the moment after projection; and, for this reason also, the angle for producing the greatest range of a rocket exceeds very considerably that which gives the extreme range of a shell projected from a mortar.

Prop. I.

The strength or first force of the gas from the inflamed composition of a rocket being given, as also the weight and quantity of the composition, the time of its burning, and the weight and dimensions of the case and stick; to find the height to which it will ascend, when projected perpendicularly upwards.

It is obvious here, that the principal point of investigation is the height to which the rocket will rise, and the velocity it will have acquired, at the moment when the composition is all expended; as the determination of its farther ascent, with these data, depends upon well-known and established principles. We shall, therefore, only consider the former case. For this purpose, put

w = the weight of the rocket-case and stick.
c = the weight of the composition.
a = the time in which it will be consumed.
n = the medium pressure of the atmosphere.
sn = the assumed force of the inflamed composition.
d = the diameter of the rocket's base, and pd^2 its area.
x = the space described. And
v = velocity acquired in any indeterminate time t.

Then $snpd^2$ is the constant impelling force of the composition.

Now the weight of the quantity of rocket-matter that is consumed in the time t is $\frac{ct}{a}$; therefore, $c - \frac{ct}{a}$ is the weight of the part unconsumed; and $w + c - \frac{ct}{a}$, or $m - \frac{ct}{a}$ (making $m = w + c$), is the weight of the whole mass, at the end of the time t.

Hence $snpd^2 - \left(m - \frac{ct}{a}\right)$ is the *motive* force, and

$$\frac{snpd^2 - \left(m - \frac{ct}{a}\right)}{m - \frac{ct}{a}} = \frac{asnpd^2}{am - ct} - 1, \text{ the } \textit{accelerating} \text{ force.}$$

Therefore, from the known formulæ for variable forces, we have $\dot{v} = 2gf\dot{t}$, which hence becomes

$$v = \frac{2agsnpd^2\dot{t}}{am - ct} - 2g\dot{t};$$

the fluent of which is

$$v = -\frac{2agsnpd^2}{c} \times \text{hyp. log.}\left(\frac{am}{c} - t\right) - 2gt, \text{ or}$$

$$v = -b \,.\, \text{hyp. log.}\left(\frac{am - ct}{c}\right) - 2gt;$$

$$\text{where } b = \frac{2agsnpd^2}{c}.$$

This fluent, corrected for the case in which $t = 0$, gives the correct fluent,

$$v = b \,.\, \text{hyp. log.}\frac{am}{am - ct} - 2gt;$$

which, when $t = a$, becomes

$$v = b \,.\, \text{hyp. log.}\frac{m}{m - c} - 2ga,$$

the velocity required.

Again, to find the space described in the same time, we have $\dot{s} = v\dot{t}$, or $\dot{x} = b\dot{t} \times \text{hyp. log.}\frac{am}{am - ct} - 2gt\dot{t}$. The correct fluent of this is $x = \left(bt - \frac{bam}{c}\right)$ hyp. log. $am + \frac{b}{c}(am - ct) \,.\, \text{hyp. log.}\,(am - ct) + bt - gt^2$; and in the case when $t = a$, it becomes $x = \frac{ab}{c} + \left((m - c)\text{ hyp. log.}\frac{m - c}{m} + c - \frac{acg}{b}\right)$ the space sought.

It will be observed, however, that in both these cases, gravity has been supposed to act directly in opposition to the motion of the rocket; but had we considered the flight uninterrupted by gravity, (as we must suppose, in estimating its flight, when projected at any given angle, where gravity is not considered as in any respect retarding the rocket's motion in the first line of projection,) then the last terms in each of the above expressions will disappear, and we shall have simply

$$v = b \,.\, \text{hyp. log.}\frac{m}{m - c}, \text{ and}$$

$$x = \frac{ab}{c} + \left((m - c)\text{ hyp. log.}\frac{m - c}{m} + c\right).$$

Having thus determined the height of the rocket, and its velocity, when the composition is just consumed, it follows that its whole height may be determined in the usual manner, by the known formula for the ascent and descent of heavy bodies.

Prop. II.

To determine the path of a rocket near the earth's surface, neglecting the resistance of the air.

If, during the time the rocket was on fire, the weight of the whole mass remained constant, the path of the rocket would, from the known laws of the composition and resolution of forces, be a right line; but this not being the case, on account of the continual wasting of the composition, the accelerative force will be different at every instant; and, therefore, since the accelerative force of gravity is constant, the path of the rocket will necessarily be a curvilinear one.

Let A C (*Plate Pyrotechny, fig.* 16.) be the first direction of the rocket, and A D the curve in which it moves; draw C D B perpendicular to the horizontal line A B. Now the path of the rocket will be determined by finding the relation between A B and B D, or between A C and C D, the angle B A C being given.

Now

Now we have found, generally for A C, $x = \left(bt - \frac{abm}{c}\right)$ h. l. $am + \frac{b}{c}(am - ct)$ h. l. $(am - ct) + bt$, while C D $= gt^2$. Hence, by assuming any number for t, the relation between A C and C D will be determined, or the relation between A B and D B; for representing A C by $\varphi(t)$, we have A B = cos. A . $\varphi(t)$, and C B = tan. A . cos. A $\varphi(t)$, and D B = tan. A . cos. A $\varphi(t) - gt^2$.

PROP. III.

To find the velocity of the rocket in the curve at any given instant.

Let A C (*Plate Pyrotechny, fig.* 17.) $= x$, and A D $= z$, being the space described by the rocket in the time t; then calling the velocity at C $= b$. h. l. $\frac{am}{am - ct} = V$; the velocity at D in the curve will be expressed generally by $\frac{\dot{z}V}{\dot{x}}$, following from the laws for the resolution and composition of motion. Now, by the laws of falling bodies, C D $= gt^2$: and putting k and l for the natural sine and cosine (to rad. 1) of the angle C A B of projection, we shall have A B $= lx$, C B $= kx$, and D B (the ordinate of the curve) $= kx - gt^2$. Therefore

$$\dot{z} = [(k\dot{x} - 2gt\dot{t})^2 + l^2\dot{x}^2] \text{ and}$$

$$v = \frac{\dot{z}V}{\dot{x}} = \frac{[l^2\dot{x}^2 + (k\dot{x} - 2gt\dot{t})^2]^{\frac{1}{2}}}{\dot{x}} \times V.$$

Again, by the theory of variable motions, $\dot{x} = v\dot{t}$; consequently

$$v = \frac{[l^2v^2\dot{t}^2 + (kV\dot{t} - 2gt\dot{t})^2]^{\frac{1}{2}}}{V\dot{t}} \times V, \text{ or}$$

$$v = [v^2l^2 + (kV - 2gt)^2]^{\frac{1}{2}}, \text{ or}$$

$$v = [l^2b^2 . \text{h. l.}^2 \frac{am}{am - ct} + (kb . \text{h. l.} \frac{am}{am - ct} - 2gt)^2]^{\frac{1}{2}},$$

the velocity of the rocket at D; which requires no correction.

When the angle of projection is 90°, $l = 0$, and $k = 1$; therefore v, in this case, will be $= b$. hyp. log. $\frac{am}{am - ct} - 2gt$, as determined in the preceding part of this article; and when $g = 0$, or when the action of gravity is not considered, the velocity of the rocket in its rectilinear path is $v = b$. hyp. log. $\frac{am}{am - ct}$, which agrees with what has been already observed.

When the angle of elevation is 30°, $k = \frac{1}{2}$, and $l = \frac{1}{2}\sqrt{3}$, therefore

$$v = \left(\tfrac{3}{4}b^2 . \text{h. l.}^2 \frac{am}{am - ct} + (\tfrac{1}{2}b . \text{h. l.} \frac{am}{am - ct} - 2gt)^2\right)^{\frac{1}{2}}.$$

And when the angle of elevation is 60°, then changing the values of k and l, we have

$$v = \left(\tfrac{1}{4}b^2 . \text{h. l.}^2 \frac{am}{am - ct} + \left(\frac{\sqrt{3}}{2}b . \text{h. l.} \frac{am}{am - ct} - 2gt\right)^2\right)^{\frac{1}{2}}.$$

PROP. IV.

To find the horizontal range of a rocket, the angle of elevation, and the time the composition is on fire, being given.

Let D (*Plate Pyrotechny, fig.* 18.) be the place of the rocket, when all the matter it contained is just exhausted; and C m and C n the measures of the velocities of the rocket in the directions A C, D I, the latter of which is a tangent to the curve at D; then by trigonometry, sin. $< C n m$ ($= n$CB $=$ IDB) $= \frac{Cm}{Cn}$. sin. $< Cmn = \frac{Cm}{Cn}$ cos. of the angle of elevation $= \frac{\text{velocity at C}}{\text{velocity at D}}$ cos. C A B.

Whence, calling the velocities at C and D, V and v, computed on the principles of our second proposition, we have sin. I D B $= \frac{V}{v}$ cos. C A B: and since we have found the angle I D B, it will be easy to determine that part of the range denoted by B L. For the curve from D being a parabola, D H $= \frac{suv^2}{g}$, and V E $= \frac{s^2v^2}{4g}$, (from the laws of projectiles in vacuo,) where s and u represent the sine and cosine of the angle I D H; consequently V F $=$ VE + EF $=$ VE + DB $= \frac{s^2v^2}{4g} + kx - gt^2$, whereof x is given by the first proposition.

Again, by the nature of the parabola VE : VF :: EH^2:

$$FL^2 = \frac{u^2v^2}{g}\left(\frac{s^2v^2}{4g} + kx - gt^2\right), \text{ and therefore}$$

$$FL = \frac{uv}{\sqrt{g}}\left(\frac{s^2v^2}{4g} + kx - gt^2\right)^{\frac{1}{2}}, \text{ whence}$$

$$AL = \frac{uv}{\sqrt{g}}\left(\frac{s^2v^2}{4g} + kx - gt^2\right)^{\frac{1}{2}} + \frac{suv^2}{2g} + lx,$$

the entire range of the rocket, as required.

For a great variety of other propositions relative to this subject, see Moore's Treatise on the "Motion and Flight of Military Rockets."

ROCKET, in *Botany*. See ERUCA.

ROCKET, *Bastard*. See RESEDA.

ROCKET, *Corn, Sea*, or *Square-podded Rocket*, a distinct genus of plants, called by Tournefort *erucago*, and by Linnæus *Bunias*; which see.

ROCKET, *Garden*, a name by which the *hesperis* of botanists is sometimes called. See HESPERIS.

ROCKET, *Water, Marsh*, or *Winter*, the name of a species of *Sisymbrium*; which see.

ROCKET is also used for a habit. See ROCHET.

ROCKFORD, in *Geography*, a post-town of America, in North Carolina; 573 miles from Philadelphia.

ROCKHILL, a township of America, in Bucks county, Pennsylvania, containing 1508 inhabitants.

ROCKINGHAM, a market-town and parish in the hundred of Corby, and county of Northampton, England, is situated close to the river Welland, at the distance of 26 miles N.N.E. from Northampton, and 84 miles N.N.W. from London. In former times it was a place of some note on account of its castle and appendant forest. This castle was built by William the Conqueror, on the summit of a hill overlooking the town, and appears to have been occa-

occaſionally the reſidence of ſeveral of our early monarchs. In the reign of William Rufus, a great council of the nobility, biſhops, and clergy, was aſſembled here to terminate the diſpute between the king and Anſelm, archbiſhop of Canterbury, reſpecting the right of inveſtiture, and obedience to the ſee of Rome. The council ſat on Sunday the 11th of March, 1094, in the chapel belonging to the caſtle. Edward III. frequently honoured this fortreſs with his preſence; as is evident from the numerous diſpatches, and other inſtruments of royal authority, which are dated at Rockingham, in different years of his reign. Edward IV. ſettled the manor here, together with the caſtle and foreſt, on his queen, Elizabeth, for her life-time. Theſe afterwards formed part of the duchy of Cornwall, and continued ſo till the reign of Edward VI., when they were granted to Edward, lord Clynton, from whoſe family they paſſed to the Watſons, one of whom, ſir Lewis Watſon, was created baron Rockingham, of Rockingham caſtle, in the year 1644. At what period the caſtle was diſmantled is uncertain; but it is probable that event happened early in the reign of Henry III., as in the 34th year of that monarch, it is deſcribed as being in a ruinous condition. Leland, who viſited it in the time of Henry VIII., gives the following account of this ſtructure in the firſt volume of his Itinerary. "The caſtelle of Rokingham ſtandith on the toppe of an hill, right ſtately, and hath a mighte diche, and bulwarkes agayne withoute the diche. The utter waulls of it yet ſtond. The kepe is exceding fair and ſtrong; and in the waulles be certein ſtrong towers. The lodgings that were within the area of the caſtelle be diſcovered and faul to ruine. One thing in the waulls of this caſtle is much to be notid; that is, that they be embatelid on booth the ſides. So that if the area of the caſtelle were won by cumming in at either of the 2 greate gates of the caſtelle, yet the keepers of the waulles might defende the caſtelle. I marked that there is a ſtronge tower in the area of the caſtelle, and from it over the dungeon dike is a drawbridge to the dungeon toure." All that now remains of the original building is the arched gateway of the grand entrance, which is flanked by two maſſy baſtion-towers. Rockingham foreſt extended about 20 miles in length, from Oxendon bridge to Stamford bridge, and four or five miles in breadth. Leland ſays there were only "fallow dere in it" "with dyers lodges for kepers" in his time.

The town of Rockingham conſiſts chiefly of one irregular ſtreet. The market-day is Thurſday, weekly; and there is an annual fair on the 25th of September. Theſe privileges were granted by Henry III., at the requeſt of Edmund, earl of Cornwall, the then poſſeſſor of the manor; but they are at preſent only nominal. According to the population returns of 1811, this pariſh contains 49 houſes, and 230 inhabitants. The church is not remarkable, except for ſome handſome monuments, erected to commemorate different individuals of the Watſon family. An altar-tomb, in the chancel, bears the recumbent ſtatue of a man in armour, with that of a female by his ſide; and on the entablatures are the figures of nine children, ſculptured in relief. This tomb was erected in memory of Edward Watſon, grandfather of the firſt lord Rockingham, and his wife, one of the daughters of ſir Edward Montague, lord chief juſtice of the court of king's bench. Another handſome monument commemorates Lewis Thomas, lord Sondes, who died June 21, 1806. Beauties of England, &c. vol. xi. by John Britton, F.S.A. The Hiſtory and Antiquities of Northamptonſhire, compiled from MS. Collections of the late learned Antiquary, John Bridges, eſq. by the Rev. P. Whalley, 2 vols. fol. Oxford, 1791.

Rockingham, one of the ſix counties into which the ſtate of New Hampſhire is divided. It lies on the S.E. part of the ſtate, having the Atlantic on the S.E., the county of Hillſborough on the W., Strafford on the N., and the ſtate of Maſſachuſetts on the S.; about ſixty miles long and thirty broad, and comprehending the only ſea-port, and moſt of the commercial towns, in the ſtate. The number of inhabitants is 50,175. Its chief towns are Portſmouth, Exeter, and Concord.—Alſo, the N.E. townſhip in Windham county, Vermont, on the W. bank of Connecticut river, which ſeparates it from Walpole, in New Hampſhire. It contains 1954 inhabitants.—Alſo, a county of Saliſbury diſtrict, in North Carolina, bounded E. by Caſwell, and W. by Stokes. This county is watered by the river Dan, on the banks of which are large tracks of low fertile land. Many parts of the county furniſh iron ore. The number of inhabitants is 10,316.—Alſo, the chief town of Richmond county, North Carolina, ſituated on an eminence, about 6 miles E. of Great Pedee river, and containing a court-houſe, gaol, and a few dwelling-houſes; 74 miles from Hillſborough.—Alſo, a mountainous county of Virginia, bounded N. by Shenandoah, and S. by Auguſta. It contains 12,753 inhabitants.—Alſo, a poſt-town (uſually called *Rocktown*, though its legal name is *Harriſonburg*) and the ſeat of the courts of the above county, ſituated on a branch of the Shenandoah river, and containing a court-houſe, gaol, and about 30 houſes; 52 miles S.W. of Straſburg, in Pennſylvania.

Rockingham *Bay*, a bay on the N.E. coaſt of New Holland, N.W. of Cape Sandwich. This bay was ſo called by Cook in June 1770, who ſays that it is large, and appears to afford good ſhelter and good anchorage. The N. point of this bay is in S. lat. 17° 59′, and its boundary is formed by an iſland of conſiderable height, which is marked in the chart by the name of "Dunk Iſle," and which lies ſo near the ſhore as not to be eaſily diſtinguiſhed from it. The longitude of the N. point of the bay is 213° 57′ W.

ROCKLAND, a county of New York, in the United States, on the W. ſide of Hudſon river: it was ſeparated from Orange county, and is now the ſouthernmoſt county in the ſtate on that ſide of the river, bounded by New Jerſey S.W., Orange county N.W., and Hudſon's river E. The number of inhabitants is 7758.

ROCKLINGEN, a town of Germany, in the margraviate of Anſpach; 2 miles N.E. of Waſſertrudingen.

ROCKMANSTATT, a town of Bavaria, in the biſhopric of Bamberg; 5 miles S.W. of Weiſmain.

ROCKNABAD, *Abi Rockny*, a famous rivulet of the cleareſt water, about two feet broad, running between two gardens in the vicinity of Shirauz, in Perſia. See Shirauz.

ROCKSALT, a townſhip of Philadelphia county, in Pennſylvania, containing 1508 inhabitants.

Rocksalt, in *Mineralogy*. See Rock-*Salt*.

ROCKY, in *Geography*, a ſmall river of North Carolina, which diſcharges itſelf into Yadkin river.

Rocky *Bay*, a bay on the E. coaſt of Labrador. N. lat. 53° 30′. W. long. 56° 10′.—Alſo, a bay on the coaſt of Terra del Fuego, in the ſtraits of Magellan; 6 miles S.E. of Dolphin bay.—Alſo, a bay on the S.E. coaſt of Nova Scotia, N.E. of Halifax harbour.

Rocky *Iſland*, a large rock in the river Detroit, Upper Canada, on the E. ſide of Groſſe iſle, compoſed of limeſtone, lying in pretty regular ſtrata.

Rocky *Meadow*. See Prairie *de Rocher*.

Rocky *Mount*, lies in Catabau river, in the loweſt part

part of Chester county, South Carolina, and is one of the largest fishing places in the southern states. It is said that a fisherman, with a hand net, sometimes takes 10 or 12,000 shad in a day.

Rocky *Point*, a cape on the S. coast of Jamaica, S. of Carlisle bay.—Also, a cape on the S. shore of lake Erie.—Also, a cape on the coast of New Albion. N. lat. 41° 8′. E. long. 236° 5′.—Also, a cape on the S.E. coast of Alashka, so named by Capt. Cook in 1778. N. lat. 55° 10′. E. long. 198° 50′.

Rocky *River*, a river of the Indiana territory, which runs into the E. side of Mississippi river, about 70 miles below the mouth of Mista river.

Rocky *Land*, in *Agriculture*, that sort which is much covered or beset with rocks or stones, either upon the surface or underneath it. Land of this kind is very common, and of considerable extent in many parts of the country, and, of course, often very injurious to the operations of tillage, as well as of planting, and many others. See Clearing, and Reclaiming, *Land*.

ROCO Grande, in *Geography*, an island on the coast of the Spanish Main, in the West Indies. N. lat. 11° 5′. W. long. 67° 39′.

ROCOU. See Roucou.

ROCQUIGNY, in *Geography*, a town of France, in the department of the Ardennes; 12 miles N. of Rethel.

ROCROY, a town of France, and principal place of a district, in the department of the Ardennes. The place contains 2875, and the canton 8077 inhabitants, on a territory of 237½ kiliometres, in 12 communes. N. lat. 49° 55′. E. long. 4° 35′.

ROD, Virga, *Virge*, a wand, or long slender stick, or staff. See Verge.

Rod is also used for a land-measure of 16½ feet: the same with perch and pole. It is likewise a long measure in Sweden, equal to 8 ells or 16 feet, the Swedish foot being to the English as 40 to 39. See Measure.

There are also local rods of seven yards and an half, or more. Likewise some of smaller lengths in particular places. See Weights and Measures.

Rod, in *Gauging*. See Gauging-*Rod*.

Rod, in the *Manege*, called in French *gaule*, is a switch, held by the horseman in his right hand, partly to represent a sword, and partly to conduct the horse, and second the effects of the hand and heels.

Rod, *Golden*, or *Aaron's*, in *Botany*. See Golden-*Rod*.

Rod, *Shepherd's*. See Teazel.

Rod, *Golden*, *Tree*. See Bosea.

Rod-*Knights*, in *Ancient Customs*. See Redmans.

Rod, *Black*. See Black-*Rod*, and Usher.

Rod, *Ezekiel's*. See Ezekiel.

Rod, *Fishing*. See Fishing.

Rod, *Rhineland*. See Rhineland.

RODA, in *Geography*, a town of Saxony, in Thuringia; 3 miles N. of Sangershausen.—Also, a town of Spain, in the province of Aragon; 20 miles S. of Ainsa.—Also, a town of Spain, in Catalonia, on the Tar; 6 miles N.N.E. of Vicque.—Also, a town of Saxony, in the principality of Altenburg; 28 miles W.S.W. of Altenburg.—Also, a river of Germany, which runs into the Mayne, 2 miles below Hanau.—Also, a town of Egypt, on the Nile; 3 miles E. of Ashmunein.

Roda, *La*, a town of Spain, in New Castile; 19 miles S. of Alarcon.

RODABERG. See Rœttvik.

RODACH, a town of Germany, in the principality of Coburg; 6 miles W.N.W. of Coburg. N. lat. 50° 21′. E. long. 10° 57′. The town lies on a river of the same name, which runs into the Itsek, 6 miles S. of Coburg.

RODAK, a town of Hindoostan, in the country of Delhi; 50 miles E. of Hissar. N. lat. 29°. E. long. 76° 35′.

RODANSEE, a lake of the Ucker Mark of Brandenburg, S. of Templin.

RODAS, a town of South America, in the province of Popayan; 65 miles S. of Santa Fé de Antioquia.

RODATIO, unusual shortness of the eye-lashes.

RODAU, in *Geography*, a town of Saxony, in the Vogtland; 6 miles W. of Plauen.—Also, a river of Germany, which runs into the Wumme, 2 miles W. of Rotenburg, in the county of Verden.

RODAUN, a river of Prussia, which joins the Motlau at Dantzic, near which both together fall into the Vistula.

RODAW, a town of Prussia, in the province of Oberland; 14 miles E.N.E. of Marienwerder.

RODBYE, a sea-port town of Denmark, in the island of Laaland, with a convenient harbour. The principal article of trade is corn; 10 miles S.E. of Naskov. N. lat. 54° 42′. E. long. 11° 24′.

RODDA, a town of Arabia, in the province of Yemen; 4 miles N.W. of Sana.—Also, a town of Egypt, on the Nile, at the mouth of one of the branches of the canal of Joseph; 115 miles S. of Cairo.

RODDEN, a river of England, in the county of Salop, which runs into the Tern, 3 miles W. of Wellington.

Rodden *Cribs*, in *Agriculture*, a sort of large wicker-work basket, for containing the hay or other fodder in farm-yards. It is observed by Mr. Marshall, in his "Rural Economy of the Vale of Gloucester," that these large baskets are made of the top wood of willow pollards, and are an utensil common to this county and to Lincolnshire, though situated on the opposite sides of the island: but they are alike grass-land counties, wherein cattle are fattened on hay. They are about six feet in diameter. The height of the basket-work is two feet and a half; of the stakes, three feet and a half; their heads rising about a foot above the basket. The width between the stakes twelve to fourteen inches. The size, that of large hedge-stakes. The thickness of the rods varies from that of a small hedge-stake, down to a well-sized edder.

And in making these hay-baskets, the stakes are first driven in a ring of the required size firmly into the ground. Some of the larger rods are then wound in at the bottom, in the basket-work manner. Upon these the smaller rods are wound; the middle part of the work requiring the least strength, reserving the largest for the top. In the winding and due binding of those the principal part of the art of withy crib making rests. Some makers warm these thick rods in burning straw: others wind them cold; one man drawing them with a rope, while another beats them at the stake with a wooden beetle, until they acquire a degree of suppleness. They are mostly made by men who go about the country, and who by practice make them very completely; winding in the top rods so firmly and so regularly, that it is difficult to know which has been the last put in.

When in use, the cattle lay their necks between the tops of the stakes. Each being thus kept in its place, the master cattle are in a degree prevented from running round and driving away the underlings. The closeness of these cribs prevents a waste of hay, either by the wind or by the cattle. On the whole they are useful, simple, cheap, and if well made, will last several years.

RODEBACK, in *Geography*, a town of the duchy of Holſtein; 10 miles E.N.E. of Braamſted.

RODELHEIM, a town of Germany, which gives title to a branch of the houſe of Solms; 3 miles W. of Francfort on the Maine.

RODEMACK, or Rodemacheron, a town of France, in the department of the Moſelle; 7 miles N. of Thionville.

RODEN, a town of the duchy of Wurzburg; 8 miles S. of Gemunden.—Alſo, a town of Pruſſia, in the palatinate of Culm; 4 miles N.W. of Bretchen.

RODENBERG, a town of Weſtphalia, in the county of Schauenburg, annexed to Heſſe Caſſel; near which is a medicinal ſpring; 4 miles S. of Hagenburg.

Rodenburg. See Ardenburg.

RODENTHALL, a town of Saxony, in the circle of Erzgeberg; 6 miles E. of Chemnitz.

RODEO *de Tala*, a town of South America, in the province of Tucuman; 100 miles N. of St. Miguel de Tucuman.

RODER, Gros, a river of Saxony, which runs into the Schwartz Elſter, 2 miles below Elſterwerda.

Roder, *Klein*, a river of Saxony, which runs into the Schwartz Elſter, near Hertzberg.

RODERICKE, a town of Switzerland, in the canton of Berne; 3 miles S. of Aarburg.

RODERODE, a town of Germany, in the county of Henneberg; 4 miles E.N.E. of Smalkalden.

RODERSDORF, a town of Saxony; 4 miles S.W. of Plauen.

RODES, or Rhodez, a town of France, and principal place of a diſtrict, in the department of the Aveyron, and capital of that department; before the revolution the ſee of a biſhop, ſuffragan of Bourges; 32 miles N.N.E. of Alby. The place contains 6233, and the canton 12,168 inhabitants, on a territory of 247½ kiliometres, in 33 communes. N. lat. 44° 21′. E. long. 2° 39′.

RODHEIM, a town of Germany, in the county of Hanau Munzenberg; 9 miles N. of Francfort on the Maine.

RODIA, a town of Naples, in Capitanata, on the coaſt of the Adriatic; 14 miles W.N.W. of Vieſte.

RODIALOWITZ, a town of Bohemia, in the circle of Boleſlau; 12 miles S.E. of Jung Buntzel.

RODIGA, a town of Italy, in the duchy of Mantua; 9 miles N.W. of Mantua.

RODING, or Roden, a river of England, in the county of Eſſex, which runs into the Thames, below Barking.

RODITZ, a town of Germany, in the principality of Culmbach; 2 miles W. of Hof.

RODNEY, George Brydges, in *Biography*, a celebrated naval commander, was the ſon of Henry Rodney, eſq. of Walton on Thames, a naval officer, who commanded the yacht in which king George I., attended by the duke of Chandos, uſed to embark in going to or coming from Hanover, and who, in conſequence, aſked leave that his ſon might be called George Brydges. He was the ſecond ſon, and born in 1718. At the deſire, or by the command, of his royal and noble god-fathers, he entered early into the navy, and in 1742 he was lieutenant in the Namur, commanded by admiral Matthews. In November of the ſame year, he was promoted by the admiral to the command of the Plymouth, of ſixty guns; on returning home he was removed into the Sheerneſs, a ſmall frigate; and in 1744 he was appointed to the command of the Ludlow-caſtle, of forty-four guns. Captain Rodney was, during the war, very ſucceſsful, and attained to a conſiderable degree of profeſſional eminence. In 1753 he married Miſs Compton, daughter of Charles Compton, eſq. and ſiſter to Spencer, then earl of Northampton. In 1757 he was engaged, under the command of admirals Hawke and Boſcawen, to attempt a deſcent on the coaſt of France, near Rochefort: and in 1759 he was advanced rear-admiral of the blue. In this ſame year he was ſent to bombard Havre de Grace, where a large force was collected for the purpoſe of attempting an invaſion of this country. He executed the truſt committed to him ſo completely, that the town itſelf was ſeveral times on fire, and the magazines of ſtores and ammunition burnt with fury upwards of ſix hours, notwithſtanding the exertions uſed to extinguiſh it. Thus had admiral Rodney the happineſs of totally fruſtrating the deſign of the French court; and ſo completely did he deſtroy their preparations, that the fort itſelf, as a naval arſenal, was no longer, during the war, in a ſtate to annoy Great Britain. In 1761 admiral Rodney was very inſtrumental in the capture of the iſlands of St. Pierre, Granada, St. Lucia, and St. Vincent, when the whole Caribbees came into the poſſeſſion of the Engliſh. For his ſkill and bravery in the war, he was, after the concluſion of it, raiſed to the dignity of a baronet. In 1768, after an expenſive, and to ſir George Rodney a ruinous, conteſt with Mr. Howe, he was elected member of parliament for Northampton. His affairs were now ſo deranged that he exiled himſelf to France, the government of which had long ſince trembled at his name. The French king wiſhed to take advantage of his pecuniary embarraſſments, and through the duke de Biron made him the moſt unbounded offers, if he would quit the Engliſh for the French ſervice. In reply to this ſhameful propoſal, he ſaid, "my diſtreſſes, ſir, it is true, have driven me from the boſom of my country, but no temptation can eſtrange me from her ſervice. Had this offer been voluntary on your part, I ſhould have deemed it an inſult, but I am glad to learn it proceeds from a ſource that can do no wrong." The duke was ſo ſtruck with the patriotiſm of the admiral, that he became attached to him as a friend.

Before ſir George Rodney's arrival in England, the French had united with the Americans in a war againſt this country. Towards the cloſe of the year 1779, the chief command of the Leeward iſlands was given him; upon which he hoiſted his flag on board the Sandwich. From this time he was very ſucceſsful againſt his majeſty's enemies, but our limits do not allow us to particularize all the advantages that reſulted from his ſervices during the remainder of the war of which we are ſpeaking. In the firſt year he had done enough to obtain a vote of thanks from the houſe of lords; and the freedom of the cities of London and Edinburgh; but his great triumph, and that which muſt not be paſſed over, was on the 12th of April 1782, in an engagement in the Weſt Indies with count de Graſſe. This battle was fought among the iſlands of Guadaloupe, Dominique, the Saintes, and Marigalante. As ſoon as the day broke, admiral Rodney threw out the ſignal for cloſe action, and every veſſel obeyed it moſt ſcrupulouſly. The Britiſh line was formed at the diſtance of one cable's length between each ſhip. As the ſhips came up ſeparately, they ranged cloſe alongſide their opponents, paſſing along the enemy for that purpoſe, giving and receiving, while thus taking their ſtations, a moſt dreadful and tremendous fire. The action continued in this manner till noon, when admiral Rodney reſolved to carry into execution a manœuvre, which he expected would gain him a complete and deciſive victory: for this purpoſe, in his own ſhip, the Formidable, ſupported by the Namur, the Duke, and the Canada, he bore down with all the ſail ſet

on

on the enemy's line, within three ſhips of the centre, and ſucceeded in breaking through it in a moſt maſterly ſtyle. As ſoon as he had accompliſhed this, the other ſhips of his diviſion followed him, and they all wore round, doubled on the enemy, and thus they placed between two fires thoſe veſſels which, by the firſt part of the manœuvre, they had cut off from the reſt of the fleet. As ſoon as admiral Rodney, and the veſſels which followed him, wore, he made the ſignal for the van to tack, by which means they gained the windward of the French, and completed the diſorder and confuſion, in which the *breaking of the line* had thrown them. One conſequence of the breaking of the line was, that opportunities were given for deſperate actions between ſingle ſhips. The whole loſs of the enemy on this occaſion amounted to eight ſhips; one had been ſunk, and another blown up after ſhe had been taken, and ſix ſhips remained in poſſeſſion of the conquerors. It was eſteemed remarkably fortunate, and glorious for the victors, that de Graſſe's ſhip, the Ville de Paris, was the only firſt rate man-of-war that had ever, at that time, been taken and carried into port by any commander of any nation. And this ſhip was on the preſent occaſion fought ſo well, that when it ſtruck there were but three men left alive and unhurt on the upper deck.

The Britiſh nation were ſo ſenſible of the bravery diſplayed both by officers and men in this action, and of the importance of it as the only means of preſerving the remainder of the Weſt India iſlands, that they manifeſted the moſt exceſſive joy when intelligence of the victory arrived. It came extremely ſeaſonable in other points of view. Neither by land, nor by ſea, except where admiral Rodney had been engaged, had we been able to meet the enemy, on any occaſion, with great and deciſive advantage; and, in too many inſtances, we had retired from the conteſt not in the moſt honourable manner. As the means of obtaining more favourable terms of peace, this important victory was hailed with joy and exultation; and as admiral Rodney was looked up to as the cauſe of it, the gratitude of the nation towards him was deeply felt, and expreſſed in warm and glowing language. It was recollected that the fortune of ſir George Rodney had been peculiarly ſingular, as well as highly glorious in the war. Within little more than two years he had given a ſevere blow to each of our three powerful continental enemies, the French, Spaniards and Dutch. He had in that time taken an admiral of each nation; added twelve line of battle ſhips, all taken from the enemy, to the Britiſh navy; and deſtroyed five more. He received the unanimous thanks of both houſes of parliament; and his majeſty added dignity to the peerage of the realm, by calling the victorious admiral to a ſeat in the upper houſe.

It has been obſerved, that the victory of the 12th of April was gained by putting in practice an entirely new ſyſtem of naval tactics, the adoption of which formed an era in our naval hiſtory, and may be regarded as the cauſe of the glorious victories, by which the fame of Britiſh ſeamen has been raiſed to ſuch a pitch of glory; and the maritime power of our enemies in the late war, has not only been crippled, but abſolutely annihilated. It has been ſaid, in order to derogate from the honour of the admiral, that, in the inſtance of the 12th of April, it was the effect of chance, and not effected by the foreſight of ſir George Rodney. This idea has been ſatisfactorily expoſed and refuted. The only queſtion on the ſubject is, and into which we ſhall enter at large under the word Tactics, *Naval*, whether the honour of the plan is due to admiral Rodney or Mr. Clerk, the author of a treatiſe on "Naval Tactics."

With the brilliant victory of the 12th of April ſir George cloſed his profeſſional career; to his title was added a penſion of 2000*l.* to deſcend to his heirs. He died in London the 24th of May, 1792. For his important ſervices to the Weſt Indian iſlands in particular, a temple was built to receive his ſtatue at Spaniſh Town, Jamaica.

A contemporary of the noble admiral ſaid, that as an officer of nautical abilities, none were his ſuperiors, and but few his equals. He poſſeſſed a bold and original genius, which always carried him directly to the object he had in view. As a man, he was benevolent, generous, and friendly. He has been known to be writing his private letters, and dictating to three ſecretaries at the ſame time. "In private life he diſplayed the manners of an accompliſhed gentleman; and he who, when called by his country, could hurl its thunders againſt the foes, and lead its navies to almoſt undeviating victory, was, in peace, the ornament of domeſtic ſociety, and a pattern of that elegant and poliſhed behaviour, which almoſt always diſtinguiſhes the higher orders among us." Stockdale's edition of Campbell's Lives of the Admirals.

Rodney, *Cape*, a cape of New Zealand, being the N.W. point of the entrance into the river Thames. S. lat. 36° 15′. W. long. 184° 53′.

Rodney *Point*, the N. point of Norton Sound, on the N.W. coaſt of North America, ſo called in honour of admiral Rodney. N. lat. 64° 30′. W. long. 166° 3′.

RODOE, a ſmall iſland near the coaſt of Norway; four miles E.N.E. of Chriſtianſand.

RODOLDESCO, a town of Italy, in the department of the Mincio; 10 miles S.E. of Mantua.

RODOLPH I., in *Biography*, emperor of Germany, founder of the imperial houſe of Auſtria, born in 1218, was the eldeſt ſon of Albert IV., count of Hapſburgh and landgrave of Alſace. He was brought up in the court and camp of the emperor Frederic II., and early diſtinguiſhed himſelf by his courage and dexterity in martial exerciſes. On the death of his father, in 1240, he ſucceeded to a territory of moderate extent, which he endeavoured to augment by military enterpriſe. He entertained a band of adventurers of different nations, whom he employed either in defending him from his enemies, or in attempts to aggrandize himſelf at their expence. In 1245 he married a daughter of Burcard, count of Hohenburgh, with whom he obtained ſome acceſſion of eſtates. Some years afterwards he ſerved under Ottocar, king of Bohemia, againſt the Pagan Pruſſians. In 1273, as he was encamped before the walls of Baſil, with whoſe biſhop he was at enmity, he received the very unexpected intelligence, that he was unanimouſly elected king of the Romans.

Rodolph, then in his 55th year, willingly accepted the offered elevation, though ſenſible of the arduous taſk he was undertaking againſt the oppoſition of two unſucceſsful candidates. He was crowned at Aix-la-Chapelle, and immediately ſtrengthened himſelf by marrying two of his daughters to the count palatine of Bavaria, and duke of Saxony. He alſo took meaſures for ingratiating himſelf with the pope, Gregory X., who gave his ſanction to the election. Alphonſo, one of the unſucceſsful candidates, was induced by the pope to renounce his pretenſions; but Ottocar, the other, king of Bohemia, refuſed to acknowledge the new emperor, and manifeſted the bitterest animoſity againſt him. The king of Bohemia was, at this time, one of the moſt powerful princes in Europe, and was diſtinguiſhed by his abilities and military ſkill. Beſides Bohemia and Bavaria, he poſſeſſed territories in the north of Germany and Hungary; and had lately acquired Auſtria, with Carinthia and

Carniola. Both parties having prepared for the conteſt, war broke out between the emperor and the king in 1275, and Rodolph commenced his operations with all the vigour of his character. He firſt marched againſt Henry, duke of Lower Bavaria, whom Ottocar had ſecured in his intereſt, and ſoon brought him to change his party. He then penetrated into Auſtria, and appeared under the walls of Vienna, before Ottocar thought of his danger. This prince, finding himſelf unable to ſave the Auſtrian capital, bent his haughty ſpirit to ſue for peace, which was granted upon the condition of his renouncing his claims upon the Auſtrian provinces, and conſenting to acknowledge the emperor, and do homage for Bohemia and his other fiefs. The Auſtrian provinces, as fiefs, devolved to the empire, and were taken poſſeſſion of by the emperor.

The mind of Ottocar was ſo much irritated by the loſs and diſgrace he had undergone, that he could not bring himſelf to a faithful execution of the treaty, and the war was renewed in 1277. A fierce battle enſued, in which Rodolph was beaten to the ground by a Thuringian knight, and brought into great danger; but, on the other hand, Ottocar was killed, and his army entirely defeated. Rodolph was prevented from taking poſſeſſion of Bohemia by Otho, margrave of Brandenburgh, and he entered into an accommodation, by which Wenceſlaus was acknowledged king of Bohemia, while he himſelf was to hold Moravia for five years, and was to retain the Auſtrian provinces. The ſecuring of theſe to his family was thenceforth a great object of his policy, in which he encountered many difficulties, but at length he ſucceeded in ſettling them upon his two ſons, Albert and Rodolph.

In the midſt of theſe tranſactions, the emperor, thinking it would be for his honour to revive the imperial authority in Italy, after the death of Gregory, during the ſubſequent ſhort-lived pontificate, ſent commiſſaries into that country to exact homage from ſeveral of the towns; but, on the acceſſion of Nicholas III. he found it expedient to confirm to the papal ſee its poſſeſſions in Romagna. He afterwards attempted to reſtore the authority of the empire in Tuſcany; but in this he alſo failed, and was obliged to content himſelf with drawing large ſums from Lucca and other cities for the confirmation of their privileges. No foreign foe now remaining, Rodolph turned his attention to the reſtoration of peace and order in Germany; and for this purpoſe it was neceſſary to enforce the laws againſt building private fortreſſes, which were the retreats of banditti, or the refuge of turbulent nobles, who defied all law and authority. Of theſe ſtrong-holds he razed ſeventy in one year, condemning to death many of their owners for their violations of the public peace. He made many progreſſes through the imperial cities, adminiſtering juſtice and making ſalutary regulations, ſo that he obtained the title of "a living law," and deſerved to be regarded as a ſecond founder of the German empire. In 1283 he engaged in a war againſt Philip, count of Savoy, who had appropriated ſeveral imperial fiefs in Helvetia; but in an action near Morat he was overpowered by numbers, unhorſed, and obliged, for ſaving himſelf, to ſpring into the lake, where he ſupported himſelf by the branch of a tree till reſcued by his followers. He was, however, victorious, and brought the count to terms of ſubmiſſion. He was likewiſe ſucceſsful againſt the count of Burgundy, who had tranſferred his homage from the empire to France; but he failed in an attempt to gain poſſeſſion of Bern, which had declared itſelf an independent republic. The troubles of Bohemia, in which the oppreſſions of the regent Otho had excited revolts, while the minor king, Wenceſlaus, was detained as a priſoner, called Rodolph into that country. He delivered Wenceſlaus, whom he married to one of his daughters, and left him at the head of the government, in a ſtate of tranquillity. The final object of this emperor was to ſecure the imperial crown to his only ſurviving ſon, Albert; but the electors were not to be perſuaded into this meaſure, and Rodolph was ſeverely mortified with the diſappointment. His ſtrength had already begun to fail, and as he was upon his way to Spire he was obliged to ſtop at Germerſheim, where he died in July 1291, in the ſeventy-third year of his age, and the nineteenth of his reign.

There is ſcarcely an excellency of body or mind which the biographers of the houſe of Auſtria have not attributed to its founder; and it appears from the hiſtory of his actions, that few princes have ſurpaſſed him in energy of character, and civil and military talents. In the beginning of his career, he ſeems to have been little ſcrupulous in the means of aggrandizement; but, as an emperor, he was in general moderate and equitable. In his ſixty-fourth year he married, for his ſecond wife, a princeſs of Burgundy, only fourteen years of age, but no iſſue proceeded from this ill-ſorted union. By his firſt marriage he had a numerous offſpring, of whom ſix daughters were all united to powerful families. Mod. Univ. Hiſt.

Rodolph II., emperor of Germany, ſon of Maximilian II., was born in 1552. His father procured him the crown of Hungary in 1572, and that of Bohemia in 1575, together with the title of king of the Romans. On the death of Maximilian, in 1576, he ſucceeded to the imperial throne, being then regarded as a highly accompliſhed prince, converſant with various branches of knowledge. Unfortunately, his taſte and acquirements were ſo far from qualifying him for the ſtation to which he was elevated, that they diverted his attention from the principal duties of a ſovereign. He was attached to mechanical inventions, and ſpent whole days in the ſhops of clock-makers, turners, and other artiſts. Chemiſtry was alſo one of his favourite ſtudies, with its uſual attendant in that age, alchemy. Having been educated among the Jeſuits, his zeal for the Catholic religion rendered him unfriendly to thoſe tolerating principles upon which his father had acted. He had ſucceeded to the ſole poſſeſſion of the territories of the houſe of Auſtria, and finding that the Proteſtant religion had ſpread in them to a degree that threatened to ſubvert the ſuperiority of the Catholic, his firſt care was to reſtore the preponderance of the latter. His meaſures for this purpoſe occaſioned revolts, and a total alienation of the minds of his Proteſtant ſubjects. In the other parts of the empire, Rodolph took part againſt the Proteſtants, and his interference was a principal cauſe of the depoſition and expulſion of the archbiſhop and elector of Cologne, who had embraced the Proteſtant religion, and married. Troubles ſoon aroſe in his Hungarian dominions, where ſultan Amurath III. made various incurſions, in which he over-ran part of Hungary and Croatia. Theſe were, however, chaſtiſed by ſeveral defeats given to the Turks by the imperial generals. But Mahomet III., the ſucceſſor of Amurath, took the important town of Agria, in Upper Hungary, and war was maintained, with various fortune, in that kingdom, till a peace was concluded with ſultan Achmet, in 1606. Rodolph took little perſonal ſhare in theſe events, being chiefly occupied with his ſtudies; and his Hungarian ſubjects had contracted ſuch a contempt for his character, that they invited his brother, the archduke Matthias, to undertake the government, and in 1607 elected him for their king. Matthias prepared to take poſſeſſion of his kingdom, and, marching with an army through Auſtria, projected to make himſelf maſter of that duchy. The timid and pacific Rodolph was perſuaded to enter into a treaty with

with his brother, by which he ceded to him Hungary and Auſtria, and Matthias was ſolemnly inaugurated as ſovereign of thoſe countries.

Soon after, diſturbances aroſe in the empire on account of the diſputed ſucceſſion to the duchies of Juliers and Cleves, with which were aſſociated the cauſes of diſſention between the Catholics and Proteſtants of Germany. Confederations were formed, and both parties prepared for war. The emperor convoked diets, and diligently exerted himſelf, in order to prevent extremities. He, however, gave his chief confidence to his couſin the archduke Leopold, who, at length, marched into Bohemia, to awe the Proteſtants that had been rendered diſcontented, by attempts to introduce the infernal inquiſition into the country, and by violations of their privileges. In this emergency they applied for aſſiſtance to Matthias, who entered Bohemia, and obliged Leopold to diſband his troops. Not content with this ſucceſs, he ſo wrought upon his brother, that Rodolph reſigned to him his remaining kingdom of Bohemia, of which Matthias received the crown in 1611. Rodolph was, at that time, in a declining ſtate of health; he died in January 1612, in the ſixtieth year of his age, and thirty-ſixth of his reign. It is ſaid, that the predictions of the celebrated but ſuperſtitious aſtronomer Tycho Brahe, had rendered him diſtruſtful of all his relations, ſo that he finally ſhut himſelf up in his palace, which he never quitted either for exerciſe or amuſement. Among his various ſtudies was that of aſtronomy, his attachment to which induced him to invite Tycho Brahe to Prague, where he was patronized till his death; and the ſame patronage was afterwards given to the more eminent Kepler. The Rodolphine tables, commenced by the former, and completed by the latter, have perpetuated the name of this emperor as a promoter of ſcience. Mod. Univ. Hiſt. Gen. Biog.

RODOLPHE, ——, one of the moſt celebrated profeſſors on the French horn that ever exiſted. Though he uſually played the ſecond horn, he mounted as high as the firſt ever went. His execution was truly wonderful! and he had found the means of producing ſounds with his inſtrument that were never heard before.

This able muſician was equally powerful in compoſition as in performance. In 1773 he ſet "Jemona," a ſerious opera, for the marriage of the compt d'Artois. For the Italian theatre he had previouſly ſet, in 1765, the comic opera called "Marriage by Capitulation;" and, in 1767, "The blind Man of Palmyra."

RODOME, in *Geography*, a town of France, in the department of the Aude; 9 miles S.W. of Quillan.

RODON, a town of Sweden, in Jamptland, on lake Storſio; 7 miles N.W. of Oſterſund. — Alſo, a ſmall iſland on the weſt ſide of the gulf of Bothnia. N. lat. 62° 23′. E. long. 17° 20′.

RODONDA, a ſmall iſland at the entrance of the harbour of Rio Janeiro.

RODONI, Cape, a cape on the coaſt of Albania, in the Adriatic. N. lat. 41° 55′. E. long. 19° 16′.

RODOPE, a mountain of Romania; 50 miles S. of Filippopoli.

RODOSTO, a town of European Turkey, in the province of Romania, on the north coaſt of the ſea of Marmora, where the Armenians have one church, and the Greeks five. The environs are fertile in corn and wine; 53 miles N.E. of Gallipoli.

RODRIGO. See Civdad *Rodrigo*.

RODRIGUEZ. See Diego *Ruis*.

Rodriguez *Key*, a ſmall iſland on the coaſt of Florida. N. lat. 25°.

RODRIGUEZIA, in *Botany*, a genus ſo named in the *Flora Peruviana*, p. 105, after Emanuel Rodriguez, a Spaniſh botaniſt, apothecary to the king of Spain. *De Theis*.

RODSEG, in *Geography*, a town of Iſtria; 16 miles N.N.E. of Pedena.

ROE, *Sir* Thomas, in *Biography*, a diſtinguiſhed traveller and negociator, was born, in 1580, at Low Layton, in Eſſex. He was ſent at an early age to Magdalen college, in Oxford: after he had left that ſeminary of learning, he paſſed ſome time at one of the inns of court. He was made an eſquire of the body to queen Elizabeth, towards the cloſe of her reign; and in 1604 he was knighted by king James. At the inſtigation of Henry, prince of Wales, he undertook an exploratory voyage to Guiana. Having fitted out a ſhip and pinnace at his own charge, and that of his friends, he ſailed in 1609 for the river Amazons, up which he proceeded to the diſtance of 300 miles, landing in various places to examine the country. Having ſpent thirteen months in a laborious ſurvey of this part of the American continent, in ſearch of gold, no doubt, he returned to England in 1611. In 1614 he was ſent, at the deſire of the Eaſt India Company, as ambaſſador to the Mogul emperor, for the purpoſe of concluding a treaty of peace and commerce. He arrived at Surat in the autumn of that year, and reſided at the Mogul court till the beginning of 1618. His conduct in this ſtation did honour to himſelf and his country; and he made a great number of curious obſervations on the court and people, of which we have ſpecimens in Purchas's Pilgrims. On his departure from this country, he viſited the court of Schah Abbas in Perſia, with whom he made a treaty, by which the Eaſt India Company obliged itſelf to aſſiſt him with a fleet, for the purpoſe of expelling the Portugueſe from Ormus, on condition of being allowed a free trade with Perſia. After his return, ſir Thomas Roe was elected in 1620 a repreſentative in parliament for Cirenceſter; and in the following year he was nominated ambaſſador to the Ottoman Porte, which poſt he occupied under the ſultans Oſman, Muſtapha, and Amurath IV. He performed, in this capacity, ſome moſt important ſervices for his country; and he was, at the ſame time, very ſerviceable to the Greek church, by protecting it from the oppreſſions of the Turkiſh miniſters, and from the intrigues of the Jeſuits, and other perſons attached to the Papal ſee. In return for his various ſervices, he was aſſiſted in his collection of manuſcripts in the Greek and Oriental languages, which he preſented to the Bodleian library; and to his care was entruſted the celebrated Alexandrian manuſcript of the Bible, preſented to Charles I. by Cyril, patriarch of Conſtantinople. During his embaſſy, ſir Thomas drew up "A true Relation of what lately happened in Conſtantinople, concerning the Death of Sultan Oſman, and the ſetting up of Muſtapha, his Uncle," &c. This was printed in London in 1622. He alſo kept minutes of his negociations at the Porte, which remained in manuſcript till 1740, when they were publiſhed by the ſociety for promoting learning, under the title of "The Negociations of ſir Thomas Roe, in his Embaſſy to the Ottoman Porte, from the Year 1621 to 1628 incluſive."

After his return from Conſtantinople, he was ſent, in 1629, to mediate a peace between Poland and Sweden. He was afterwards employed in negociating a treaty with the king of Denmark at Copenhagen; and he went a ſecond time to that court, and alſo to thoſe of ſeveral German princes; and was preſent at the congreſs of Hamburgh, and its removals to Ratiſbon and Vienna. In 1640 he was a repreſentative in parliament for the univerſity of Oxford, and

and made ſeveral ſpeeches upon very important occaſions. While a member of parliament, he was ſent, in 1641, to the diet at Ratiſbon, to negociate for the reſtoration of the late king of Bohemia's ſon to the Palatinate; and after his return, the king created him a privy-counſellor, and chancellor of the order of the Garter. The view of the approaching national diſturbances was thought to have ſhortened his life, which was terminated in 1644. He left the character of a very able and upright miniſter, a true patriot, and accompliſhed gentleman. Beſides the works already referred to, he left in manuſcript "A compendious Relation of the Proceedings and Acts of the imperial Dyet, held at Ratiſbon in 1640 and 1641;" and "A Journal of ſeveral Proceedings of the Knights of the Garter." Biog. Brit.

Roe, in *Geography*, a river of Ireland, in the county of Londonderry, which riſing in the Cairntogher mountains, flows northward through Newtown Limavaddy into lough Foyle.—Alſo, the name of a ſmall iſland in Clew bay, county of Mayo, Ireland.

Roe, *La*, a town of France, in the department of the Mayenne; 7 miles N.W. of Craon.

Roe of a fiſh is that part which contains the ſpawn or ſeed thereof.

That of the male fiſh is uſually diſtinguiſhed by the name of *ſoft* roe, or milt; that of the female by *hard* roe, or ſpawn.

The ſoft roe, when ſqueezed, yields a liquor reſembling milk; whence its name *milt*. The French call it expreſsly *milk*, *lait*.

M. Petit found 342,144 ovula, or little eggs, in the hard roe of a carp eighteen inches long.

Leuwenhoeck, tom. ii. p. 216, only found 211,629 eggs in a carp, but four times the number in a cod; and, p. 188, he ſays, that a common cod contains 9,344,000 eggs; and that the eggs of a fiſh of one year old are as big as thoſe of a fiſh of twenty-five years old. Mem. Acad. R. Scien. an. 1733, p. 290. See Milt and *Fecundity of* Fish.

Roe is alſo one of the beaſts of chaſe.

Roe-*Buck*, the Engliſh name of the *cervus* with ramoſe, cylindric, and erect horns. It is the ſmalleſt of the deer-kind, and has been called *capreolus* and *caprea*, though without the leaſt reſemblance of the goat-kind. See Cervus *Capreolus* and Deer.

The roe-buck is called a *hind* the firſt year; *gyrle*, the ſecond; *henuſe*, the third; *roe-buck of the firſt head*, the fourth; and a *fair roe-buck*, the fifth.

The roe-buck is a deer well known in Germany; and ſeems to have alſo been formerly found in England, though now the race be extinct.

Roe-*Buck Hunting*. See Hunting.

Roe-*Buck Iſland*, in *Geography*, a ſmall iſland in the gulf of Mexico, near the coaſt of Weſt Florida. N. lat. 30° 17′. W. long. 88° 44′.—Alſo, a ſmall iſland at the eaſt extremity of lake Ontario.

Roe-*Stone*, *Oolite*, in *Mineralogy*, a variety of lime-ſtone, ſo called becauſe it is compoſed of ſmall round globules, ſuppoſed to reſemble the roes of fiſhes, imbedded in a calcareous cement. Theſe globules are compoſed of concentric lamellæ, and are evidently the reſult of cryſtallization. They vary in ſize from a grain of muſtard-ſeed to that of a pea: when they are as large as the latter, it is called pea-ſtone. Roe-ſtone is one of the ſecondary lime-ſtones, which may be conſidered as belonging to the chalk-formation. It lies under chalk in various parts of England, being ſeparated from it by beds of ſand and clay. It is found alſo in many parts of Europe, but, according to Humboldt, is not met with in South America. Some of the ſtrata of this ſtone are extenſively uſed for purpoſes of architecture: the moſt diſtinguiſhed are the Ketten ſtone in Northamptonſhire, the Bath fire-ſtone in Somerſetſhire, and Portland ſtone in the iſland of Portland. Portland ſtone is of a yellowiſh-white colour: the more compact varieties, when cloſely inſpected, ſhew a tendency to cryſtalline arrangement; it is compoſed of carbonate of lime, with a ſmall admixture of ſilex and alumine.

The iſland of Portland is properly an iſthmus, ſituated in Weymouth bay, in the Britiſh Channel. The ſtone is got in every part of the iſland, but the quarries at Kingſton are the moſt productive. According to Mr. Smeaton, the firſt ſtratum in the quarry is a dark coloured reddiſh earth, about one foot thick. To this ſucceed ſix feet of ſtone of an inferior quality, called cap. Immediately under this lies the roe-ſtone or free-ſtone, which is ten or twelve feet deep; and beneath this bed there is flint or clay. In ſome parts, irregular veins of quartz run through the roe-ſtone. The ſtratum of ſtone that is wrought for ſale lies nearly parallel with the upper ſurface of the iſland; and, in general, the cover of earth and rubbiſh upon it is thin. Several beds of ſtone lie continuous one above another, varying in thickneſs from two to four feet, and ſometimes more.

Portland ſtone was brought into repute in the reign of James I., and was employed in the conſtruction of the banqueting-houſe at Whitehall. After the great fire in London, this ſtone was generally uſed by ſir Chriſtopher Wren in the conſtruction of the new public edifices, as St. Paul's cathedral, the monument, and almoſt every building of note in the metropolis. See Stone *for Architecture*.

The different beds of roe-ſtone abound in marine organic remains, of which the pear encrinite is perhaps the moſt remarkable. In the lower beds are found the hippocephaloides, or horſe-head muſcles, which, according to Mr. Townſon, are not caſts, but petrifactions of the fiſh itſelf, and do not repreſent the interior ſurface of the ſhells, from which they are perfectly diſtinct. This ſtratum alſo contains the anomia Spinoſa of Linnæus. The ſpines are extremely delicate, and in ſome ſpecimens are more than half an inch in length; from which circumſtance we may infer, that the calcareous earth of this ſtratum was depoſited in an extremely comminuted ſtate, and in a tranquil element, otherwiſe it is almoſt impoſſible to conceive that theſe ſpines could have remained unbroken.

ROEDBACH, in *Geography*, a river of the duchy of Berg, which runs into the Rhine, two miles below Zons.

ROELL, Hermann-Alexander, in *Biography*, a celebrated Proteſtant divine, and theological profeſſor, was born in 1653 at Doëlberg, in Weſtphalia. He received an excellent education in the languages and elementary branches of ſcience. In 1670 he went to the univerſity of Utrecht, where he received lectures from the celebrated Francis Burmann on the ſcriptures; and on his return to Germany, he ſtudied for ſome time at Marpurg, and after that at Heidelberg. From thence he went to Baſil and Zurich; and in 1676 he once more viſited the United Provinces, and ſpent two years at the univerſities of Utrecht and Leyden. No ſooner had he returned to his native country than he received an invitation to become paſtor of the Proteſtant church at Cologne, which he declined, owing to ill health; and he undertook the chaplainſhip to Elizabeth, abbeſs of Hervorden, and daughter of Frederic, king of Bohemia; which poſt he retained till the death of the princeſs, in 1680. After this he was appointed preacher to Albertine, princeſs of Orange, and widow of William of Naſſau; in whoſe houſehold, and at Deventer, he exerciſed the

the miniſtry till the year 1686, when he was elected profeſſor of divinity at the univerſity of Franeker. In 1704 he accepted an invitation to fill the divinity chair at the univerſity of Utrecht, a poſt which he retained with great reputation till his death in 1718, when he was in the 66th year of his age. He was author of many works chiefly on theological topics, among which are "A Commentary upon the Epiſtle to the Epheſians;" "An Analyſis of the Epiſtle to the Coloſſians;" "An Analyſis and Abridgment of the Prophetical Books of the Old Teſtament;" "Two philoſophical Diſſertations on Natural Religion, and one on Innate Ideas."

ROELLA, in *Botany*, ſo named by Linnæus, in Hort. Cliff. 492, to commemorate William Roëll, profeſſor of anatomy at Amſterdam, who enriched Cliffort's garden with many rare plants, the ſeeds of which he had procured from Africa and Japan. Among thoſe from the Cape of Good Hope, was the firſt ſpecies of the preſent genus.—Linn. Gen. 88. Schreb. 118. Willd. Sp. Pl. v. 1. 918. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 353. Juſſ. 165. Lamarck Illuſtr. t. 123. Gærtn. t. 31.—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Campanaceæ*, Linn. Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, turbinate, permanent, in five large, deep, lanceolate, acute, toothed ſegments. *Cor.* of one petal, funnel-ſhaped, deciduous; tube rather ſhorter than the calyx; limb ſomewhat ſpreading, longer than the calyx, deeply five-cleft. Nectary of five converging ſcales, in the bottom of the corolla, permanent. *Stam.* Filaments five, awl-ſhaped, ſtanding on the nectary; anthers awl-ſhaped, converging, equal in length to the filaments, and on a level with the calyx. *Piſt.* Germen inferior, oblong; ſtyle thread-ſhaped, the length of the ſtamens; ſtigmas two, oblong, depreſſed, ſpreading. *Peric.* Capſule cylindrical, ſhorter than the calyx, crowned with its enlarged ſpreading ſegments, two-celled, burſting at the ſummit. *Seeds* numerous, angular.

Eſſ. Ch. Corolla funnel-ſhaped, cloſed at the bottom by valves bearing the ſtamens. Stigma in two ſegments. Capſule inferior, cylindrical, opening at the ſummit.

Obſ. Linnæus attributes two cells to the capſule; Gærtner only one. Probably one may be occaſionally abortive. The eſſential diſtinction ſeems to conſiſt in the capſule having a vertical opening, inſtead of diſcharging the ſeeds by torn lateral orifices, as in *Campanula*, to which genus this is certainly, in other reſpects, very nearly allied. All the known ſpecies are natives of the Cape of Good Hope, being green-houſe plants in England, and having blue flowers.

1. R. *ciliata*. Ciliated Roella. Linn. Sp. Pl. 241. Hort. Cliff. t. 35. Willd. n. 1. Ait. n. 1. Curt. Mag. t. 378. (Campanula africana fruteſcens aculeoſa, flore violaceo; Comm. Hort. v. 2. 77. t. 39.)—Leaves lanceolate, fringed, with a prominent point. Flowers terminal, ſolitary.—Found in various parts of ſouthern Africa. The Dutch have long cultivated it. Mr. Maſſon ſent ſeeds to Kew in 1774. The plant is not very common, though much to be admired for the beauty of its flowers, which are produced in ſucceſſion, throughout moſt part of the ſummer; but it is not eaſily increaſed, nor long preſerved, being impatient of our damp winters. The *ſtem* is ſhrubby, of humble growth, branching in a determinate manner; the *branches* ſlender, round, leafy. *Leaves* copious, alternate, ſmall, of a pale dull green, linear-lanceolate, fringed, each ending in a prominent, awl-ſhaped, rigid point. *Flowers* ſolitary at the ends of the branches, an inch and half, or more, in diameter, their colours well deſcribed by Curtis as follows. "The bottom of the *flower* is white, of a yellowiſh caſt; next ſucceeds a circle of deep blue, inclining to black, with a ſurface highly glazed; the next circle is greyiſh-blue, reſembling ſatin; the next nearly white, and the outermoſt, (or limb,) pale purple." Each *leaf* of the plant is accompanied by an axillary tuft of ſmaller, obtuſe, entire, naked ones.

2. R. *ſquarroſa*. Trailing Roella. Linn. Suppl. 143. Thunb. Prodr. 38. Willd. n. 2. Ait. n. 2.—Leaves ovate, recurved, toothed, fringed. Flowers terminal, aggregate. Stem herbaceous, diffuſe.—Gathered by Thunberg at the Cape, and ſent from thence to Kew garden, by Maſſon, in 1787. It bloſſoms in June. The *branches* are more ſpreading and decumbent, as well as of a leſs ſhrubby nature, than the former. The *ſquarroſa* of Bergius, from whom the younger Linnæus adopted the name, is deſcribed as a *ſhrub*, with ſolitary *flowers*. Ours, beſides the terminal tuft, has generally ſeveral ſcattered lateral *flowers*, on ſhort leafy ſtalks, or branches, which may explain this apparent diſagreement.

3. R. *decurrens*. Decurrent Roella. L'Herit. Sert. 4. t. 6. Willd. n. 3. Ait. n. 3.—Leaves lanceolate, entire, fringed, decurrent. Flowers ſolitary, terminal.—Sent from the Cape, by Mr. Maſſon, in 1787. This ſpecies is annual, flowering in September. The *root* is ſmall and tapering. *Stem* much branched from the very bottom, ſpreading and partly decumbent, hairy. *Leaves* ovato-lanceolate, fringed, for the moſt part entire; ſtrongly decurrent, ſo as to render the ſtem winged. *Flowers* terminal, ſeſſile, pale blue, ſolitary, except occaſionally on the moſt luxuriant branches.

4. R. *muſcoſa*. Moſſy Roella. Linn. Suppl. 143. Willd. n. 4. Thunb. Prodr. 38.—Leaves ovate, toothed, reflexed, ſmooth. Flowers terminal, ſolitary. Stem herbaceous, diffuſe.—Gathered at the Cape by Thunberg. A very ſmall annual ſpecies.

5. R. *ſpicata*. Spiked Roella. Linn. Suppl. 143. Willd. n. 5. Thunb. Prodr. 38.—Leaves lanceolate, fringed, nearly entire. Flowers terminal, ſomewhat ſpiked. Stem ſhrubby, erect.—Found by Thunberg at the Cape. We have ſeen no ſpecimen of this or the laſt.

Linnæus, in Sp. Pl. 241, has ? *R. reticulata*, adopted from Van Royen and Petiver, which appears to be no other than his own *Gorteria ciliaris*; *Cullumia ciliaris* of Brown, in Ait. Hort. Kew. v. 5. 137.

ROEMER, Olaus, in *Biography*, a Daniſh aſtronomer and mathematician, who flouriſhed in the 17th and 18th centuries, was born at Arhuſſen, in Jutland, in the year 1644. From an elementary ſchool at his native city he was ſent to the univerſity of Copenhagen, in 1662, where he diſtinguiſhed himſelf by the progreſs which he made in his academical ſtudies, and particularly in the mathematical ſciences, which were the favourite ſubjects of his purſuit. By diligent ſtudy he had, in 1671, become ſo expert an aſtronomer, that, being introduced to M. Picard of the Academy of Sciences at Paris, who was ſent by Louis XIV. to make aſtronomical obſervations in the northern regions, he was ſelected to accompany him when he returned to France. Here he preſented him to the king, who appointed him mathematical preceptor to the dauphin, and ſettled a penſion upon him. Roemer was united with Picard and Caſſini in making aſtronomical obſervations, and in 1672 he was admitted a member of the Royal Academy of Sciences at Paris. He reſided ten years at Paris, and acquired a high reputation by his many diſcoveries, among which was the very important one by which he aſcertained the velocity with which light moves, by means of the eclipſes of Jupiter's ſatellites. (See Light.) This diſcovery was afterwards confirmed by Dr. Bradley. In 1681 Roemer was recalled to his own country by Chriſtian V. king of Denmark, who

who appointed him profeſſor of aſtronomy, at the univerſity of Copenhagen, and gave him the flattering title of *his own mathematician*, with a conſiderable ſalary. He was alſo employed in reforming the coin; improving the public buildings; regulating the weights and meaſures; and in ſurveying and laying out the high roads throughout the kingdom. In 1687 the king directed him to travel through Germany, France, England, and Holland, in order to collect ſuch information, on a variety of points, as might be applied to beneficial purpoſes in Denmark. Upon his return home in the following year, he was made counſellor of the chancellery, and in 1693, aſſeſſor of the ſupreme tribunal of juſtice.

Chriſtian V. was ſucceeded by Frederic IV. who appointed Roemer, in 1705, burgomaſter of Copenhagen, and in 1706, honoured him with the dignity of counſellor of ſtate. Roemer died in 1710, juſt as he was about to give the world the reſult of his obſervations. Theſe, however, were publiſhed under the title of "Baſis Aſtronomiæ," in 1753, by Peter Horrebow, who had been his diſciple, and was, at the time, profeſſor of aſtronomy at Copenhagen. Accounts of Roemer's aſtronomical obſervations, and ſome other of his pieces, will be found in the different volumes of the "Memoires" of the Royal Academy at Paris, particularly vols. i. and x.

ROENBERG, in *Geography*, a town of Brandenburg, in the New Mark; 8 miles E. of Zullichau.

ROENENG, a long meaſure in Siam, equal to one league, containing 4204 Engliſh yards, or 2⅓ miles nearly.

ROENSEL, in *Geography*, a river of the county of Mark, which runs into the Wipper, about a mile above Wipperfurt.

ROER, a river of Germany, which riſes near Winterburg, and runs into the Rhine at Roerort.—Alſo, a river of France, which riſes S. of Montjoe, in the department to which it gives name, and runs into the Meuſe at Ruremond.

Roer, one of the three departments of the region of France, called the Reunited country; compoſed of the duchy of Juliers and a portion of the electorate of Cologne, ſituated in N. lat. 51°, on the left hand of the Rhine. It contains 6697 kiliometres, or 259 ſquare miles, and 516,246 inhabitants. It is divided into 4 circles or diſtricts, 40 cantons, and 993 communes. The diſtricts are Aix-la-Chapelle, including 165,261 inhabitants; Cologne, with 157,215; Crevelt, with 137,605; and Cleves, with 76,206 inhabitants. According to Haſſenfratz, this department is 23 French leagues in length and 13 in breadth; and comprehends 4 circles, 40 cantons, and 324,960 inhabitants. Its capital is Aix-la-Chapelle. Its contributions, in the 11th year of the French era, were 4,564,150 fr. and its expences for adminiſtration and public inſtruction were 331,936 fr. 66 cents. Interſperſed with heaths and marſhes, this territory is, in general, fertile in grain, fruits, and paſtures. It has mines of copper, iron, lead, and coal, with cold and hot mineral ſprings.

ROERMONT. See Ruremond.

ROERORT, a town of the duchy of Cleves, at the conflux of the Roer and the Rhine; 15 miles N. of Duſſeldorf.

ROESBACH, a river of the duchy of Berg, which runs into the Rhine at Duſſeldorf.

ROESCHILD, Roschild, *Roeſkild*, or *Roſkild*, a town of Denmark, in the iſland of Zealand, erected into a biſhopric in the year 1012. In the year 1150 it was firſt encompaſſed with a rampart and ditch, and in 1268 or 1278 it obtained the privileges of a city. It gradually increaſed to ſuch an extent as to contain 27 large churches and convents within its walls. Some of the churches of the neighbouring villages were included within its circuit, and its ſtreets extended as far as the ſea-ſhore. The kings of Denmark were formerly elected and crowned in this city, and made it the place of their reſidence. Its ſubſequent decay has been owing to frequent fires, to the tyranny of its biſhops, and alſo to the flouriſhing ſtate of Copenhagen. The reformation contributed alſo to its decline, as the monks and clergy who ſpent a great part of their revenues in this place, were obliged to quit the country. At preſent Roeſchild is a mean place, containing about 200 houſes; the cathedral, built A. D. 930, where the royal families of Denmark have for many ages been buried; and the ruins of a royal palace. Here are ſome monuments worthy of attention, particularly four elegant mauſolea in alabaſter, of late kings and queens. The firſt king who was buried here was Harol Blaacland, A. D. 980, and the laſt was Frederic V. ſurnamed the Great, A. D. 1766. The inhabitants ſupport themſelves chiefly by agriculture, and the planting of tobacco. In the year 1658, the famous peace of Roeſchild, between the Swedes and Danes, was concluded here: 16 miles W. of Copenhagen. N. lat. 55° 39′. E. long. 12° 6′.

ROESCHULT, a town of Sweden, in the province of Smaland, ſaid to be the native place of the famous Linnæus.

ROESENDAEL, a town of Brabant; 8 miles E. of Berg-op-Zoom.

ROESSEL. See Rossel.

ROETTVIK, or Raettvik, a mountain of Sweden, which, according to Bergman, is calcareous, and the height of which he eſtimates at 6000 feet above the ſea; obſerving, as a ſingularity, that upon this mountain and that of Rodeberg, are found vaſt blocks of reddiſh felſpar, mingled with quartz and brown mica.

ROEVAERT, a river of Brabant, which runs from Breda into the ſea.

ROEULX, La, a town of France, in the department of Gemappe; 8 miles N.E. of Mons.

ROEUX, a town of France, in the department of the ſtraits of Calais; 9 miles E. of Arras.

ROFANI, a cape of European Turkey, on the S. coaſt of Romania. N. lat. 40° 35′. E. long 24° 14′.

ROFFENSIS Textus. See Textus.

ROFRANO, in *Geography*, a town of Naples, in Principato Citra; nine miles N.W. of Policaſtro.

ROGA, a town of Naples, in the province of Otranto; ſeven miles N. of Otranto.

Roga, ῥογα, in *Antiquity*, a donative, or preſent, which the Auguſti, or emperors, made to the ſenators, magiſtrates, and even the people; and the popes, or patriarchs, to their clergy.

The word is derived by ſome from the Latin *erogare, to give*, or *diſtribute*; according to others from *rogo, I aſk*; hence, ſay they, it is that St. Gregory the Great calls ſuch diſtributions *precaria*, as being to be demanded in order to be had. Others, again, derive it from the Greek ῥοῖς, ſometimes uſed for *corn*; becauſe it anciently conſiſted in corn, diſtributed among the populace, the ſoldiery, &c.

The emperors uſed to diſtribute theſe rogæ on the firſt day of the year, or on their birth-day, or on the natalis dies of the cities. The popes and patriarchs in Paſſion Week.

This cuſtom of rogæ, or largeſſes, was introduced by the tribunes of the people, to gain the populace more effectually over to their intereſt. The emperors at length took it up, and made ſuch diſtributions to the people, and even to the ſoldiery, who are hence called by the Greek writers of the middle age ῥογάλορες.

Roga is alſo uſed for the ordinary pay of the ſoldiery.

ROGA-

ROGANELLO, in *Geography*, a river of Naples, which runs into the gulf of Tarento, near Civita Mendrino.

ROGATCHEV, a town of Ruſſia, in the government of Mogilev, on the Dnieper; 76 miles S. of Mogilev. N. lat. 52° 36′. E. long. 30° 14′.

ROGATIO, Rogation, in the *Roman Juriſprudence*, a demand made by the conſuls, or the tribunes, of the Roman people, when a law was propoſed to be paſſed.

The demand was made in theſe terms: *Do you will and appoint that* (for inſtance) *war be declared againſt Philip?* This was the *rogatio;* and what the people returned in anſwer, as, *The Roman people do appoint war to be made againſt Philip*, was the *decretum*, *decree*, or *reſolve*.

The word *rogatio* is frequently alſo uſed for the decree itſelf, to diſtinguiſh it from a ſenatus-conſultum, or decree of the ſenate.

Frequently, alſo, *rogatio* is uſed in the ſame ſenſe with *law*, becauſe there never were any laws eſtabliſhed among the Romans, but what was done by this kind of rogation. Otherwiſe they were null.

ROGATION Week, the week immediately preceding Whitſunday; thus called from three faſts therein; *viz.* on the Monday, Tueſday, and Wedneſday, before Holy Thurſday, or the Aſcenſion of our Lord; called alſo *Rogations*, or *Rogation days*, becauſe of the extraordinary prayers, and proceſſions then made, for the fruits of the earth.

Dr. Godolphin ſays, the Rogation days derive their name from certain ordinances for abſtinence, or days of faſting, which the biſhop of Rome recommended to be obſerved by the Weſtern churches, before he aſſumed the power of compulſion; and which he, therefore, called by the gentle name of *Rogation*, the time of abſtinence being appointed at the beginning by that ordinance, which was called *Rogatio*, and not *lex*, or *decretum*.

The firſt who appointed theſe rogations was St. Mamertus, biſhop of Vienne, who, in 474, aſſembled ſeveral biſhops, to implore the mercy of God by a faſt of three days, on occaſion of an incurſion then made into the country by a number of wild beaſts. Others ſay, it was firſt ſet on foot by the ſame Mamertus, in 463, on occaſion of ſome great public calamities.

His example was ſoon followed, firſt by the church of Clermont, in Auvergne, then by all their neighbours, and afterwards throughout all Gaul.

In 801, Leo III. confirmed this faſt, and made it univerſal.

ROGATORES, among the Romans, thoſe who in the comitia centuriata brought the cheſt into which the people threw the ballots containing their votes.

ROGE, in *Geography*, a town of Sweden, in the province of Skone; 28 miles N.W. of Chriſtianſtadt.

ROGEHAUSEN, a town of Pruſſia, in the palatinate of Culm; 21 miles N.E of Culm.

ROGELGRUBE, a town of Pruſſia, in the Friſche Nerung; 15 miles N.W. of Elbing.

ROGELIM, in *Scripture Geography*, a place of Judea, in the tribe of Gad, the reſidence of Barzillai; mentioned in the book of Kings.

ROGER, in *Biography*, firſt king of Sicily, born in 1097, was ſon of Roger, count of Sicily, and grandſon of the Norman Tancred of Hauteville. He ſucceeded in his fourth year to the ſovereignty of Sicily, under the guardianſhip of his mother Adelaide. As ſoon as he aſſumed the reins of government, he endeavoured to obtain the undivided poſſeſſion of Palermo, of which a half belonged to the elder branch of his family, and alſo to enlarge the bounds of his eſtates in Calabria. On the death of his relation, William, duke of Apulia, he was proclaimed at Reggio duke of Apulia and Calabria; but the pope, Honorius II., refuſed for ſome time to grant him an inveſtiture to thoſe duchies; at length, however, an accommodation was effected, and the pope became his friend. He was now a powerful prince, and being urged by ſome of his ſubjects to aſſume the regal title, he readily complied with their wiſhes. In 1130 he convoked an aſſembly of his barons at Palermo, and received with great pomp and ceremony the royal crown of Sicily from the hands of a cardinal, delegated for the purpoſe. He was inveſted at the ſame time with the principality of Capua and the dukedom of Naples. A rebellion broke out among his new ſubjects in Italy, which obliged him to retire to Salerno, and thence to Sicily. Roger, at this period, had eſpouſed the cauſe of Anacletus, while the emperor Lothaire had eſpouſed the cauſe of Innocent II., who was likewiſe acknowledged by ſeveral of the Italian ſtates. A formidable confederacy was formed againſt Roger, in which the republic of Piſa, then a powerful maritime ſtate, took a leading part. An active war was carried on for ſeveral years with various ſucceſs in the ſouth of Italy. In 1137 the emperor reduced the whole of Apulia, of which a new duke was created, while Roger was excommunicated by Innocent II. In 1139 he took the pope priſoner, who was obliged to purchaſe his liberty by the abſolution of the king, and his inveſtiture in Sicily, Apulia, and Capua. From this period the affairs of Roger became proſperous, and the ſucceſſors of Innocent, who had refuſed to acknowledge his regal title, were brought to comply by the terror of his arms. About the year 1146, Roger carried his arms into Africa, and after reducing Malta, which from this period was annexed to the crown of Sicily, he made himſelf maſter of Tripoli, Tunis, and other extenſive tracks along the ſea-coaſt, which he rendered tributary. About the ſame time he avenged himſelf of the injuſtice of the Greek emperor, Manuel, who had impriſoned his ambaſſadors, and offered him other indignities, by ſending a powerful fleet, which took the iſland of Corfu, and cruelly ravaged the coaſt of Morea. One reſult of this expedition was, the carrying off a number of ſilk manufacturers, and ſettling them in Apulia and Sicily, where they introduced their art. His admiral advanced as far as Conſtantinople, the ſuburbs of which he pillaged and burnt; and he had the honour of ſetting at liberty Lewis VII. of France, who, on his return from the Holy Land, had been intercepted by a Grecian ſquadron. Manuel, however, aſſiſted by the Venetians, purſued and in part deſtroyed the Sicilian fleet, and recovered Corfu. Roger now aſſociated his only ſurviving ſon with him on the throne, and after employing the laſt years of his life in erecting monuments of his munificence and piety, he expired at Palermo in the year 1154, in the 58th year of his age, and 25th of his reign as king, leaving the character of one of the ableſt, moſt vigorous, and fortunate princes of his time. Gibbon, vol. x. Mod. Univer. Hiſt.

Roger de Hoveden, a learned hiſtorian of the 13th century, was probably born at the town of Hoveden or Howden, in Yorkſhire, ſome time in the reign of Henry I. Having received the early parts of his education, he began to ſtudy the civil and canon law, which were then become the moſt faſhionable branches of learning. He was appointed domeſtic chaplain to Henry II., who employed him in many eccleſiaſtical affairs, in which he acquitted himſelf with high honour. He is, however, beſt known by his Annals of England, from the year 731, where Bede's Eccleſiaſtical

Hiſtory ends, to 1202. This work, which is one of the moſt voluminous of our ancient hiſtories, is more valuable for the ſincerity with which it is written, and the great variety of facts which it contains, than for the neatneſs of its ſtyle, or the regularity of its arrangement.

ROGERS, JOHN, an Engliſh divine, was educated at Cambridge, and became chaplain to the factory at Antwerp, where he aſſiſted Tindal and Coverdale in tranſlating the Bible into Engliſh. In the reign of Edward VI. he returned to England, and obtained a prebend in St. Paul's cathedral, where he was a frequent and zealous preacher. He was the firſt perſon executed in the reign of the bloody Mary, being burnt in Smithfield in 1555. In the former reign he had been, at leaſt, an abettor of the ſame ſort of perſecution of which he himſelf became the victim. This fact deſerves to be recorded. When the Proteſtant biſhops had determined to burn Joan of Kent, a friend of Rogers, the divinity reader in St. Paul's church, came to him, earneſtly deſiring him to uſe his intereſt with the archbiſhop, that the poor woman's life might be ſpared, and other means uſed to prevent the ſpreading of her opinions, which might be done in time; urging, though that while ſhe lived ſhe infected few with her opinion, yet ſhe might bring many to think well of it by ſuffering death for it; he pleaded, therefore, that it was better ſhe ſhould be kept in ſome priſon, without an opportunity of propagating her notions among weak people; and ſo ſhe would do no harm to others, and might live to repent herſelf. Rogers on the other hand pleaded, ſhe ought to be put to death. Well then, ſays his friend, if you are reſolved to put an end to her life, together with her opinions, chooſe ſome other kind of death more agreeable to the gentleneſs and mercy preſcribed in the Goſpel, there being no need that ſuch tormenting deaths ſhould be taken up in imitation of the Papiſts. Rogers anſwered, that burning alive was no cruel death, but eaſy enough. His friend, then hearing theſe words, which expreſſed ſo little regard to the poor creature's ſufferings, anſwered him with great vehemence, and ſtriking Rogers's hand, which he before held faſt, ſaid to him, "Well, it may perhaps ſo happen, that you yourſelves ſhall have your hands full of that mild burning." And ſo it came to paſs. Mr. Pierce, who has recorded this anecdote, conjectures with great probability, that the friend of Rogers was the hiſtorian himſelf.

ROGERS, captain Wood, a famous Engliſh navigator in the early part of the eighteenth century, of whoſe private hiſtory little is known, ſailed in the Duke, a private ſhip of war, of 30 guns and 170 men, in company with the Ducheſs, a ſmaller veſſel, commanded by captain Stephen Courtney, on an expedition into the South ſeas againſt the Spaniards. Theſe ſhips were fitted out by a company of merchants at Briſtol, and they ſet ſail on the 1ſt of Auguſt, 1708. On board one of them as pilot was the afterwards celebrated captain DAMPIER, (ſee his article.) In paſſing the ſtraits of Magellan, they not only captured ſeveral ſhips, but likewiſe took ſeveral towns upon the coaſt, and on the 22d of December 1709, they met with the famous Acapulco ſhip, which was the leſſer of two ſhips, which at that period ſailed annually from the Eaſt Indies to Mexico. She carried 20 guns, and would not ſurrender until ſhe was overcome: an action began and laſted about half an hour, when the Spaniard hauled down her colours; and ſhe was found to be a moſt valuable prize, worth 2,000,000 pieces of eight. After this they met with the larger Acapulco ſhip, but having ſkirmiſhed two days, they found it impoſſible to capture her. They therefore determined to return by the Eaſt Indies, and arrived in the Downs after having circumnavigated the globe, on the 2d of October, 1711. This voyage, which was abundantly ſucceſsful, led to the foundation of the SOUTH SEA COMPANY; which ſee. In 1718, captain Rogers having been appointed governor of the Bahama iſlands, proved himſelf well adapted to the ſituation, by the vigorous meaſures which he adopted againſt the pirates, who had become moſt inimical to the trading intereſts of the country. He arrived at Providence, after a ſhort and eaſy paſſage, on the 11th of April, took poſſeſſion of the town of Naſſau, and the whole iſland, much to the ſatisfaction of the inhabitants, and many of the pirates, who had ſettled themſelves there, ſubmitted at once to his authority. He proceeded ſoon after in forming a council, and ſettling the government of thoſe iſlands, appointing civil and military officers, raiſing militia, and taking every other ſtep neceſſary for procuring ſafety at home, and ſecurity from any thing that might be attempted from abroad, in which by degrees he completely ſucceeded. Some of the pirates at firſt rejected the terms, and continued to do a good deal of miſchief on the coaſt of Carolina; but when they ſaw that captain Rogers had thoroughly ſettled himſelf at Providence, and was not to be trifled with, and that the inhabitants of the Bahamas found it to be to their intereſt to be honeſt, they thought proper to ſolicit mercy; ſo that by the 1ſt of July, 1719, to which day the king's proclamation had been extended, there were not above three or four veſſels of thoſe pirates which continued to trade, two of theſe being captured, and their crews executed, the reſt diſperſed. "Thus," ſays the judicious Campbell, "in a ſhort time, and chiefly through the ſteady and prudent conduct of governor Rogers, this herd of villains was in ſome meaſure diſſolved, who for many years had frighted the Weſt Indies and the northern colonies, coming at laſt to be ſo ſtrong that few merchantmen were ſafe, and withal ſo cruel, that ſlavery among the Turks was preferable to falling into their hands." See Campbell's Lives of the Admirals, Stockdale's edition, vols. iii. and iv.

ROGERS, BENJAMIN, doctor of muſic, an eccleſiaſtical compoſer, whoſe works are ſtill contained in our cathedral ſervice, and for whoſe fame Anthony Wood has manifeſted great zeal. This muſician was born at Windſor, and brought up in that college under Dr. Nath. Giles; being employed there, firſt as a ſinging boy, and afterwards in the capacity of lay clerk or ſinging man. Thence he went to Ireland, and was appointed organiſt of Chriſt-church in Dublin, where he continued till the breaking out of the rebellion, in 1641; at which time, being forced to quit his ſtation, he returned to Windſor, where he was again reinſtated as choirman; but being ſoon after ſilenced in conſequence of the civil wars, he procured a ſubſiſtence by teaching in the neighbourhood. And during this time, according to his friend Ant. Wood, having addicted himſelf much to ſtudy, he acquired great credit as a compoſer, and produced ſeveral ſets of airs in four parts for violins and an organ, which being then imagined the beſt that *could* be compoſed of that kind, were ſent as great rarities to the archduke Leopold, afterwards emperor, and himſelf a great muſician; and, upon their being performed by his band, they were very much admired.

In 1658, by the favour of his friend Dr. Ingelo, he obtained the degree of bachelor in muſic at Cambridge, and acquired great reputation in that univerſity by his exerciſe. Soon after, on Dr. Ingelo going chaplain to Bulſtrode lord Whitelock, into Sweden, he carried with him ſome of Ben. Rogers's beſt compoſitions, which, upon being repeatedly

peatedly performed in the prefence of Chriftiana, queen of Sweden, were very much applauded.

At the Reftoration he was appointed to compofe the mufic that was performed at Guildhall, on the day his majefty and his brothers, the dukes of York and Gloucefter, dined there with the lord mayor, by which he greatly increafed his reputation.

About this time he was chofen organift of Eton college, which he refigned foon after, on being invited to Oxford, where he was appointed to the fame office in Magdalen college. And in 1669, upon opening the new theatre in that city, he was created doctor in mufic. He continued, fays Ant. Wood, in the univerfity, where he was much efteemed, till the year 1685, when he was ejected, in company with the fellows of his college, by king James II. after which he long refided in the fkirts of the town, wholly difregarded.

"His compofitions for inftruments," fays Ant. Wood, "whether in two, three, or four parts, have been highly valued, and were thirty years ago always firft called for, taken out and played as well in the public mufic fchools, as in private chambers: and Dr. Wilfon, the profeffor, (the greateft and moft curious judge of mufic that ever was,) ufually wept when he heard them well performed, as being wrapt up in an ecftacy; or, if you will, melted down: while others fmiled, or had their hands and eyes lifted up, at the excellence of them."

It is to be feared, that inftead of *weeping*, the wicked lovers of modern mufic would now *laugh*, if they were to hear the quaint and ftarched ftrains, and fee on paper the ruffs and roll-ups of honeft Ben. Rogers at the Opera-houfe, or profeffional concert, Hanover-fquare. But, alas! what is the fecular mufic, that thirty years have not wrinkled, withered, and rendered fuperannuated!

ROGERS'*s Point*, in *Geography*, a cape on the W. fide of lake Huron. N. lat. 44° 19′. W. long. 82° 45′.

ROGERSVILLE, the chief town of Hawkins county, in the ftate of Teneffee, pleafantly fituated in Carter's valley, with a profpect agreeably variegated by fome round hills at a diftance. It contains about 20 dwelling-houfes, fome public buildings, ftores, &c. It has a number of perennial fprings, and one above the level of the ftreets.

ROGETS, a town of the duchy of Magdeburg, at the conflux of the Oura and Elbe; 16 miles N. of Magdeburg.

ROGGENDORF, a town of Auftria; 8 miles W. of Aggfpach.

ROGGEWELD, a tranfmontane divifion of the diftrict of Stellenbofch and Drakenftein, at the Cape of Good Hope, called the Rye-grafs country, and divided into Upper, Middle and Little. Thefe are the fummit of a long extended Table mountain, whofe weftern front rifes out of the Karroo plains, behind the Bokkeweld, almoft perpendicularly, to the height of two or three thoufand feet. Stretching to the eaftward, this fummit becomes more broken into inequalities of furface, and rifes at length into the mountains of Nieuweld, the Camdeboo, and the Seeuwberg, which may be confidered as one extended chain. The great elevation of the Roggeweld, and its being furrounded by the Karroo plains, make the temperature in winter fo cold, that for four months in the year, the inhabitants are under the neceffity of defcending to the feet of the mountains, with their horfes, cattle, and fheep. The ftrongeft and largeft breed of horfes in the whole colony is that of the Roggeweld. See NIEUWELD.

ROGIERS, a town of France, in the department of the Var; 4 miles S. of St. Maximin.

ROGLIANO, a town of Naples, in Calabria Citra; 9 miles S.S.E. of Cofenza.—Alfo, a town of the ifland of Corfica; 20 miles N. of Baftia.

ROGME, in *Surgery*, a rupture or fracture.

ROGNES, in *Geography*, a town of France, in the department of the Mouths of the Rhone; 13 miles N.W. of Aix.

ROGO, an ifland of Sweden, near the E. coaft, in the Baltic. N. lat. 57° 53′. E. long. 16° 36′.

ROGONATGUNGE, a town of Bengal; 30 miles S.W. of Rogonatpour. N. lat. 23° 17′. E. long. 86° 21′.

ROGONATPOUR, a town of Bengal, and capital of the circar of Pachete; 150 miles S.S.E. of Patna. N. lat. 23° 33′. E. long. 85° 44′.—Alfo, a town of Bengal; 31 miles S.E. of Kifhenagur.

ROGOSNO, a town of the duchy of Warfaw; 16 miles N. of Pofen.

ROGOWA, a town of Pruffia, in the palatinate of Culm; 7 miles E. of Thorn.

ROGSTA, a town of Sweden, in Helfingland; 2 miles N.E. of Hudwickwall.

ROGUE, in *Law*, an idle and fturdy beggar, who, by ancient ftatutes, for the firft offence, is called a *rogue of the firft degree*, and punifhed by whipping, and boring through the griftle of the right ear, with a hot iron, an inch in compafs; and, for the fecond offence, is called a *rogue of the fecond degree*, and ordered to be put to death as a felon, if he be above eighteen years of age. For the defcription and punifhment of rogues, as they are eftablifhed by 17 Geo. II. cap. 5, fee VAGABOND.

ROGUES, or *Whores' March*, in *Military Language*, a beat of the drum, accompanied by the fifes, when a foldier is drummed out of the regiment, or common proftitutes are drummed out of camp or garrifon.

ROGUES *Yarn*, a name given to a rope-yarn, which is placed in the middle of every ftrand, in all cables and cordage in the king's fervice. It differs from all the reft, as being untarred and twifted in a contrary manner, by which it is eafily difcovered. The ufe of this contrivance is to examine whether any cordage, fuppofed to be ftolen or embezzled, has been formed for the king's fervice, the poffeffor of which is fubject to a heavy fine. Falconer.

ROGUINS, in *Geography*, a town of France, in the department of the Rhone and Loire; 6 miles E. of Roanne.

ROGUN, a town of European Turkey, in Albania; 6 miles W.N.W. of Arta.

ROHACZOW, a town of Lithuania, in the palatinate of Minfk, on the Dnieper; 85 miles S.E. of Minfk. N. lat. 52° 50′. E. long. 29° 33′.

ROHALE, a fmall ifland on the W. fide of the gulf of Bothnia, N. lat. 60° 37′. E. long. 17° 49′.

ROHAN, HENRY, *duke of*, in *Biography*, fecond of the name, but one of the firft rank, talents, and character of the French nobility of his time, was born in 1579, at the caftle of Blein, in Britanny. At the age of fixteen he diftinguifhed himfelf at the fiege of Amiens, under the eye of Henry IV., to whom he was prefumptive heir, before the birth of the dauphin. After the death of Henry, he was at the head of the Calvinift party in France, a ftation which he retained during three religious wars againft the authority of Lewis XIII. In the firft, in 1621, he defended Montauban in perfon: the fiege was raifed, and in the following year a favourable peace was granted to the Proteftants. The war was rekindled in 1625, but was foon terminated by a peace. At length Richelieu refolved entirely to fubdue a party which had become a fort of feparate republic

in France, allied for its own defence with her enemies. He besieged and took Rochelle, the strong hold of the Calvinists; and though the duke of Rohan vigorously maintained the war in Languedoc, he was at length obliged, in 1629, to make his submission, and the party was deprived of all its fortresses, but still allowed the public exercise of its religion. To some of the most violent, who were enraged at the terms of accommodation, and accused their chief of having sold them, he presented his naked breast, saying, "strike! I am content to die by your hands, after having ventured my life in your service." As it was one of the conditions that he should quit the kingdom till it pleased the king to recall him, he retired to Venice, and it is affirmed, that, during his residence in that city, the duke engaged in a negociation with the Ottoman Porte, for the purchase of the island of Cyprus, with a view of settling in it Protestant refugees from France and Germany, and that it failed principally through the death of the patriarch Cyril, by whose mediation it was carried on. The Venetian republic nominated him its general in chief against the Imperialists; but the king of France took him from its service to send him ambassador to the Swiss and Grisons. At the head of the troops of the latter, he drove the Germans and Spaniards out of the Valteline in 1633. He after this defeated the Spaniards on the banks of the lake Como, but the Grisons becoming suspicious that it was not intended to withdraw the French troops from their country, rose in arms, and the duke was obliged to make a separate treaty with them in 1637. He now retired to Geneva, and from thence went to join his friend, the duke of Saxe-Weimar, with whom he fought against the Imperialists at Rheinfeld, in 1638. He was severely wounded in the action, and died some weeks after, at the abbey of Konigfeld, in Switzerland, at the age of fifty-nine. His body was interred in the church of St. Peter, at Geneva, where a magnificent monument was erected to his memory. The duke was author of several works, military and political. These are, "Les Intèrets des Princes;" "Le parfait Capitaine, ou l'Abrègè des Commentaires de Cæsar;" "Un Traitè de la Corruption de la Milice ancienne;" "Un Traitè du Government des Treize Cantons;" "Memoires," containing the transactions in France from 1610 to 1629; "Recueil des quelque Discours politiques sur les Affaires de l'Etat, depuis 1612 jusqu'en 1629;" "Memoires et Lettres de Henri, duc de Rohan, sur la Guerre de la Valtelin." The duke was one of the greatest captains of his time, and possessed all the qualities requisite in the head of a party, together with disinterestedness, generosity, and gentleness of manners. His wife, Margaret of Bethune, daughter of the great duke of Sully, warmly espoused the interests of her husband and party, and was greatly celebrated for her courage. His brother also, Benjamin de Rohan, lord of Soubise, acted a distinguished part in the Calvinist wars, and finally took refuge in England, where he died in 1690.

ROHAN, in *Geography*, a town of France, in the department of the Morbihan, and chief place of a canton, in the district of Plöermel; 10 miles N.W. of Josselin. The place contains 422, and the canton 9951 inhabitants, on a territory of 267½ kiliometres, in 9 communes. N. lat. 48° 6′. W. long. 2° 40′.

ROHAN-ROHAN, a town of France, in the department of the Two Sevres; 6 miles S.S.W. of Niort.

ROHAULT, JAMES, in *Biography*, a French philosopher and mathematician, was born at Amiens, in Picardy, in 1620. Having received the early part of his education at his native place, he was sent to Paris, to study mathematics and philosophy. In his enquiries he appears to have been possessed of an ardent love of truth, and to have sought after it with the utmost diligence and impartiality. He studied both the ancients and moderns, but Des Cartes was the author which engaged most of his notice, and of that celebrated philosopher he became a zealous follower. His attachment to the system of Des Cartes introduced him to the acquaintance of Claude Clerselier, who gave him his daughter in marriage, in opposition to the remonstrances of his family. He engaged his son-in-law to draw up an abridgment and explanation of the philosophical works of Des Cartes, and to illustrate the same with notes. The result of his labours, which he entitled "Physics," was taught by him at Paris, during ten or twelve years before he gave it to the public. Rohault died in the year 1675, at the age of fifty-five, leaving behind him the character of an amiable, as well as very learned man. His Physics were translated from the French into Latin by Dr. Samuel Clarke, who accompanied his version with notes that overset the system of Des Cartes, in order to make way for that of the illustrious sir Isaac Newton. The best edition of this translation is that of 1718. Rohault also published "Elements of Mathematics," and "Dialogues concerning Philosophy:" and after the author's death, a collection of pieces was made from his manuscripts, and printed first at Paris, and afterwards at the Hague, in 1690, in two vols. 12mo. containing the first books of Euclid, Trigonometry, Practical Geometry, Fortification, Mechanics, Perspective, &c.

ROHBA, in *Geography*, a town of Arabia, in the province of Hedsjas; 10 miles S. of Vadelkora.

ROHEETA, a town of Hindoostan, in the circar of Gohud; 20 miles S.E. of Gohud.

ROHILCUND, or ROHILLA, a circar or province of Hindoostan, situated on the E. side of the Ganges, and N.W. of the subah of Oude. The territory of the Rohillas was formerly called Catheir, and recently derived its name from the conquerors of that tribe, who, about the year 1720, left Afghanistan, and the mountains which they occupied between India and Persia, and came thither in pursuit of military service. These emigrants were first entertained by Madar Saha, the Hindoo chief of Serowly, a small town in the N.W. quarter of Rohilcund, who, by robbery and predatory excursions, maintained a large party of banditti. Some time afterwards, the Rohillas quarrelled with Madar Saha, and associated with the chief of Bareilly; but, separating from this chief, they made incursions into the territory of the rajah of Kemaoon. In this expedition they at first succeeded, but were afterwards defeated; their leader, who was an original emigrant from Afghanistan, being taken prisoner and put to death. After his death, his associate, Ali Mahomet, a youth of the sect of Jats, whom he had captured in one of his excursions, and brought up in the Mahometan religion, became the chief of the party; and being brave and enterprising, though young, he availed himself of every opportunity that occurred for advancing his power, and enlarging his territory. Ali, chiefly by the assistance of the vizier Kummer ud Dein, obtained a commission for collecting the revenue of the pension land, which, it is said, he punctually remitted. From this period we may date the first establishment of the Rohilla power in Rohilcund, the name by which they distinguished the Cuttera or Kutterah districts, and their other territories on the east side of the Ganges. Ali Mahomet fixed his residence at Owlah, and established throughout his territory a permanent system of government, which, though occasionally rigorous, afforded protection to the lower class of people. In process of time, and in consequence of several predatory acts which he committed, Ali was attacked by the prince Mahomet Shah,

Shah, who entered Rohilcund with a powerful armament, and took poſſeſſion of the open country. At length he was compelled to ſurrender himſelf to the king, but by the interceſſion of Kummer ud Dein he was pardoned. With this event, which happened in the year 1745, the power of the Rohillas was annihilated in Rohilcund; and all their officers and principal people were removed to Delhi. Ali, having remained about a year at Delhi, under the protection of the vizier, was, by his recommendation, appointed the military governor of Sirhind, who, during his reſidence in this place, was joined by a body of 2000 or 3000 marauding Afghans; ſo that his party was computed to conſiſt of 10,000 cavalry, and 15,000 or 20,000 infantry, of various denominations. Whilſt the Mogul and Afghan armies were preparing for action, he quitted the Panjab and retired to Hurdwar, from whence he penetrated, in 1747, into Rohilcund, which he rapidly conquered, and ſoon after died at Owlah. The laſt army that might be reckoned *imperial*, was, in 1749, defeated by the Rohillas; by which their independency was firmly eſtabliſhed in the eaſtern part of the province of Delhi. About the year 1750, the territory which had been perſonally poſſeſſed by Ali Mahomet, was, by the deliberation and agreement of the principal Rohilla officers, divided among his ſons. At length, however, Hafiz Ahmed, who poſſeſſed military talents, in the exerciſe of which he had acquired influence in Rohilcund, ſuperſeded the authority of Saud Ullah, the third ſon of Ali Mahomet, and was advanced to the ſupreme adminiſtration of affairs; and at the death of Saud Ullah, which happened at Owlah in 1761, the power of Hafiz was eſtabliſhed. The form of government adopted by the Rohillas in India, ſimilar to that which ſubſiſted in their native country, may be denominated feudal. The ſucceſſors of one of the firſt invaders, *viz.* Daoud Khan, poſſeſſing very moderate hereditary pretenſions, and ſurrounded by perſons who had afforded eſſential aſſiſtance in the firſt conqueſt, held but a limited ſway. Two of the moſt reſpectable of the Rohillas never ceaſed to oppoſe the progreſs of Hafiz Rhamut, who aimed at ſovereign authority; but zealouſly attached to the intereſt of the widow of Saud Ullah, they formed a counterpoiſe to the encroaching power of that chief. The Afghan conquerors of Rohilcund, were a bold, rapacious, and lawleſs ſet of men; and after they had eſtabliſhed a kind of government in India, they adopted the more effeminate vices of the ſouth, and became intriguing, deceitful, and treacherous. The Rohillas, particularly thoſe of the lower claſs, were, with few exceptions, the only Mahometans in India who exerciſed the profeſſion of huſbandry, and their attention to agriculture was amply recompenſed by the abundance and ſuperior qualities of the productions of Rohilcund. This country is ſaid to have yielded to the Rohillas one million ſterling, a ſum which, in later times, has been very conſiderably reduced. According to Mr. Hamilton, the Rohillas themſelves have been the great cauſe of the ruin of the country which bears their name; it was parcelled out among their chiefs, who had afterwards but a feeble connection with each other; while their dependence on Hafiz (Haſſey) Rhamut, their prince, was more nominal than real. In the year 1773 the Mahrattas croſſed the Ganges to invade the Rohilla country; but a brigade of the Britiſh marched to the weſtern frontier of that country, and drove the Mahrattas acroſs the river. For this protection the Rohilla chiefs had ſtipulated to pay Sujah Dowlah, nabob of Oude, 40 lacks of rupees; but when this eſſential ſervice was performed by the Britiſh army, which moved as the allies of Sujah Dowlah, the payment of the money was evaded. This breach of treaty led to the invaſion and conqueſt of the Rohilla country in the following year, 1774; and it was then added to the ſubah of Oude. Since this conqueſt, the country has rapidly degenerated into a waſte, under the deleterious politics of the miniſters of Oude. The natives are ſaid to be a tall, handſome race of people; and when compared with the other inhabitants, are white and well featured. They continued for a conſiderable time to carry about in triumph ſome couches and palankeens of European officers that were killed by their army in the fatal action of 1774, by which we purchaſed a victory at a greater expence of European lives than was ever ſuffered by the ſame number of troops in India. The capital of Rohilcund is *Bereilly* or *Barelly*, which ſee. The diſtrict of Rampour, ſituated at the foot of the Northern mountains, and poſſeſſed by a Rohilla chief, is included in Rohilcund, but it was ſecured to Fizzoolah Cawn, the chief, by the treaty of Loldong, in 1774. It is valued at 30 lacks of rupees *per annum*; but he is, in effect, tributary to *Oude*, (which ſee,) by being bound to furniſh his quota towards an eſtabliſhment for the common defence.

ROHILLAMOW, a town of Hindooſtan, in Oude; 21 miles S.S.E. of Kairabad.

ROHINI, in *Aſtronomy*, the Sanſkrit name of a ſtar, ſuppoſed to be that deſignated on our globes by α Tauri. In mythology it is an aſterifm that furniſhes more poetical alluſion than any other in the zodiac. Rohini is one of the ſixty daughters of Dakſha, and one of the twenty-ſeven eſpouſed by Soma, or the moon; the lunar regent being male among the Hindoos, as it is with ſome European mythologiſts. (See SOMA.) Under the article NAKSHATRA, which means the aſterifms marking the moon's path, mention is made of the poetical derivations from this fruitful ſource, and we will here add another inſtance of it, relating to Rohini, the favourite conſort of the fickle Soma. In one of their terreſtrial journies, arriving at the ſouthern mountain Sahyadri, they unwarily entered the foreſt of Gauri, or Parvati, where ſome men, having formerly ſurpriſed Mahadeva careſſing that goddeſs, they were puniſhed by a change of their ſex, and the foreſt had retained a power of effecting a like change on all males who ſhould enter it. Soma, or Chandra, inſtantly becoming a female, (Chandri,) was ſo afflicted and aſhamed, that ſhe haſtened far to the weſt, ſending Rohini to her ſeat in the ſky, and concealed herſelf in a mountain, afterwards named Somagiri, where ſhe performed acts of the moſt rigorous devotion. Darkneſs then covered the world each night, the fruits of the earth were deſtroyed, and the univerſe was in ſuch diſmay, that the Devas, or divinities, with Brahma at their head, implored the aſſiſtance of Mahadeva, who, placing Chandri on his head, ſhe became male again. Mahadeva, in ſtatues and pictures, is uſually ſeen with the moon on his head and forehead, and one of his names is Chandra-ſekra, or *moon-crowned*. (See SIVA.) Another fable ſtates that ſhe was viſited in her retreat by Surya, or the ſun, from which conjunction aroſe a numerous progeny. Mahadeva is the ſun; and this ſol-lunarian progeny is, perhaps, vegetation. Under the article ILA is another lunarian fable, probably connected with theſe. Siva's ſpouſe, Parvati, is as jealous as Juno.

Theſe fables, taken from the Aſiatic Reſearches, vol. iii. are related by Mr. Wilford, from Puranic authority; and were thus explained to him by an ingenious Pandit. To the inhabitant of the countries near the ſource of the Kali, or Nile, the moon, being in the manſion of Rohini, or the Pleiades, ſeemed to vaniſh behind the ſouthern mountains. Now when the moon is in oppoſition to the ſun, it is the god Chandra; in conjunction, the goddeſs Chandri. The moon is believed, by Hindoo naturaliſts, to have a powerful

ful influence on vegetation, especially on certain plants, and, above all, on the Somalata, or moon-plant. (See SOMALATA.) This mode of interpretation, Mr. Wilford adds, may serve as a clue to the intricate labyrinth of the Puranas, which contain all the history, physiology, and science of the Indians and Egyptians, disguised under similar fables. See PURANA.

ROHITZ, in *Geography*, a town of Stiria, in which is a medicinal spring; 20 miles E. of Cilley.

ROHL, a small island in the gulf of Finland. N. lat. 59° 55′. E. long. 26° 26′.

ROHLA, a river of Bohemia, which runs into the Egra, near Carlsbad.

ROHN, a town of Germany, in the county of Henneberg; two miles N.N.W. of Salzungen.

ROHN. See PULO *Ron*, and POOLARON.

ROHND, a town of Bengal; 15 miles N. of Toree.

ROHOB, a town of Judea, in the tribe of Asher, mentioned in the books of Joshua and Numbers. To this place Moses sent twelve men to reconnoitre the land of promise. It was assigned to the Levites of the family of Gershon.

ROHOSSETZ, a town of Bohemia, in the circle of Boleslaw; eight miles N.W. of Turnau.

ROHR, a town of the duchy of Stiria; nine miles W. of Gnaa.—Also, a river of the duchy of Bremen, which runs into the Weser near Carlsburg.—Also, a town of Germany, in the principality of Culmbach; five miles S.E. of Culmbach.—Also, a town of Germany, in the county of Henneberg; two miles E. of Meinungen.

ROHR, *Inn*, a town of Austria; 10 miles N.W. of Neustadt.

ROHRBACH, a town of Germany, belonging to the priory of Odenheim; 10 miles W. of Heilbronn.

ROHRBECK, a town of Saxony, in the principality of Querfurt; two miles S. of Juterbock.

ROHRIA, in *Botany*, a genus of Schreber's, has been supposed, by De Theis, to commemorate Julius Bernard von Rohr, a German botanical writer of the middle of the 18th century, whose works are little known out of his own country. We rather presume, with professor Martyn, that the author of this name had in view a more recent, and very eminent, practical botanist, long resident in South America, Julius Philip Benjamin von Rohr, perhaps a relation of the former, whose discoveries are often mentioned by Vahl, and who has written on *Quassia amara*, the culture of Cotton, and other subjects. Thunberg has also a *Rohria*, adopted from Vahl; which having been previously called *Berckheya*, by Ehrhart, is now retained under the latter name in Willd. Sp. Pl. v. 3. 2269.—Schreb. Gen. 30. Willd. Sp. Pl. v. 1. 186. Mart. Mill. Dict. v. 4. (Tapura? Aubl. Guian. v. 1. 126. Juss. 419. Lamarck Illustr. t. 122.)—Class and order, *Triandria Monogynia*. Nat. Ord. uncertain, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, bell-shaped, in five deep, ovate, concave, obtuse, fringed, coriaceous segments, the two interior ones rather longest. *Cor.* Petals five, erect, longer than the calyx, the two uppermost rather largest, the three lower smallest; claws narrow, dilated at the base, woolly on the inside, a little bent outwards under the border; which in each petal is ovate, erect; in the larger petals hooded inwards; in the smaller expanded and bluntish. *Stam.* Filaments three, one between the two larger petals, two at their sides, connected below with their claws, all thread-shaped, longer than the corolla, woolly at the inside; anthers roundish, erect, directed inwards. *Pist.* Germen superior, turbinate, downy; style thread-shaped, villous, the length of the stamens; stigmas three, revolute. *Peric.* and *Seeds* unknown.

Ess. Ch. Calyx bell-shaped, in five deep segments. Petals five, unequal. Stigmas three, revolute.

Obs. Schreber doubted whether his plant were the same with Aublet's, because the latter describes the corolla as monopetalous, and the three long stamens as accompanied by two short ones besides. This last circumstance may be accidental; the corolla seems more material. The flowers however are so minute, that Schreber, having seen them in a dried state only, might easily be mistaken. As he is the author of the name *Rohria*, we prefer his description, as Aublet's plant, if different, must have another generic appellation.

1. R. *petioliflora*. Willd. n. 1. (Tapura guianensis; Aubl. Guian. v. 1. 126. t. 48?)—The plant of Aublet was found in forests, near the Serpent mountain, in Guiana, flowering in August. It is a shrub, 12 feet, or more, in height, with many flexible, roundish, smooth *branches*. *Leaves* alternate, on short thick stalks, elliptic-lanceolate, pointed, entire, smooth and shining, about four inches long; paler beneath. Of *stipulas* we can perceive no traces in Aublet's specimen, except a slight intrafoliaceous abrupt border. *Flowers* yellow, small, five, seven, or more together, on very short stalks, springing from the summit of each *footstalk*, at the base of the leaf.

We presume Schreber received his specimens from von Rohr; and as they agreed with Aublet's in the very remarkable mode of inflorescence, and must have come from the same country, there can be little reason to suspect any real difference.

ROI *des Violons*, or king of the fidlers, in France. Each profession, or incorporated company, had formerly a superior, who was dignified with the title of king. The masons, carpenters, barbers, lawyers' clerks, cross-bow-men, the principal soldiers called *ribauds*, even the poets, and many other orders of men, had their particular kings; but their exactions and tyranny, by degrees, occasioned the abolition of these phantoms of sovereignty.

The minstrels, religious observers of ancient usages, were the last to relinquish this precious relic of antiquity. The king at arms, and king of the minstrels, were the only surviving monarchs of their calling. But the first has few tributaries, and his functions are only exercised occasionally; the other, on the contrary, was always in power, and pretended to exercise his empire over the whole realm.

The history of the first kings of the minstrels is unknown; it is only recorded that, after the decease of Constantin, the famous violin of the 17th century, the crown passed, in 1630, to Dummoir I., then to Dummoir II., who relinquished the crown by a voluntary abdication, occasioned by an anarchy, in 1685. Louis XIV. saw with indifference the extinction of this royalty, and declared that it was not his intention it should be restored.

This monarchy had been long agitated by internal troubles, and civil and foreign wars. The dancing-masters, originally incorporated with this company, had been 50 years soliciting its extinction; indignant at being united with such vile artizans, who dishonoured their faculty by playing at alehouses (cabarets) and places of debauchery; or if not totally silenced, that one of the strings of their fiddles should be cut off, and they reduced to their ancient level, and be allowed to play on no instrument but the three-stringed rebec.

They had commenced a suit against the city dancing-masters, and obtained a solemn sentence against them, January 14th, 1667. No company was ever more discordant,

more tumultuous; all the courts of juſtice rang with their diviſions and quarrels, by which the law was enriched, and the public amuſed, at their expence. The interregnum laſted from 1685 to 1741, when the celebrated Guignon, the violiniſt, was ambitious of having the royalty revived in his favour. The king had the goodneſs to comply with his requeſt, and honoured him with the miniſtrel crown, on the 15th of June the ſame year. But his election awakening a deſire to revive certain prerogatives, which he pretended to be inherent in his crown, he had ſuits and actions to defend againſt a hoſt of muſicians, particularly the organiſts, who obtained a complete victory; and Guignon, willing to give a proof of his love for the arts and diſintereſtedneſs, generouſly, and voluntarily, reſigned his ſovereignty of king of the miniſtrels.

ROIDALK, in *Geography*, a town of Norway; 48 miles N.N.E. of Stavanger.

ROIHA. See OURFA.

ROIOC, in *Botany*, a barbarous South American, or perhaps Spaniſh, name, for one of Plumier's genera, rightly referred by other botaniſts to MORINDA; ſee that article.

ROISELLE, in *Geography*, a town of France, in the department of the Somme, and chief place of a canton, in the diſtrict of Péronne; ſix miles E.N.E. of Péronne. The place contains 1122, and the canton 14,428 inhabitants, on a territory of 190 kiliometres, in 23 communes.

ROKEJECA, in *Botany*, an Arabic name, inadmiſſible in ſyſtematic language, applied by Forſkall, Fl. Ægypt-Arab. 90, and adopted by Juſſieu, Gen. 313, for a ſuppoſed genus of the natural order of *Portulaceæ*, found in ſandy waſte ground about Cairo. Juſſieu ſuppoſes it akin to *Trianthema*. The *capſule* however is ſaid to have only one cell, and there is a *corolla* of five petals. We know not that thoſe who have ſeen Forſkall's ſpecimens, have thrown any light on this ſubject.

ROKETNITZ, a town of Bohemia, in the circle of Konigingratz; ſeven miles N. of Geyerſberg.

ROKHAGE. See AROKHAGE.

ROKIT, CAPE, a cape on the N. coaſt of Africa, at the entrance into the ſtraits of Babelmandeb; 60 miles W. of cape Guardefai.

ROKITNO, a town of Lithuania, in the palatinate of Brzeſk; 72 miles E.S.E. of Pinſk.

ROKITZANY, a town of Bohemia, in the circle of Pilſen; eight miles E. of Pilſen.

ROKOL, an iſle, or rather large rock, which, according to M. Kerguelen, is ſituated in N. lat. 57° 50′, and long. 16° W. of Paris; or about 5° S.W. of St. Kilda.

ROKOSNIA, a town of Poland, in the palatinate of Braclaw, on the Bog; 16 miles W.N.W. of Braclaw.

ROLAND, DE LA PLATIERE, J. M., in *Biography*, born at Villafranche, near Lyons, of a family diſtinguiſhed in the profeſſion of the law. He was the youngeſt of five brothers, left orphans and without fortune. To avoid entering into the church, like his elder brothers, he left home at the age of nineteen, alone, without money, or friends; he traverſed a part of France on foot, and arrived at Nantes, intending to embark for India. He was, however, diſſuaded from this project, by a merchant who had ſeen him throw up blood, and who was aware that the climate of the Eaſt would infallibly kill him. He accordingly went to Rouen, engaged in the direction of ſome manufactories; diſtinguiſhed himſelf there by his love of ſtudy, and his taſte for economical and commercial purſuits; and obtained the place of inſpector-general at Amiens, and then at Lyons. Having travelled in Italy, Switzerland, and other countries, he accumulated a great maſs of valuable information, particularly in what related to the arts, which, on his return, gained him admiſſion into a great number of learned ſocieties. Early in the revolution he became a member of the municipality of Lyons, and founded there a club, which he connected with the Jacobin club of Paris. In 1790 he went to the capital, took a decided ſhare with the popular party, and in March 1792, was raiſed to the adminiſtration of the interior. He ſeems now to have poſſeſſed an enthuſiaſtic love and attachment to a republican form of government. The firſt day that he appeared before the king, he went with ſtraight undreſſed hair, a black coat, and ſhoes without buckles; his behaviour was, at the ſame time, ſo very uncourtly, that his majeſty diſmiſſed him a very ſhort time before he himſelf was reduced to ſcenes of adverſity and the moſt poignant diſtreſs. From this time Roland attached himſelf more than ever to the Jacobins, and was probably deeply implicated in the buſineſs of the 20th of June and 10th of Auguſt of that ſame year. He deprecated, however, the cruelties of the 2d of September, and denounced the horrors that were tranſacting under the maſk of patriotiſm. As the violent gained aſcendency, Roland was declining in credit. On the 20th of January 1793, he, as member of the proviſional executive council, ſigned the order for the execution of the king: this was one of his laſt official acts: yielding to the voice of the Mountain faction he reſigned, and was involved in the proſcription which iſſued againſt the Briſſotines; but he contrived to eſcape from Paris, and conceal himſelf among his friends at Rouen: as ſoon, however, as he heard of his wife's execution, he determined not to ſurvive her. He ſtabbed himſelf near the high road, leaving a paper containing the following lines; "whoever you may be that find me lying here, reſpect my remains; they are thoſe of a man who devoted his whole life to being uſeful, and who died, as he lived, virtuous and honeſt." Roland was kind and obliging to his friends, but the iraſcibility of his temper made him many enemies. He was deeply read in the learned, and in ſeveral modern languages, and was author of the following works: "An Eſſay on the Rearing of Flocks and the Improvement of Wool;" "The Art of the Woollen-Cloth Printer, of the Cotton-Velvet Maker," &c. This work forms the Compendium of Mechanical Arts, publiſhed by the Academy of Sciences. "Letters written from Switzerland, Italy, Sicily, and Malta, in 1782." A new edition of this work was publiſhed in 1800. They are addreſſed to a lady whom he ſoon after married, and are filled with uſeful views and intereſting accounts of the manufactories of various countries. See the next article.

ROLAND, MARIE-JEANNE PHILEPON, wife of the preceding, was born at Paris in 1754. She was the daughter of an eminent engraver, who, though highly diſtinguiſhed in his profeſſion, had brought himſelf to ruin by extravagance and diſſipation. The daughter, brought up in the midſt of the fine arts, ſurrounded by books, pictures, and muſic, became learned and ſkilled in muſic and painting. Though not what might be called regularly handſome, her perſon was attractive, and her character excited general admiration in the circle in which ſhe moved. Her mother dying while ſhe was young, ſhe was obliged, owing to the ruined fortunes of her father, to ſeek an aſylum in a convent. Here ſhe lived in honourable ſolitude, ſubmitting cheerfully to the privations which were found neceſſary in her reduced ſituation, while ſhe took every means to improve her mind by ſtudy. In 1780, Roland addreſſed to her, as we have ſeen, his letters on Italy, and offered her his hand. She accepted the offer, and when married they went to Amiens, where ſhe ſtudied botany, and made an herbal of the plants of Picardy. She afterwards, in 1787, viſited Switzerland and

and England, and was led, from what ſhe obſerved in the conſtitutions of thoſe countries, to ſtudy the theory of government, the reſult of which was an ardent attachment to the principles of liberty. M. Roland having been appointed inſpector of the manufactories at Lyons, was deputed to the conſtituent aſſembly, to obtain from it ſuccours neceſſary for the payment of the debt of that town. Madame Roland at this period ſettled with her huſband in the capital, and took delight in receiving at her houſe the chief of the popular party, and the moſt diſtinguiſhed deputies of the Gironde, that is, of the Briſſotine party. Briſſot, Barbaroux, Louret, Claviere, and Vergniaud, were admitted there; ſhe not only infuſed ardour into their political deliberations, but is ſuppoſed, in many caſes, to have been ſomething more than ſecretary, inditing as well as writing their moſt celebrated papers: for a time, ſhe was the ſecret power that directed the whole government of France. In the month of March 1792, when the king found it neceſſary, in order to allay the public diſcontents, to nominate a popular adminiſtration, Roland was appointed miniſter of the interior: the principal part of his labours was generally attributed to madame Roland; ſo much ſo, that when he reſigned, and was urgently preſſed by the aſſembly to reſume his functions, Danton exclaimed, "if we give an invitation to Roland, we muſt give one to his wife too. I know all the virtues of the miniſter, but we want men who ſee otherwiſe than by their wives." According to the memoirs which ſhe wrote of herſelf, ſhe was in fact the miniſter without the name: ſhe reviſed, or perhaps dictated, the letter which Roland addreſſed to the king on going out of office; "if he had written ſermons," ſaid ſhe, "I ſhould have done the ſame." On the 7th of December 1792, having appeared at the bar of the national convention, to repel a denunciation made againſt her, ſhe ſpoke with eaſe and eloquence, and was afterwards admitted to the honours of a ſitting. She preſented herſelf there again, when the decree was paſſed againſt her huſband; but then, the power of eloquence having loſt its charms in the ruffian breaſts of the ſenators, ſhe was refuſed a hearing, and was herſelf ſent to the Abbaye, that dreadful bourn, from whoſe gate few paſſed but to a mock-trial and ſavage execution. From this abode of miſery ſhe wrote to the aſſembly, and to the miniſter of the interior; her ſection alſo demanded for her liberty, but it was in vain; and on the 24th of June 1793, ſhe was ſent to the convent of St. Pélagie, which had been converted into a priſon, where ſhe paſſed her time in conſoling her fellow priſoners, and compoſing an account of her own life, and of the tranſactions of which ſhe had been the eye-witneſs, and in many of which ſhe had been an actor. At length ſhe was called before the revolutionary tribunal, and underwent an examination with calmneſs and ſerenity, diſturbed only when one of the ermined ſavages put to her queſtions offenſive to her modeſty. On the 8th of November ſhe was condemned to death for having conſpired againſt the unity and indiviſibility of the republic. Her execution immediately followed. On paſſing the ſtatue of liberty, in the Place de la Revolution, ſhe bent her head towards it, exclaiming, "O Liberty, how many crimes are perpetrated in thy name." Madame Roland was a woman capable of inſpiring all the elevated ſentiments that ſhe felt; with the grace and animation of one ſex, ſhe poſſeſſed the firmneſs and ſolidity of the other; and ſhe was generally admitted to be ſuperior to all the men of the party with whom her huſband acted. She particularly excelled in the penetration and knowledge of the human character. She left one daughter, whoſe only proviſion was her mother's writings, which are as follow: "Opuſcules," on moral topics, which treat of the ſoul, melancholy, morality, old age, friendſhip, love, retirement, &c.; "Voyage en Angleterre et en Suiſſe;" and when in priſon ſhe compoſed what ſhe entitled, "Appel à l'impartiale Poſteritè," containing hiſtorical notices, anecdotes, and her own private memoirs. This work preſents many well-drawn characters of that period, with the pureſt ſentiments of public and private morality. Her own memoirs are extremely valuable, as giving a picture of life and manners in the middle ranks of life in France, with a view of the progreſs of a mind which was unqueſtionably one of the higheſt order with reſpect to virtue and intellect. Biog. Moderne, 3 vols. 1814. Biographical Anec. of the Fr. Revol.

ROLAND, or ORLANDO, the poetical hero of Boiardo, Berni, and Arioſto, and nephew of Charlemagne, celebrated in ſome ancient military ſongs; for an account of which, ſee CHANSON. One of theſe begins with the following verſe:

"Let ev'ry valiant ſon of Gaul
Sing Roland's deeds, her greateſt glory,
Whoſe name will ſtouteſt foes appal,
And feats inſpire for future ſtory."

See Burney's Hiſt. of Muſic, vol. ii. p. 277.

ROLANDINO, an early Italian hiſtorian, was the ſon of a notary at Padua, in which city he was born, in the year 1200. He ſtudied at Bologna, and in 1220 received the honorary title of maſter and doctor in grammar and rhetoric. He had kept a chronicle of memorable events as they occurred, and put his papers into his ſon's hands after he returned from Bologna, with a charge to continue them. This he executed with care and fidelity to the year 1260, when he was urged to reviſe and complete his work. He employed two years in this reviſion; and in 1262, his chronicle, in twelve books, in the Latin language, was read publicly before the univerſity of Padua, ſubmitted to an attentive examination, and ſolemnly approved. Rolandino died in 1276. His hiſtory is accounted one of the moſt exact and faithful records of that time. Though his ſtyle is not free from barbariſms, his narrative is clear and well arranged. Voſſius affirms, that he ſurpaſſed all the writers of his age in perſpicuity, order, and judgment, and that he ſhewed himſelf well verſed in ſacred and profane literature. An edition of his work, with other chronicles, was given at Venice in 1636, by Felix Oſius, and it has been reprinted by Muratori, in the 7th volume of his Italian hiſtorians.

ROLANDRA, in *Botany*, ſerves to commemorate Daniel Rolandra, a pupil of Linnæus, who viſited Surinam, and communicated an account of the *Doliocarpus* to the Academy of Stockholm, which appeared in the 17th volume of the Tranſactions of that learned body, publiſhed in 1756. Several of his papers on Entomology are to be found in the ſame collection. He was almoſt the only naturaliſt, educated by Linnæus, whoſe character diſappointed the hopes of his preceptor; but he is ſaid to have been ſtill more unfortunate, than negligent or ungrateful. We know no particulars of his hiſtory. The name was given by Rottböll, in the Collectanea of the Medical Society at Copenhagen, v. 2. 256. —Schreb. Gen. 593. Willd. Sp. Pl. v. 3. 2400. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 186. Swartz Prodr. 116. Ind. Occ. v. 3. 1388. (See Juſſ. 176.)—Claſs and order, *Syngeneſia Polygamia-ſegregata.* Nat. Ord. *Compoſitæ capitatæ*, Linn. *Cinaroceph alæ*, Juſſ.

Gen. Ch. *Common Calyx* none. Florets cluſtered into a roundiſh head, the cluſters diſtinct, ſtalked, ſeparated by numerous, ovate or lanceolate, awned ſcales, ſhorter than the florets. Partial perianth chaffy, of two unequal, compreſſed,

preſſed, keeled valves; the upper one largeſt, awned, encloſing the other, which is pointed. *Cor.* of each floret very minute, of one petal, funnel-ſhaped; tube long, thread-ſhaped; limb in five very ſhort, erect, acute ſegments. *Stam.* Filaments in each floret, five, ſhorter than the tube; anthers united into a cylinder, below the throat. *Piſt.* Germen, in each floret, triangular, compreſſed, acute at the baſe, abrupt at the ſummit; ſtyle the length of the tube, divided at the top; ſtigmas tumid, erect. *Peric.* none, the ſeed being encloſed in the unchanged partial calyx. *Seed* triangular, crowned with a toothed border.

Eſſ. Ch. Common Calyx none. Perianth of two valves, ſingle-flowered. Florets all perfect. Seed with a toothed crown.

Obſ. Rottböll deſcribes the corolla of each floret as four-cleft; Swartz found it always five-cleft, with five ſtamens.

1. R. *argentea*. Silver-leaved Rolandra. Swartz Ind. Occ. v. 3. 1389. Willd. n. 1. Ait. n. 1. (Echinops fruticoſus; Linn. Sp. Pl. ed. 1. 815? Amaranthoides fruticoſum, foliis longis, anguſtis, ſubtùs niveis; Sloane Jam. v. 1. 43. t. 7. f. 3.)—Native of Jamaica, Cayenne, and Surinam. Cultivated in Chelſea garden, before the year 1714, and ſaid to flower in the ſtove in July. We have never met with the living plant. The *ſtem* is ſhrubby, erect, branched, round, reddiſh; the young branches whitiſh and downy. *Leaves* ſtalked, alternate, ovato-lanceolate, minutely ſerrated, about two inches long, ribbed; green and ſhining, but roughiſh to the touch, on the upper ſide; ſnow-white and downy beneath. There are uſually axillary tufts, of a few much ſmaller leaves. *Flowers* in ſmall, round, ſeſſile, ſolitary, axillary, whitiſh heads.—Plumier's Echinops, t. 125. f. 1, which Linnæus adopted from him under the name of *fruticoſus*, without ſeeing a ſpecimen, but afterwards rejected, bears too little reſemblance to Sloane's plant to be conſidered, with any probability, as the ſame.

ROLAS, in *Geography*, a ſmall iſland in the Atlantic, near the S.W. coaſt of the iſland of St. Thomas.

ROLDUC, a town of France, in the department of the Lower Meuſe, and chief place of a canton, in the diſtrict of Maeſtricht; called, in the language of the country, "Hertogenrode," formerly well fortified, but greatly demoliſhed by wars, and the capital of a county, which contained a great number of villages; 10 miles S.W. of Juliers. The place contains 940, and the canton 11,196 inhabitants, on a territory of 100 kiliometres, in 12 communes. N. lat. 50° 52′. E. long. 6° 5′.

ROLE, a town of Bengal; 25 miles S.S.E. of Palamow.

ROLEPARA, a town of Hindooſtan, in Oriſſa; 25 miles S.E. of Boad.

ROLL, in the *Manufactories*, ſomething wound and folded up in a cylindrical form.

Few ſtuffs are made in rolls, except ſattins, gauzes, and crapes, which are apt to break, and take plaits not eaſy to be got out, if folded otherwiſe. Ribbands, however, and laces, galloons, and paduas of all kinds, are thus rolled.

The ancients made all their books up in form of rolls, or little columns; and, in Cicero's time, the libraries conſiſted wholly of thoſe rolls. The dearneſs of parchment, and the cheapneſs of papyrus, of which the rolls were made, was the reaſon that ſcarcely any but paper rolls were uſed.

Voſſius ſays, they paſted ſeveral ſheets end to end, when filled on one ſide, and rolled them up together, beginning with the laſt, which they called *umbilicus*, and to which they faſtened an ivory or boxen ſtick, to ſuſtain the roll. To the other extremity they paſted a piece of parchment, to cover and preſerve it.

Theſe rolls were placed in the libraries perpendicularly to the horizon. The Jews ſtill preſerve the ancient uſage of rolls for the books they read in the ſynagogues.

ROLL, *To*, in *Military Language*, is to continue one uniform beat of the drum, without variations, for a certain length of time. When a line is advancing in full front, or in echellons, for any conſiderable diſtance, the muſic of one regulating battalion may, at intervals, be permitted to play for a few ſeconds at a time, and the drums of the other battalions may be allowed occaſionally to roll: drums likewiſe roll when troops are advancing to charge. For the method of performing the roll, ſee *Roll*, under DRUM.

ROLL, *Long*, a beat of drum by which troops are aſſembled at any particular ſpot of rendezvous or parade.

ROLL, *Short*. See *Ruffle* under DRUM.

ROLL *of Tobacco*, is tobacco in the leaf, twiſted in the mill, and wound twiſt over twiſt, about a ſtick or roller.

The generality of tobacco in America is there ſold in rolls of various weights; and it is not till after its arrival in England, Spain, France, and Holland that it is cut. Roll tobacco is what is chiefly uſed, both for chewing and raſping. See TOBACCO.

ROLL *of Parchment* contains 20 ſkins.

ROLL, *Rotulus*, in *Law*, denotes a ſchedule of paper or parchment, which may be wound up by the hand into the faſhion of a pipe.

Of theſe there are, in the Exchequer, ſeveral kinds; *viz.* the great *wardrobe-roll*, the *cofferer's-roll*, the *ſubſidy-roll*, &c.

The word is formed from the French *rolle*, of the Latin *rotulus*; becauſe moſt inſtruments and expeditions in law were anciently written on papers, or parchments, ſewed or glued together, and thus rolled up: whence the word *enrol*, and the like.

ROLLS *of Parliament*, are the manuſcript regiſters of the proceedings of our ancient parliaments.

Before the uſe of printing, and till the reign of Henry VII. our ſtatutes were all engroſſed in parchment, and (by virtue of the king's writ for that purpoſe) proclaimed openly in every county.

In theſe rolls we have alſo a great many deciſions of difficult points in law, which were frequently, in former times, referred to the deciſion of that high court.

ROLL, *Rider*, a ſchedule, or ſmall piece of parchment, frequently ſewed, or added to ſome part of a roll, or record.

Noy obſerves, that the court ex-officio may award a certiorari ad informandam conſcientiam; and that which is certified ſhall be annexed to the record, and called a *rider-roll*.

ROLL is alſo uſed for a liſt of the names of ſeveral perſons of the ſame condition, or entered in the ſame engagement.

ROLL, *Court*. See COURT-*Roll*.

ROLL, *Muſter*. See MUSTER-*Roll*.

ROLL, *Size*, a liſt containing the names of all the men belonging to a troop or company, with the height or ſtature of each ſpecifically marked. Every ſerjeant keeps a regular ſize-roll, and every captain of a troop or company ought to have one likewiſe.

ROLL, *Squad*, a liſt containing the names of each particular ſquad. Every non-commiſſioned officer and corporal, who are entruſted with the care and arrangement of a ſquad, muſt have a roll of this kind.

ROLL-*Calling*, is the calling over of the ſoldiers of a troop, or company, by their names, to ſee that they are all preſent.

and England, and was led, from what ſhe obſerved in the conſtitutions of thoſe countries, to ſtudy the theory of government, the reſult of which was an ardent attachment to the principles of liberty. M. Roland having been appointed inſpector of the manufactories at Lyons, was deputed to the conſtituent aſſembly, to obtain from it ſuccours neceſſary for the payment of the debt of that town. Madame Roland at this period ſettled with her huſband in the capital, and took delight in receiving at her houſe the chief of the popular party, and the moſt diſtinguiſhed deputies of the Gironde, that is, of the Briſſotine party. Briſſot, Barbaroux, Louret, Claviere, and Vergniaud, were admitted there; ſhe not only infuſed ardour into their political deliberations, but is ſuppoſed, in many caſes, to have been ſomething more than ſecretary, inditing as well as writing their moſt celebrated papers: for a time, ſhe was the ſecret power that directed the whole government of France. In the month of March 1792, when the king found it neceſſary, in order to allay the public diſcontents, to nominate a popular adminiſtration, Roland was appointed miniſter of the interior: the principal part of his labours was generally attributed to madame Roland; ſo much ſo, that when he reſigned, and was urgently preſſed by the aſſembly to reſume his functions, Danton exclaimed, "if we give an invitation to Roland, we muſt give one to his wife too. I know all the virtues of the miniſter, but we want men who ſee otherwiſe than by their wives." According to the memoirs which ſhe wrote of herſelf, ſhe was in fact the miniſter without the name: ſhe reviſed, or perhaps dictated, the letter which Roland addreſſed to the king on going out of office; "if he had written ſermons," ſaid ſhe, "I ſhould have done the ſame." On the 7th of December 1792, having appeared at the bar of the national convention, to repel a denunciation made againſt her, ſhe ſpoke with eaſe and eloquence, and was afterwards admitted to the honours of a ſitting. She preſented herſelf there again, when the decree was paſſed againſt her huſband; but then, the power of eloquence having loſt its charms in the ruffian breaſts of the ſenators, ſhe was refuſed a hearing, and was herſelf ſent to the Abbaye, that dreadful bourn, from whoſe gate few paſſed but to a mock-trial and ſavage execution. From this abode of miſery ſhe wrote to the aſſembly, and to the miniſter of the interior; her ſection alſo demanded for her liberty, but it was in vain; and on the 24th of June 1793, ſhe was ſent to the convent of St. Pélagie, which had been converted into a priſon, where ſhe paſſed her time in conſoling her fellow priſoners, and compoſing an account of her own life, and of the tranſactions of which ſhe had been the eye-witneſs, and in many of which ſhe had been an actor. At length ſhe was called before the revolutionary tribunal, and underwent an examination with calmneſs and ſerenity, diſturbed only when one of the ermined ſavages put to her queſtions offenſive to her modeſty. On the 8th of November ſhe was condemned to death for having conſpired againſt the unity and indiviſibility of the republic. Her execution immediately followed. On paſſing the ſtatue of liberty, in the Place de la Revolution, ſhe bent her head towards it, exclaiming, "O Liberty, how many crimes are perpetrated in thy name." Madame Roland was a woman capable of inſpiring all the elevated ſentiments that ſhe felt; with the grace and animation of one ſex, ſhe poſſeſſed the firmneſs and ſolidity of the other; and ſhe was generally admitted to be ſuperior to all the men of the party with whom her huſband acted. She particularly excelled in the penetration and knowledge of the human character. She left one daughter, whoſe only proviſion was her mother's writings, which are as follow: "Opuſcules," on moral topics, which treat of the ſoul, melancholy, morality, old age, friendſhip, love, retirement, &c.; "Voyage en Angleterre et en Suiſſe;" and when in priſon ſhe compoſed what ſhe entitled, "Appel à l'impartiale Poſteritè," containing hiſtorical notices, anecdotes, and her own private memoirs. This work preſents many well-drawn characters of that period, with the pureſt ſentiments of public and private morality. Her own memoirs are extremely valuable, as giving a picture of life and manners in the middle ranks of life in France, with a view of the progreſs of a mind which was unqueſtionably one of the higheſt order with reſpect to virtue and intellect. Biog. Moderne, 3 vols. 1814. Biographical Anec. of the Fr. Revol.

ROLAND, or ORLANDO, the poetical hero of Boiardo, Berni, and Arioſto, and nephew of Charlemagne, celebrated in ſome ancient military ſongs; for an account of which, ſee CHANSON. One of theſe begins with the following verſe:

"Let ev'ry valiant ſon of Gaul
Sing Roland's deeds, her greateſt glory,
Whoſe name will ſtouteſt foes appal,
And feats inſpire for future ſtory."

See Burney's Hiſt. of Muſic, vol. ii. p. 277.

ROLANDINO, an early Italian hiſtorian, was the ſon of a notary at Padua, in which city he was born, in the year 1200. He ſtudied at Bologna, and in 1220 received the honorary title of maſter and doctor in grammar and rhetoric. He had kept a chronicle of memorable events as they occurred, and put his papers into his ſon's hands after he returned from Bologna, with a charge to continue them. This he executed with care and fidelity to the year 1260, when he was urged to reviſe and complete his work. He employed two years in this reviſion; and in 1262, his chronicle, in twelve books, in the Latin language, was read publicly before the univerſity of Padua, ſubmitted to an attentive examination, and ſolemnly approved. Rolandino died in 1276. His hiſtory is accounted one of the moſt exact and faithful records of that time. Though his ſtyle is not free from barbariſms, his narrative is clear and well arranged. Voſſius affirms, that he ſurpaſſed all the writers of his age in perſpicuity, order, and judgment, and that he ſhewed himſelf well verſed in ſacred and profane literature. An edition of his work, with other chronicles, was given at Venice in 1636, by Felix Oſius, and it has been reprinted by Muratori, in the 7th volume of his Italian hiſtorians.

ROLANDRA, in *Botany*, ſerves to commemorate Daniel Rolandra, a pupil of Linnæus, who viſited Surinam, and communicated an account of the *Doliocarpus* to the Academy of Stockholm, which appeared in the 17th volume of the Tranſactions of that learned body, publiſhed in 1756. Several of his papers on Entomology are to be found in the ſame collection. He was almoſt the only naturaliſt, educated by Linnæus, whoſe character diſappointed the hopes of his preceptor; but he is ſaid to have been ſtill more unfortunate, than negligent or ungrateful. We know no particulars of his hiſtory. The name was given by Rottböll, in the Collectanea of the Medical Society at Copenhagen, v. 2. 256. —Schreb. Gen. 593. Willd. Sp. Pl. v. 3. 2400. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 186. Swartz Prodr. 116. Ind. Occ. v. 3. 1388. (See Juſſ. 176.)—Claſs and order, *Syngeneſia Polygamia-ſegregata*. Nat. Ord. *Compoſitæ capitatæ*, Linn. *Cinaroſcephalæ*, Juſſ.

Gen. Ch. *Common Calyx* none. Florets cluſtered into a roundiſh head, the cluſters diſtinct, ſtalked, ſeparated by numerous, ovate or lanceolate, awned ſcales, ſhorter than the florets. Partial perianth chaffy, of two unequal, compreſſed,

preſſed, keeled valves; the upper one largeſt, awned, encloſing the other, which is pointed. *Cor.* of each floret very minute, of one petal, funnel-ſhaped; tube long, thread-ſhaped; limb in five very ſhort, erect, acute ſegments. *Stam.* Filaments in each floret, five, ſhorter than the tube; anthers united into a cylinder, below the throat. *Piſt.* Germen, in each floret, triangular, compreſſed, acute at the baſe, abrupt at the ſummit; ſtyle the length of the tube, divided at the top; ſtigmas tumid, erect. *Peric.* none, the ſeed being encloſed in the unchanged partial calyx. *Seed* triangular, crowned with a toothed border.

Eſſ. Ch. Common Calyx none. Perianth of two valves, ſingle-flowered. Florets all perfect. Seed with a toothed crown.

Obſ. Rottböll deſcribes the corolla of each floret as four-cleft; Swartz found it always five-cleft, with five ſtamens.

1. R. *argentea.* Silver-leaved Rolandra. Swartz Ind. Occ. v. 3. 1389. Willd. n. 1. Ait. n. 1. (Echinops fruticoſus; Linn. Sp. Pl. ed. 1. 815? Amaranthoides fruticoſum, foliis longis, anguſtis, ſubtùs niveis; Sloane Jam. v. 1. 43. t. 7. f. 3.)—Native of Jamaica, Cayenne, and Surinam. Cultivated in Chelſea garden, before the year 1714, and ſaid to flower in the ſtove in July. We have never met with the living plant. The *ſtem* is ſhrubby, erect, branched, round, reddiſh; the young branches whitiſh and downy. *Leaves* ſtalked, alternate, ovato-lanceolate, minutely ſerrated, about two inches long, ribbed; green and ſhining, but roughiſh to the touch, on the upper ſide; ſnow-white and downy beneath. There are uſually axillary tufts, of a few much ſmaller leaves. *Flowers* in ſmall, round, ſeſſile, ſolitary, axillary, whitiſh heads.—Plumier's Echinops, t. 125. f. 1, which Linnæus adopted from him under the name of *fruticoſus*, without ſeeing a ſpecimen, but afterwards rejected, bears too little reſemblance to Sloane's plant to be conſidered, with any probability, as the ſame.

ROLAS, in *Geography*, a ſmall iſland in the Atlantic, near the S.W. coaſt of the iſland of St. Thomas.

ROLDUC, a town of France, in the department of the Lower Meuſe, and chief place of a canton, in the diſtrict of Maeſtricht; called, in the language of the country, "Hertogenrode," formerly well fortified, but greatly demoliſhed by wars, and the capital of a county, which contained a great number of villages; 10 miles S.W. of Juliers. The place contains 940, and the canton 11,196 inhabitants, on a territory of 100 kiliometres, in 12 communes. N. lat. 50° 52′. E. long. 6° 5′.

ROLE, a town of Bengal; 25 miles S.S.E. of Palamow.

ROLEPARA, a town of Hindooſtan, in Oriſſa; 25 miles S.E. of Boad.

ROLL, in the *Manufactories*, ſomething wound and folded up in a cylindrical form.

Few ſtuffs are made in rolls, except ſattins, gauzes, and crapes, which are apt to break, and take plaits not eaſy to be got out, if folded otherwiſe. Ribbands, however, and laces, galloons, and paduas of all kinds, are thus rolled.

The ancients made all their books up in form of rolls, or little columns; and, in Cicero's time, the libraries conſiſted wholly of thoſe rolls. The dearneſs of parchment, and the cheapneſs of papyrus, of which the rolls were made, was the reaſon that ſcarcely any but paper rolls were uſed.

Voſſius ſays, they paſted ſeveral ſheets end to end, when filled on one ſide, and rolled them up together, beginning with the laſt, which they called *umbilicus*, and to which they faſtened an ivory or boxen ſtick, to ſuſtain the roll. To the other extremity they paſted a piece of parchment, to cover and preſerve it.

Theſe rolls were placed in the libraries perpendicularly to the horizon. The Jews ſtill preſerve the ancient uſage of rolls for the books they read in the ſynagogues.

ROLL, *To*, in *Military Language*, is to continue one uniform beat of the drum, without variations, for a certain length of time. When a line is advancing in full front, or in echellons, for any conſiderable diſtance, the muſic of one regulating battalion may, at intervals, be permitted to play for a few ſeconds at a time, and the drums of the other battalions may be allowed occaſionally to roll: drums likewiſe roll when troops are advancing to charge. For the method of performing the roll, ſee *Roll*, under DRUM.

ROLL, *Long*, a beat of drum by which troops are aſſembled at any particular ſpot of rendezvous or parade.

ROLL, *Short*. See *Ruffle* under DRUM.

ROLL *of Tobacco*, is tobacco in the leaf, twiſted in the mill, and wound twiſt over twiſt, about a ſtick or roller.

The generality of tobacco in America is there ſold in rolls of various weights; and it is not till after its arrival in England, Spain, France, and Holland that it is cut. Roll tobacco is what is chiefly uſed, both for chewing and raſping. See TOBACCO.

ROLL *of Parchment* contains 20 ſkins.

ROLL, *Rotulus*, in *Law*, denotes a ſchedule of paper or parchment, which may be wound up by the hand into the faſhion of a pipe.

Of theſe there are, in the Exchequer, ſeveral kinds; *viz.* the great *wardrobe-roll*, the *cofferer's-roll*, the *ſubſidy-roll*, &c.

The word is formed from the French *rolle*, of the Latin *rotulus*; becauſe moſt inſtruments and expeditions in law were anciently written on papers, or parchments, ſewed or glued together, and thus rolled up: whence the word *enrol*, and the like.

ROLLS *of Parliament*, are the manuſcript regiſters of the proceedings of our ancient parliaments.

Before the uſe of printing, and till the reign of Henry VII. our ſtatutes were all engroſſed in parchment, and (by virtue of the king's writ for that purpoſe) proclaimed openly in every county.

In theſe rolls we have alſo a great many deciſions of difficult points in law, which were frequently, in former times, referred to the deciſion of that high court.

ROLL, *Rider*, a ſchedule, or ſmall piece of parchment, frequently ſewed, or added to ſome part of a roll, or record.

Noy obſerves, that the court ex-officio may award a certiorari ad informandam conſcientiam; and that which is certified ſhall be annexed to the record, and called a *rider-roll*.

ROLL is alſo uſed for a liſt of the names of ſeveral perſons of the ſame condition, or entered in the ſame engagement.

ROLL, *Court*. See COURT-*Roll*.

ROLL, *Muſter*. See MUSTER-*Roll*.

ROLL, *Size*, a liſt containing the names of all the men belonging to a troop or company, with the height or ſtature of each ſpecifically marked. Every ſerjeant keeps a regular ſize-roll, and every captain of a troop or company ought to have one likewiſe.

ROLL, *Squad*, a liſt containing the names of each particular ſquad. Every non-commiſſioned officer and corporal, who are entruſted with the care and arrangement of a ſquad, muſt have a roll of this kind.

ROLL-*Calling*, is the calling over of the ſoldiers of a troop, or company, by their names, to ſee that they are all preſent.

This neceſſary duty is performed by the ſerjeants of companies, morning and evening, in every well-regulated corps. Hence we have "morning roll-call," and "evening roll-call," on critical occaſions; and in ſervices that require promptitude and exertion, frequent roll-calls ſhould be made.

Roll, *Calves-head*, is a roll in the two Temples, in which every bencher is taxed yearly at 2*s*., every barriſter at 1*s*. 6*d*., and every gentleman under the bar at 1*s*. to the cook, and other officers of the houſe, in conſideration of a dinner of calves-heads, provided in Eaſter term.

Roll, *Ragman's*, or *Ragimund's Roll*, is a roll denominated from *Ragimund*, a papal legate in Scotland; who, calling before him all the people who held benefices in that kingdom, cauſed them, upon oath, to give in the value of their eſtates, according to which they were taxed in the court of Rome.

Rolls, or *Office of Rolls*, in Chancery-lane, London, is an office appointed for the cuſtody of the rolls and records in chancery.

The maſter of this office is the ſecond perſon in that court; and, in the abſence of the lord chancellor, he ſits as judge. See Master *of the Rolls*.

This houſe, or office, was anciently called *Domus Converſorum*, as being appointed, by king Henry III., for the uſe of converted Jews; but their irregularities occaſioned king Edward II. to expel them thence: upon which, the place was deputed for the cuſtody of the rolls.

Rolls, *Clerk of the*. See Clerk *of the Rolls*.

Rolls, or *Roul*, among *Military Men*. See Roul.

Roll, *Bead*. See Bead-*Roll*.

Roll, *Check*. See Check-*Roll*.

Roll, *Counter*. See Counter-*Roll*.

Roll, in *Antiquity*. From the time of Anaſtaſius, we find in the hands of the emperors, on medals, a kind of narrow long roll, or ſachel; the meaning of which has greatly puzzled the antiquaries.

Some imagine it to be a roll or bundle of papers, memoirs, petitions, &c. preſented occaſionally to princes, conſuls, and the like. Others take it to be a plaited handkerchief, which the perſons who preſided at the games caſt forth as a ſignal for their beginning. Others will have it a bag of duſt and aſhes, preſented the emperor at the ceremony of his coronation, and called *akakia*, *q. d.* a means of preſerving innocence, by the remembrance of duſt, &c.

Roll, or *Roller*, is alſo a piece of wood, of a cylindrical form, uſed in the conſtruction of ſeveral machines, and in ſeveral works and manufactures; though ſometimes under other names.

It is on ſuch rolls, properly called *beams*, that the woollen, ſilken, and other threads are wound, of which the weaver's works conſiſt. For which end, each loom has uſually two, and that of the gauze-weavers three.

In the glaſs manufacture, they have a running-roll, being a thick cylinder of caſt braſs, ſerving to conduct the melted glaſs to the end of the table, on which large looking-glaſſes are to be caſt.

The founders alſo uſe a roller to work the ſand which they uſe in making their moulds.

The preſſes called calenders, as ſerving to calender ſtuffs, conſiſt, among other eſſential parts, of two rollers.

It is alſo between two rollers that the waves are given to ſilks, mohairs, and other ſtuffs proper to be tabbied.

Prints, or impreſſions, from copper-plates, are alſo taken by paſſing the plate and the paper between two rollers. See *Rolling-preſs* Printing, and Copper-*Plate Work*.

Rolls, in *Coining*, are two iron inſtruments, of a cylindrical figure, which ſerve to draw or ſtretch out the plates of gold, ſilver, and other metals, of which the planks or pieces are to be formed for the ſpecies.

Rolls, in *Printing*, are two large cylinders or barrels of wood faſtened in the middle of what they call the cradle or gallows of the preſs; and which, by means of a cord or girt paſſing over each, and a handle which gives motion to one of them, draw the carriage of the preſs backwards and forwards. See Printing.

Rolls, in the *Sugar-Works*, are two large iron barrels, which ſerve to bruiſe the canes, and expreſs the juice. They are caſt hollow, and their cavities are filled up with wood, the cylinders of which are properly the rollers.

Rolls, or *Rollers*, among *Carpenters*, *Maſons*, &c. are plain cylinders of wood, ſeven or eight inches in diameter, and three or four feet long; uſed for the removing of beams, huge ſtones, and other like burdens, which are cumberſome, but not exceedingly heavy.

Theſe rollers are placed, ſucceſſively, under the fore-part of the maſſes to be removed; which, at the ſame time, are puſhed forward by levers, &c. applied behind.

Rolls, *Endleſs*. When blocks of marble, or other exceſſive heavy loads, are to be removed, they uſe what they call *endleſs* rolls.

Theſe, to give them the greater force, and prevent their burſting, are made of wood joined together by croſs-quarters; they are about double the length and thickneſs of the common roller, and, beſides, are girt with ſeveral large iron hoops at each end. At a foot's diſtance from the ends are four mortiſes, or rather only two, but pierced through and through, into which are put the ends of long levers which the workmen draw by ropes faſtened to the ends, ſtill changing the mortiſe, as the roll has made a quarter of a turn.

Roll-*rich Stones*, in *Antiquity*, a ſeries of huge ſtones, ranged in a circle, near Morton in the Marſh, in Oxfordſhire. There are many fabulous traditions about them. Among the antiquaries, ſome take them to be a monument of a victory; others, a burying place; and others, a place for the coronation of the Daniſh kings.

Near Penros, in Cornwall, is a like monument.

ROLLAND, in *Geography*, an iſland in the South Indian ſea, diſcovered by Kerguelen in the year 1773, ſo called by him after the name of the veſſel in which he ſailed; about nine miles in circuit. N. lat. 48° 37′. E. long. 68° 43′.

ROLLE, Michael, in *Biography*, a French mathematician, was born at Ambert, a ſmall town in Auvergne, in the year 1652. His father was in rather low circumſtances, and placed him to gain his livelihood, at firſt with a notary, and afterwards with different country attornies. Diſguſted with an occupation ſo little ſuited to his genius, at the age of 23 he went to Paris, depending for his ſupport on his penmanſhip. At firſt he taught writing and the early rules of arithmetic: from arithmetic he advanced by gradual ſteps to algebra, to which he became ſo enthuſiaſtically attached, that he ſpent every leiſure moment in the ſtudy till he became diſtinguiſhed in that branch of ſcience. In 1682, the learned Ozanam having propoſed a difficult mathematical problem to exerciſe the ingenuity of mathematicians, M. Rolle ſent him a very clear ſolution of it, together with methods which he had invented of ſolving other problems, attended with ſtill greater difficulty. The miniſter Colbert, always the patron of talent, having heard of Rolle, determined to draw him out of the obſcurity in which he had hitherto been concealed, and ſettled on him a penſion. He now gave up the occupation of a writing maſter, and devoted himſelf entirely to the ſtudy of algebra, and the other

other branches of pure mathematics; and so great was his success, that in 1685, three years only after his name was first known in the mathematical world, he was chosen a member of the Academy of Sciences. In the year 1690, M. Rolle published a treatise on Algebra, which was followed by a new work, entitled "A Demonstration of a Method for the Resolution of Equations of all degrees;" to which succeeded two other methods; by the first of which the same equations are resolved geometrically; and by the second, several unresolved questions of Diophantus are answered. In the year 1699 he published a work, entitled "A Method of resolving indeterminate Questions in Algebra," and he was appointed second geometrical-pensionary of the Academy of Sciences. About this time he united with that party in the Academy which opposed the new geometry, and carried on a controversy against the marquis de l'Hôpital, on the subject of infinitesimals, till the society imposed silence on all the disputants. M. Rolle thought that his favourite science, algebra, was capable of almost indefinite improvement, and he announced his design of drawing up entirely new elements, but death put an end to his plans. He died in 1719, in the 68th year of his age, having uniformly borne an excellent character for piety, probity, and amiable manners. Besides the works already mentioned, many curious papers were communicated by him to the Academy of Sciences, and may be found in their "Memoirs," from the year in which he took his seat in that body till 1714. The higher branches of the mathematics are the subjects of almost all these papers.

Rolle, Johann Heinrich, the youngest of three brothers, all eminent musicians, and sons of a father who, as music director at Magdeburg, had rendered the name illustrious. Henry, who succeeded his father as music-director in his native city, was born in 1718, and died in 1785. He was an excellent composer for the church, as well as author of pieces for the organ and harpsichord of great merit. His oratorio of "Thirsa and her Sons," is full of good taste, new passages, pleasing effects, and true pathos.

Rolle, Fr. a part in *Music* and *Dramatic Works*. The French have a distinct term in music for a vocal and instrumental part in an opera or concert. The singer's or the actor's part in an opera or play, is equally termed *rolle;* in a concert or opera each instrumental part is called *partie*. We make no distinction, in England, between a vocal or instrumental part in an opera or concert: each is called part: as the part of Hamlet, in a play, of Mandane, in an opera; the first violin, tenor, or violoncello part needs no other distinction than the name of the character, or instrument.

Rolle, in *Geography*, a town of Switzerland, and capital of a lordship, situated on the N.W. side of the lake of Geneva; 14 miles S.W. of Lausanne.

ROLLER. See Roll.

Roller, in *Gunnery*, a round piece of wood of about nine inches diameter, and four feet long, which serves in moving mortars from one place to another, when near. This is done by raising the fore-part of the bed so high that a roller may be laid under it; then pushing the bed forwards, and laying another in its way, and another before that, and so on, the mortar is easily moved.

Roller is also a small wheel placed at the foot of the hammer of a gun, or pistol-lock, in order to lessen the friction of it against the hammer or feather-spring.

Roller, in *Agriculture*, a well-known implement formed of wood, cast-iron, or stone, so as to turn upon its axis, and be drawn over the surface of the land by means of horses, for the purpose of reducing the lumpy or cloddy state of tillage lands, and rendering these, as well as those of the grass kind, smooth and even. They are constructed in different ways for different purposes, and of different sizes and weights to suit different uses in husbandry. They are, however, in general distinguished into the tillage and grass kind. It has been a matter of dispute, whether rollers with large or small diameters have the advantage, in point of effect upon the land. It is probable that there may be inconveniencies in both extremes. The roller should not, however, be so small as to require much loading, as by such means much time and labour are lost. A late practical writer, however, advises that in constructing heavy rollers, the workmen should be careful that they have not too great a diameter, whatever the material be of which they are formed, as the pressure is diminished where the implement is of very large size, by its resting on too much surface at once, except an addition of weight in proportion be made. By having the roller made small, when loaded to the same weight, a much greater effect will be produced, and a considerable saving of expence be made in the construction of the implement. And he recommends that all the larger sorts of rollers should have double shafts, in order that they may be drawn by two horses abreast; and such as are employed for arable lands should have a scraper attached to them. This addition, he thinks, saves much time, and prevents the driver the trouble of constantly scraping the machine, especially in wet seasons, and clayey tenacious lands. Strong frames are also necessary for rollers, so that proper weights may be put upon them; and open boxes or carts placed upon them may sometimes be requisite, in order to contain any additional weight that may be thought proper, as well as to receive stones or other matters that may be picked up from the ground. Pieces of wood or stone, as heavy as a man can lift, are the most suitable substances for loading these implements with, where they have not the advantage of boxes for the purpose of containing such weighty substances.

There has been much inconvenience experienced in the use of this sort of implement in turning at the ends of ridges, fields, or other places, from their not moving upon their axes, but being drawn along the surface of the ground, by which they are liable to tear it up, and make deep holes and depressions before they come again into the direct line of draught, and are not brought round without great exertion in the teams: it has therefore been attempted, in order to obviate these inconveniencies, to construct rollers in two pieces, and by the division in the middle to enable the different parts to twist round on their proper axes, one forward and the other in a retrograde direction. When formed in this way, the cylinders are best made of cast-iron, as they turn with greater ease and readiness.

Roller, *Common*. This is a sort of roller which is employed for the common purposes of tillage, and which is mostly used for rolling wheat in the spring, and grass-seeds; they are generally about five or six feet long, and from fifteen to thirty inches in diameter; but those employed for flattening one-bout ridges, in order to prepare them for drilling turnips upon, are commonly shorter and of much less diameter, and frequently attached to the drilling implement.

But of the various kinds of these rollers that are made use of, Mr. Morley of Newark thinks that those of the best construction, and which answer the most perfectly in practice, are such as are made of cast-iron, and divided into two parts: the length from three feet to three feet six inches, covering a surface of from six to seven feet, and being above ten hundred weight: the frame should be made in

in a ſtout manner, with ſhafts for one horſe, to be fixed on the near ſide, and hooks put in on the other ſide in order to have recourſe to an additional horſe when it may be neceſſary. The gudgeons or pivots ſhould act upon ſmall caſe-hardened friction-wheels, two to be fixed upon each ſide the frame; with a ſmall roller made of hard wood, about nine inches long and three inches in diameter, bound at each end with iron, and to be fixed to the back part of the frame, ſo that both rollers may act with each other in the centre wheel, which will be a means of keeping the great roller ſteady, and at the ſame time very much diminiſh the draught of the implement.

And it is obſerved in the Agricultural Report of Norfolk, that Mr. Prieſt of Beſthorpe uſes a roller that is divided in two parts, riſing and falling in the centre, for the purpoſe of rolling the ſlopes of ridges. And that the ſame uſeful tool is in practice in Suffolk by the Rev. Mr. Hill.

In Dengey and Rochford hundreds, in the county of Eſſex, where the wire-worm has long been ſo very deſtructive to the grain crops, an extremely heavy ſtone roller is a common implement on every farm; they are made ſix or ſeven feet long, and eighteen inches, and ſome more, in diameter, weighing from one and a half to two tons.

In Devonſhire they uſe heavy granite and moor-ſtone rollers with two horſes, which are from five to eight feet in length, and of proportionate diameters, for rolling wheat and paſture grounds, as well as for aiding the operation of ſeparating the ſpine from the mould on the burn-beat-lands, in preparation for the former crop and turnips.

In many other diſtricts heavy ſtone rollers, of the free-ſtone and other kinds, are preferred to all other ſorts for tillage uſes.

Roller, *Compound.* This is an implement of the roller kind, conſtituted of the plane or common and ſpike kinds united in the ſame frame; but it is capable of being uſed ſeparately, and its weight varied according to the nature or circumſtances of the land. It is the ingenious invention of Mr. Amos of Lincolnſhire, in which the ſpike part of the roller is made of a piece of oak wood, ſeven feet long, and fifteen inches and a quarter in diameter, hooped with iron at each end. The inventor adviſes in conſtructing it to divide the circumference of this roller into twelve equal parts, from which to draw parallel lines, one diviſion oblique the whole length of the roller. On the firſt of theſe lines to ſet off two inches at each end, and divide the remainder into twenty equal parts, of four inches each. On the ſecond line to ſet off four inches at each end, and divide the remainder into nineteen equal parts; and ſo of all the other lines alternately. In every diviſion to fix an iron ſpike, ſo that there will be twenty ſpikes in one row, and nineteen in the other, throughout the whole circumference, making in all two hundred and thirty-four ſpikes. That part of the ſpike which projects out of the wood is four inches long, one inch ſquare at the circumference of the roller, and three-quarters of an inch ſquare at the point. The tongue, which goes into the wood, is four inches long, ſeven-eighths of an inch ſquare at the circumference of the roller, and tapers to a point at the end. The plain roller is made of a piece of oak wood, ſeven feet long and eighteen inches diameter. In the centre of each end of both rollers are fixed iron buſhes of two inches diameter. The bow part of the left-hand ſide of the frame is made of iron, four inches broad, half an inch thick, and is a ſegment of a circle twenty-ſeven and a half inches radius, fixed for turning the roller upſide down. The ſtring part of the bow is five feet two inches long, and eight by three inches ſquare, made of oak wood. In theſe pieces are fixed gudgeons of two inches diameter, on which the rollers move, and at four feet one and a half inch aſunder. The four ſhafts are eleven feet long, ſix by three and a half inches ſquare at the hinder ends, through which the centre-bolt paſſes. There are four bars four by one and a half inches ſquare, and three and a half feet long, for bracing the ſhafts together. And two bars eight feet long, and three by eight inches ſquare, with double tenons at each end, for bracing the outſide frames together. In the outer ends of theſe tenons are linchpins for the convenience of taking the machine to pieces. The centre-bolt is made of hammered iron, two and a quarter inches diameter; at one end is a round head, at the other a linchpin. The principal uſe of this bolt is to give the uppermoſt roller inclination forward when working, and the degree of inclination is governed by the breadth of, and the diſtance between the two braces, which reſt upon the ſhafts when the roller is at work, ſo as to make the horſes carry a little weight on their backs, otherwiſe it would be in danger of endeavouring to fall backward. The diſtance between them is twelve or ſix inches from the centre-bolt. This implement is found of vaſt uſe in reducing the ſtubborn ſorts of ſoil to a fine ſtate of mould, or what is termed tilth by farmers. The ingenious inventor remarks, that it affords the farmer a command over dry ſeaſons, and enables him to ſow his ſpring and fallow crops in proper time. It likewiſe, he thinks, furniſhes him with the means of cleaning his tillage lands from weeds, whether of the root or ſeed kind. After paſſing this ſort of roller two or three times over the land, with drag harrowing in the intervals, he ſuppoſes it would be rendered ſufficiently fine for any purpoſe that it may be wanted for. And that when the cloddy ſurface is reduced to ſuch a condition as to be incapable of being longer acted upon by the ſpike roller, the plane roller may be had recourſe to with the dry harrow. It is likewiſe ſtated to be of great advantage in reſtoring ſuch graſs-lands as have the ſward in a degenerated ſtate. See Rolling.

Roller, *Concave.* The bellying or furrow-rollers have been in common uſe ſome length of time, in moſt tillage parts of the country; but the concave ones have perhaps never yet been met with, except about Bradwell, in the county of Eſſex. They are there made the ſmalleſt in the middle, ſwelling out to a large circumference at each end. The whole of the farmers thereabouts highly approve of this kind of roller, having very generally adopted it. It is made of ſuch lengths as to ſuit the differences of the ridges or ſtitches, which are made uſe of in cultivating the ground. And it has a ſcraper attached to it, for taking away the cloggy mould that hangs upon it. The moſt uſual length of the roller part is ſeven feet two inches; to the extremities or outſides of the frame, ſeven feet nine inches; the length of the ends of the frame, four feet three inches; the diameter of the roller at the ends, one foot ten inches; in the concave part in the middle, one foot four inches; the circumference in the ſame place, four feet. A repreſentation of it may be ſeen in the firſt volume of the Agricultural Report of Eſſex.

Roller, *Drill.* This is a roller originally contrived for the purpoſe of forming drills in dry light ſoils, for putting the grain in; but which is likewiſe found uſeful in reducing cloddy rough tillage land into a ſtate of pulverization and fineneſs. The invention of it has by ſome been aſcribed to the Norfolk farmers; but the writer of the Agricultural Survey of that diſtrict ſays, that he has at different periods made many inquiries for the inventor of this tool, but could not aſcertain it thirteen years ago. Mr. Sillis, of Hartford Bridge, near Norwich, was mentioned to him as a perſon who had improved it. It is deſcribed as a cylinder of iron, about

about ſeven feet in length, around which are fixed cutting wheels of caſt-iron, that each turn independently of the others around the common cylinder, weighing from a ton to a ton and a half, being drawn by four horſes, and is heavy work. It is obſerved, that the cutting wheels, being moveable, may be fixed by waſhers at any diſtance, commonly at four inches. By paſſing over a freſh ploughed layer, the ſoil is cut into little channels, four inches aſunder; the ſeed is then ſown broad-caſt, and the land buſh-harrowed in the direction of the drills: thus the ſeed is depoſited at an equal depth. George, earl of Orford, gave the writer one, but the ſoil was too heavy for it: for breaking clods in a dry ſeaſon, no tool he ever beheld comes near to it. It is ſuppoſed by ſome, that the main object of the practice is to ſave the trouble and expence of dibbling, though it is not near ſo good a practice.

And it is remarked by the author of the above Agricultural Report, that they are much in uſe in Lodden hundred. Mr. Burton, of Langley, puts in a great deal of corn thus, and approves the method ſo much, that hitherto he has drilled little; but thinks dibbling a vaſt improvement. It is, however, added, that the implement was more commonly uſed in the county ten or twelve years ago than it is at preſent; for the drill machine has been adopted by many, who formerly had a good opinion of this tool. It muſt, however, be found beneficial in its original intention, in many caſes, on the very light friable ſoils; and as a pulverizing machine on thoſe of the heavy kind, when uſed in ſuitable ſeaſons.

Roller, *Furrow*. This is a tool of the roller kind, contrived for the purpoſe of rolling the furrows in ſteep hilly ſituations, and other places where the common ſort cannot be employed. It is the invention of Mr. Pinchard, and is an uſeful contrivance for the purpoſe for which it was intended.

Roller, *Graſs*. This is a heavy ſort of roller, made uſe of for the purpoſe of rendering the ſurface of graſs-lands ſmooth and even. It has been ſuggeſted, that the wooden rollers of this ſort, which are frequently employed with great propriety on graſs and paſture lands, are in many caſes made too large to produce that powerful effect which is wanted, without the aid of additional weight being given, If made leſs, and well loaded, it is ſuppoſed that a greater degree of preſſure will be afforded. A medium ſize is probably the moſt effectual in giving the requiſite preſſure in ſuch caſes. A powerful implement of this ſort, which is uſed in the beſt graſs diſtrict of the kingdom, weighs ſomething leſs than half a ton. It is, however, made of wood; but iron or ſtone, where they can be had, are much better materials. It is ſtated in the Norfolk Agricultural Report, that Mr. Coke has the moſt powerful roller for graſs-land that the writer has ſeen: it was caſt at the Carron foundery. It is five feet ſix inches high, and five feet ſix inches long; weighs three and a half tons; is drawn by four horſes, and coſt ſixty pounds. It is obſerved, that it leaves the ſurface of graſs-lands in the order that it ought always to be in.

Roller, *Jointed*, ſuch a one as is made with a joint or joints, in order to conform to the nature of the ridges. Theſe kinds of rollers are conſtructed by ſome farmers in the county of Eſſex. Mr. Tweed has invented one, which he finds of very great uſe. He rolls all his clover-land for drilling wheat with it, and employs it for whatever ſort of tillage-rolling is to be performed. The great object of it is to prevent the horſes from poaching, by their going only in the furrow, two of them at length.

Roller, *Spike*. This ſort of roller is conſtructed much in the ſame way as thoſe of the common kind, only inſtead of being plain, it is ſtudded or ſet with a conſiderable number of ſpikes, by which it is ſuppoſed to break the ſoil more effectually. It is moſtly employed on the heavy, ſtiff, lumpy tillage lands, for the purpoſe of reducing and bringing theſe into a better ſtate of pulverization. In ſome caſes it may be a good implement: it may be connected with the compound roller. When the drill-roller is in uſe, this ſort of roller is unneceſſary.

Roller, in *Gardening*, a very uſeful implement in many different intentions, and for ſeveral different purpoſes. The kinds which are moſt commonly employed in this way are thoſe of ſtone and caſt-iron, for compreſſing the more hard ſurfaces; and thoſe of the ſmaller wood ſort, for removing worm-caſts and other protuberances on ſhort graſs-lawns, and other deſcriptions of pleaſure-grounds, in the ſtate of turf or ſward. They are never required to be of any great weight for theſe uſes, but to be capable of being readily managed by the labourer without difficulty or inconvenience.

No unuſual peculiarity of form is here ever neceſſary, as the main object is conſtantly that of rendering the ſurfaces, over which they may paſs, as ſmooth and even as poſſible.

Moderate or middle-ſized common caſt-iron rollers are now moſt uſually made uſe of, for the purpoſes of gardening.

Roller, in *Inland Navigation*, a term applied to an inclined plane, with rollers on it.

Roller, in *Ornithology*, the common name of a bird of the mag-pie kind, called *garrulus argentoratenſis* by authors, and ſuſpected to be the ſame with the bird deſcribed by Geſner, under the name of the *blue crow*, *cornix cærulea*, and by Aldrovand under the name of *pica marina*. It is the Coracias *Garrula* of Linnæus; which ſee.

Roller is alſo the name by which ſome call the *ampelis*, or *garrulus Bohemicus*. This, in the Linnæan ſyſtem, is a ſpecies of the *ampelis*. See Garrulus.

Roller, in *Block-making*, a cylindrical pin turning on its own axis, which is uſed in ſome blocks, inſtead of a ſheave.

Rollers, *Cylindrical*, pieces of timber, revolving on an iron axis, and ſo fixed above the deck, either perpendicularly or horizontally, as to prevent the chafing of the meſſenger or cable againſt the jeer and topſail-ſheet bitts, &c. Thoſe fixed forward in the manger are to facilitate the meſſenger to the capſtan.

Rollers, *Friction*, are made of two parallel circular plates of braſs, about a quarter of an inch thick. Four or more ſolid braſs cylinders are placed at equal diſtances round theſe plates, and work upon their own axes, between them, at right angles. Thus any pin working through theſe plates of braſs muſt touch the rolling ſurfaces of the ſolid braſs cylinders, by which the friction is conſiderably leſſened.

Roller, in *Surgery*, a long and broad ligature, uſually of linen cloth, uſed for binding, ſurrounding, and containing, the parts of the human body, and keeping them in, or diſpoſing them, to a ſtate of health.

A roller conſiſts of two parts; the *body*, and the two extremities, which ſome call *heads* or *chiefs*, and others *tails*. There are ſingle-headed rollers, that is, ſuch as are rolled at one head only, double-headed rollers, &c.

Again: ſome are equally rolled and gathered together; as thoſe applied to fractures and diſlocated joints. Others are cut into ſeveral chiefs or heads; as thoſe for the head, chin, &c. Others are compoſed of ſeveral ſwaths, gathered and ſtitched together; as thoſe for the teſticles, &c. Some again

again are broad; as thofe for the breaft, belly, &c. Others narrow; as thofe for lips, fingers, &c.

Guidon directs the roller for the fhoulder to be fix fingers broad; that for the thigh, five; for the leg, four; for the arm, three; and the finger, one. See BANDAGE.

ROLLFELD, in *Geography*, a town of Germany, on the Maine; 2 miles S. of Clingenberg.

ROLLI, PAOLO, in *Biography*, a Roman poet, born in 1687, the fon of an architect. He was a difciple of the celebrated Gravina, who infpired him with the love of poetry and literature. The earl of Burlington having brought him to England, which he commemorates in the dedication of his opera of "Aftarte" to his noble patron, who attached him to the court as mafter of the Tufcan language to the princeffes.

Rolli did not fpend an inactive life in England; for, befides being opera poet to the Royal Academy of Mufic till it was broke up, teaching his language to the royal family, and many of the firft nobility, he publifhed Italian odes, fongs, elegies, endeca fillaba in the manner of Catullus, which were much admired. Befides thefe he publifhed epigrams, and fine editions in London of the Satires of Ariofto, the complete works of Berni, Varchi, &c. 2 vols. 8vo. much efteemed; the Decamerone of Boccaccio, the Lucretius of Marchetti, Odes of Anacreon, and a tranflation of Milton's Paradife Loft, in Italian verfe, folio.

Upon the death of queen Caroline, his royal protectrefs, in 1737, he left England, and returned into Italy, where he died in 1767, leaving behind him a very curious cabinet, and a rich library of well-chofen books.

ROLLIN, CHARLES, an eloquent writer and profeffor, was born at Paris in 1661. He was intended for the fame trade as that of his father, namely, a cutler; but a Benedictine, who had watched the opening of his mind, and clearly perceived in him a genius for learning, procured for him an exhibition at the college of Pleffis; and he was immediately taken under the protection of the principal, M. Charles Gobinet. He went through, with much applaufe, a courfe of claffics and philofophy; and then ftudied theology for three years at the Sorbonne. A way feemed now open to him in the college of Pleffis, and in 1683 Rollin entered that feat of learning. In 1687 he was made profeffor of rhetoric, and in 1688 he obtained the chair of eloquence in the Royal College. He became rector in 1694, and occupied that poft two years. During his adminiftration, he revived the ftudy of the Greek, fubftituted academical exercifes for the reprefentation of tragedies, and introduced the cuftom of obliging the fcholars to get the holy fcriptures by heart. In 1698 he was appointed coadjutor of the college of Beauvais, an office which he held till 1712. In the year 1720 he was again rector of the univerfity; after which he entirely devoted himfelf to the compofition of the works for which his name is particularly celebrated, and of which the following is an enumeration of the principal: "Traité de la Manière d'enfeigner et d'étudier les Belles Lettres par Rapport, à l'Efprit et au Cœur," 4 vols. 12mo., publifhed at different times between the years 1726-8, with a fupplement relative to the ftudies of children, and the education of females. Several editions of this work have been publifhed. "L'Hiftoire Ancienne des Egyptiens, des Carthaginois, des Affyriens, des Babyloniens," &c. 13 vols. 12mo., publifhed between 1730-38. Voltaire fpeaks in terms of high refpect of this work: while he admits that the latter volumes are not written with fo much care as the earlier ones, yet he fays it is the beft hiftorical compilation in any language; becaufe the compilers of fuch works are feldom eloquent, which Rollin always was. It has been thought, and with probability, that Rollin wrote hiftory chiefly for the opportunity of throwing into the narrative abundance of ufeful reflections. He paid too much credit to the exaggerations of the ancient hiftorians, and is in a good meafure void of that critical fagacity, which fhould be characteriftic of the writer of hiftory. This quality could fcarcely be expected from the man who gave implicit creed to the miracles, as they were called, of the abbè de Paris, and who was accuftomed to pray kneeling before his tomb. The other principal work of Rollin was "Hiftoire Romaine depuis la Fondation de Rome jufquà la Bataille d'Actium," 8 vols. 12mo. This was continued by Crevier to the reign of Conftantine. Rollin died with a character univerfally efteemed, at the age of 80, in the year 1741. His writings have been popular both in France and in other countries. Voltaire fays, that he was the firft member of the univerfity who wrote with purity and dignity. He began with eftablifhing his reputation as a claffical fcholar, by a number of Latin harangues and poems, which have been printed; and by an edition of Quinctilian, intended for the ufe of fchools, which he illuftrated with fhort notes, and a preface. This edition of Quinctilian has been feveral times reprinted, in 2 vols. 12mo.; that in our poffeffion was publifhed at Paris in 1774.

ROLLING, ROTATION, in *Mechanics*, a kind of circular motion, in which the moveable turns round its own axis, or centre, and continually applies new parts of its furface to the body it moves upon.

Such is that of a wheel, a fphere, or the like. Such, particularly, are the motions of the earth, the planets, &c.

The motion of rolling is oppofed to that of *fliding*; in which the fame furface is continually applied to the plane it moves along.

It muft be noted, that in a wheel it is only the circumference that properly rolls; the reft proceeds in a compound angular kind of motion, and partly rolls, partly flides. The not diftinguifhing between which two, occafioned the difficulty of that celebrated problem, the *rota Ariftotelica*, *Ariftotle's wheel*.

The friction of a body in rolling, or the refiftance made to it by the roughnefs of the plane it moves on, is found to be much lefs than the friction in fliding.

Hence, the great ufe of wheels, rolls, &c. in machines; as much of the action as poffible being laid thereon, to make the refiftance the leffer.

For the laws of bodies rolling on inclined planes, fee *Inclined* PLANE and DESCENT. See alfo ROTATION.

ROLLING, in *Gardening*, the work of rendering any furface level by means of the roller. It is practifed equally for the purpofe of bringing the furfaces of the gravel and other kinds of hard walks and roads into an exact and even order, as well as thofe of pleafure-grounds, which are in the condition of fhort or mown grafs. And it is fometimes applicable in other intentions, as thofe of rolling in particular forts of feeds, inftead of putting them in by means of treading the beds by the feet, and the rolling down and rendering more clofe the too loofe and open grounds of gardens, &c.

The rolling down of garden-walks and roads fhould always be done, when poffible, immediately after flight falls of rain, the gravel or other kinds of materials being previoufly put in fuitable order by fweeping and raking with proper rakes for the purpofe. The roller is then to be carefully drawn up on one fide and down the other of them as clofe as poffible to the grafs verges, and afterwards along the middle parts, in a forward and backward direction, which moftly completes the work.

In rolling and rendering ſhort-graſs pleaſure-grounds ſmooth and even, it is uſual to go over them, in the firſt place, when they are to be mown, as ſoon as poſſible after a good fall of rain, with a ſmall wooden roller, in order to take up and remove the worm-caſts, and then to follow with the iron one, beginning at one ſide and going on in a regular manner over the whole, in a cloſe up-and-down direction. The rolling, in theſe caſes, is ſometimes alſo performed for the purpoſe of mowing only, which is always done by the wooden roller, as it clears the graſs in the beſt manner; the iron roller being run over afterwards, when the mown graſs has been removed.

Rolling ſhould be frequently practiſed in caſes of this nature, in order that the walks, roads, and lawns, may be kept in a neat, proper condition, and never be ſuffered to run into a ruinous and diſorderly ſtate.

Rolling, in *Huſbandry*, the action or operation of drawing a roller over the ſurface of the ground, with the view of breaking down the clods, rendering it more compact, and bringing it even and level; or for only levelling the ſurface, as in graſs-lands. This is a practice that becomes neceſſary both upon the tillage and graſs-lands, and which is of much utility in both ſorts of huſbandry. In the former caſe, it is made uſe of with different intentions, as for the purpoſe of breaking down and reducing the cloddy and lumpy parts of the ſoil in preparing it for the reception of crops. It is alſo of great uſe in many caſes of light ſoils, in rendering the ſurface more firm, even, and ſolid, after the ſeed is put in. It is likewiſe found beneficial to the young crops in the early ſpring, in various inſtances. And it is ſtated by the author of Practical Agriculture, that in the caſes of ſtiff, heavy, and adheſive ſoils of different kinds, it may frequently be made uſe of with the firſt-mentioned intention with very great advantage; but it ſhould only be employed when ſuch lands are tolerably dry, for when drawn over the ground under the contrary circumſtances, little benefit can be afforded in the way of pulverization, while much miſchief muſt be produced by the poaching of the horſes, and the plaſtering the earth round the implement. But by uſing it in the manner juſt directed, all the lumpy or cloddy parts of the ſurface ſoil may be effectually cruſhed and reduced into a fine powdery ſtate, fit for the reception of the ſeed. And that if, in ſuch ſorts of ſoil, it be applied, in the intervals between the different harrowings, it may contribute much in the ſame way, not merely by reducing a great number of the lumps by the preſſure that it cauſes, but by forcing others ſo much into the ground that they may be acted upon, and further broken down by the fermentation that moſtly takes place in the ſoil after the land has been ſtirred. In all the light and more porous ſorts of ſoil very beneficial conſequences may alſo be derived from this operation by the conſolidation of ſurface that is thus produced, and the more perfect retention of moiſture, by which the ſeed, eſpecially if of the ſmall kind, is enabled to vegetate more equally, as well as in a more expeditious manner than would otherwiſe be the caſe. It is likewiſe ſuppoſed, that, in caſes where lands have been left rough after ploughing, for the purpoſe of more effectually deſtroying weeds, it may be of utility, by being employed before the harrows, to give them more power in laying hold of and reducing the ſoil, and by the pulverization that it affords, and the more perfect retention of moiſture that it cauſes, in conſequence of the ſurface being rendered more cloſe and compact, the ſeed-weeds are produced more abundantly, and more readily deſtroyed. It is likewiſe in theſe laſt methods, Mr. Donaldſon ſays, that it proves ſo highly beneficial in all caſes where graſs-ſeeds are ſown; as well as by the equality and ſmoothneſs of ſurface that are thereby produced; and it is well obſerved by the ſame writer, that if no other benefit were derived from rolling lands in tillage, than ſmoothing the ſurface, even that in harveſt is of material conſequence, more eſpecially where the crops are cut down with the ſcythe, which is general in moſt of the ſouthern diſtricts of the kingdom, and which the increaſing ſcarcity of labourers muſt ſoon, in all probability, introduce into thoſe of the north. It is alſo remarked by Mr. Morley, in the fourth volume of Communications to the Board of Agriculture, that old ſward, or graſs-ſeeds, upon firſt breaking up, ſhould always be rolled before dibbling for either wheat, beans, or peaſe, as it makes the land more ſolid, and the grain, when it vegetates, will form a ſtronger root. Wheat ſhould always be rolled in the ſpring after froſt, as it will make the ſoil adhere more cloſely to the roots of the plants, which very much encourages vegetation, and will cauſe the ſtem to be much ſtronger, and the grain will be brought to greater perfection. Barley and oats ſhould always be rolled when the blades are about an inch above the ground, if the weather permits; and turnips ſhould be rolled at night, ſoon after the plants make their appearance, which will be a means of deſtroying a great number of ſlugs and ſnails, that are very deſtructive to the young plants. And it is ſuppoſed by Mr. Somerville, in his Agricultural Survey of Eaſt Lothian, that rolling, when conducted in a judicious manner, is highly beneficial, and admits of being much extended, eſpecially upon all winter crops after that ſeaſon has been ſevere, and without any regard to ſoils, as both loams and clays, after much naked froſt, have their coheſion ſo much broken as to leave the plants quite looſe, and almoſt without any eſtabliſhment. It has alſo been ſtated, that the rolling of wheat, rye, barley, &c. with a roller of good length, and half the weight of the common ones above deſcribed, may be advantageous in other ways, as it preſſes down the ſoil that has been raiſed by the froſts about the minute ramifications of the attracting veſſels or ducts, and augments the quantity of mould upon them by breaking the little lumps of ſod; which, indeed, were very ſerviceable in winter by affording ſhelter, but in ſpring will ſtill be of greater uſe, by ſuch imminution in filling up the fiſſures, and preventing, in a great meaſure, the ill effects droughts have on light ſoils, by retaining and filtering rain-water; whereby the ſoil imbibes whatever is nutritive, and what is ſuperfluous of the ſimple fluid only eſcapes.

But it is added, that although theſe are ſome of the many advantages rolling produces in agriculture, notwithſtanding it amounts to no more than mere conjecture, that, in general, rolling corn may do more damage than it can good, if ſuch cautions as the following be not carefully attended to; *viz.* never to roll corn but in dry freſh weather; by no means to uſe heavy rollers, nor to roll too early, as before the blades be pretty ſtrong, for the wounds that the blades may receive, the roots, being then tender, will be unable ever to recover; nor too late, as, when the ſtalks are hardened and grown to any height, for the roller will break them, which injury can hardly be repaired, and the crop is thereby greatly hurt; that none but light lands are proper to be rolled with this view, and thoſe which have been manured that or the preceding year with dung only: in ſhort, none but rich, light ſoils, in general, can be improved by rolling in this intention; for in poor lands it oppoſes the moſt active principles, and undoes all that has been done for the crop by ploughing, &c. It is conſequently concluded, that the ſoil, the condition, the growth of the corn, the weather, and the weight of the roller, are all to be moſt ſcrupulouſly regarded: when all coincide, the advantages of rolling may be great; but when they do not, the

the diſadvantages may be inſuperable. Rolling, then, is neither the leaſt critical, nor the moſt inſignificant piece of the huſbandman's profeſſion; therefore ought not to be performed at random and without circumſpection, in caſes where young crops are concerned.

Mr. Marſhall, in his Rural Economy of Norfolk, in ſpeaking of rolling, remarks, that one circumſtance requires to be mentioned, which is, that the roller, notwithſtanding the lightneſs of the ſoil, and its proneneſs to be injured by dry weather, is never uſed in Norfolk for the purpoſe of compreſſion. He never ſaw one uſed by a farmer either upon fallow or upon a lay; not even upon the firſt year of a clover-lay, to ſmooth the ſurface for the ſcythe. The only uſes to which he has ſeen a roller put, in that diſtrict, are that of ſmoothing the ſurface before ſowing, to prevent the ſeed from running down too low, and that of ſmoothing it afterwards as a preparation for the ſcythe; and even this operation is performed with a roller not more perhaps than ſeven or eight inches in diameter; a circumſtance which he confeſſes he is no way able to account for; nevertheleſs, it would be raſhneſs to condemn an eſtabliſhed practice, unleſs he could, from his own experience, or from adequate obſervation on the experience of others, prove it to be ineligible. And it is ſtated, that there is a ſort of land which, when clover is ſown upon it, throws out the young plants after a froſt. Rolling in the beginning of winter, and immediately after the froſt is gone, will, in ſome meaſure, prevent this. The firſt rolling hinders the froſt from penetrating ſo deep as it would otherwiſe do; and the ſecond makes the land firm, after having been looſened by the change from froſt to open weather. In the latter caſe, or that of graſs-land, this is alſo a proceſs that is of much advantage, eſpecially where ſuch lands are kept under the ſcythe. And it is probable, that in many caſes of paſture lands it may be found of great benefit. In the former it is found beneficial in keeping the ſurface free from hills, and in a more even ſtate, as well as the graſs from becoming in ſo tuſſocky a condition, as is often the caſe where the practice is neglected, or not well underſtood. And in the latter it may perhaps have a ſimilar effect, and keep the graſs more free from tufts, and in a more regular condition, which is a circumſtance of great conſequence in the practice of grazing. It has been remarked, that the impreſſion of the roller not only renders the ſurface more level and fine, but at the ſame time induces the graſs plants to ſpread more laterally, and in that way to form a better and more cloſe ſward, which may be highly beneficial in both caſes. Its importance on new laid-down graſs-lands is therefore extremely obvious, as it muſt be highly ſerviceable in theſe different intentions. And the worm-caſts are by this means reduced and brought into order, by which means the mowing can be performed with greater facility, and in a cloſer manner. Beſides, it may be uſeful in other views, as by preſſing the mould, as well as the manure, more cloſely round the roots of the graſs plants; and in conſequence of ſuch means, they may not only be better eſtabliſhed in the ſoil, and their vigorous growth more effectually promoted, but, from the moiſture being more fully preſerved in the ground, be in leſs danger of injury from the effects of heat in the ſummer months, and of courſe better crops be afforded at the period of cutting them down. In order to perform this buſineſs in the moſt complete and effectual manner, a roller of conſiderable weight is neceſſary, ſuch as has been already deſcribed; and it has been adviſed, in order to prevent as much as poſſible the ground from being injured by the feet of the animals that draw it, as may frequently be the caſe where they follow each other in the ſame part, it may be the beſt practice to have them yoked double, as by that means there will be leſs treading on the ſame portion of the ſurface; and that where two horſes are ſufficient to execute the work, more ſhould never be made uſe of; but if a third ſhould be found neceſſary, it may be attached as a leader in the middle, before the other two: a greater number of horſes can ſeldom or ever be of any material advantage in this ſort of work. It is alſo ſuggeſted as neceſſary, to be very careful in executing this operation, to ſee that every part receives the due impreſſion of the implement. On lands where this ſort of work is regularly performed, it will ſeldom be requiſite to paſs more than once in a place, but in other caſes it may often be done more frequently with benefit; and in particular caſes, a more frequent repetition of the operation is abſolutely requiſite, in order to bring the ground into a proper ſtate. It is neceſſary, in the execution of this buſineſs on graſs-lands, to attend in a particular manner to the ſeaſon, as it cannot be performed with advantage, either when the ſurface is in too dry or too moiſt a condition. It is ſtated, that in theſe caſes the work of rolling may be advantageouſly performed at different ſeaſons, as in the beginning of the autumn, and in the commencement of the year, or very early ſpring months; but the latter is the moſt common period. But in order to its being executed with the greateſt poſſible benefit; a time ſhould always be choſen, if poſſible, when the ground is in a ſuitable ſtate for receiving the impreſſion of the implement. In the drier deſcriptions of land it may frequently be performed in the moſt beneficial manner, after the land has been rendered a little ſoft by a moderate fall of rain; but in thoſe of the contrary ſort, it may be neceſſary to wait till the ſuperabundant moiſture be ſo much dried up, as to admit the animals employed in drawing the machine, without poaching or otherwiſe injuring the ſurface of the ground while the proceſs is going on. It has been remarked by Mr. Boſwell, that the rolling of watered meadows ſhould be executed towards the latter end of February or beginning of the following month, after the land has been left in a dry ſtate for a week or ten days. And that the work ſhould be performed lengthwiſe of the panes, going up one ſide of the trenches, and down the other. And in the caſe of rolling the common hay lands, it is a good mode to proceed up one ſide the field, and down the other, ſomewhat in a ſimilar manner, as by that means the work may be the moſt completely executed, and with the leaſt trouble.

Alſo a writer, in the Communications to the Board of Agriculture, mentioned above, has remarked, that ſward and meadow land ſhould always be rolled in April or the beginning of May, and when the ground is in a moiſt ſtate, as it cauſes the graſs to be of a more kind nature, and reduces the hills raiſed by the ants to a proper ſtate of being mown over.

Likewiſe on ſuch new graſs-lands as have been juſt reſtored to the ſtate of ſward, and which are often thin and patchy, when ſeeds are ſown over ſuch parts, the roller may frequently be run over them in order to force in the ſeeds; but a better practice is to turn ſheep upon the lands, confining them upon ſuch patches by means of hurdles, in order that they may tread them in. In either caſe, a rather moiſt time ſhould be choſen for the purpoſe. In caſes of this nature, where there is a degenerate ſward, Mr. Amos, in his Minutes on Agriculture, adviſes the uſe of his compound roller, which ſhould be run over the ground early in March, when the ſward will admit the ſpikes without being injured by the feet of the horſes, the land being previouſly covered with well-rotted dung, or compoſt, in the proportion of from about eight or ten tons to the acre. It ſhould be well rolled in

different

different directions, till the ſurface ſward is pretty much broken, then ſowing the graſs-ſeed over the land, and after letting it be well dreſſed with the ſward-dreſſer, and all the rubbiſh collected cleared away, rolling it well down with the plain roller, and admitting no ſort of live-ſtock afterwards upon it. In this method of uſing the roller, vaſt improvements may, in many caſes of degenerated or worn-out graſs-lands, be effected, without incurring any very heavy expences, or much trouble. See SWARD-*Dreſſer*.

ROLLING-*Bridge* ſignifies, among *Canal-Makers*, an INCLINED *Plane*; which ſee.

ROLLING-*Carts*. See CARTS.

ROLLING-*Mill*, in *Metallurgy*, and particularly in the *Iron Manufacture*, is a mill for reducing maſſes of iron or other metals into even parallel bars, or flat thin plates: this is effected by paſſing the metal, whilſt red-hot, between two cylindrical rollers of iron or ſteel, which are put in motion by the power of the mill; and being ſo mounted in a ſtrong metal frame, that they cannot recede from each other, they compreſs the metal which is paſſed between them, and reduce it to a thickneſs equal to the ſpace between their ſurfaces.

It requires a moſt enormous power to put in motion the rollers which are employed for laminating iron in the large way; and for this reaſon, the greateſt number of rolling-mills are ſituated upon the banks of rivers which have the advantage of a ſufficient fall to turn the machinery. Of late years, the improvements of ſteam-engines have been carried to ſuch a high perfection, as to put them on a par with water, for moſt purpoſes, and particularly for rolling-mills, as the waſte heat of the furnaces uſed for heating the metal may be employed, in part, to raiſe ſteam for the engines which turn the rollers.

Rolling-mills were not very generally uſed in the iron manufacture till within theſe ſixty years. The old mills which were firſt uſed are extremely ſimple; two ſeparate water-wheels are placed on the oppoſite ſides of the mill, with their axles in the ſame direction, but at different heights, ſo that one wheel can be connected with the upper, and the other with the lower roller: it therefore requires the two wheels to have the water delivered at oppoſite ſides, to make them revolve in different directions, in order that the upper ſurface of the lower roller, and the under ſurface of the upper roller, may move in the ſame direction, and paſs the iron between them. The conſtruction of the rollers generally uſed in ſuch mills is ſhewn at *figs*. 3, 5, and 6, of *Plate* V. *Iron Manufacture*, except that the two rollers, F and G, are there ſhewn with equal pinions, *d* and *e*, fixed upon the ends of their pivots, to compel the two to revolve equally together; whereas, in the mills with two ſeparate wheels, no proviſion is made to enſure the equal motion of the two. The gudgeons, or necks, of the lower roller, G, are ſupported in braſſes, fitted into ſtrong carriages of iron E, E, which have holes through their ends, to receive four ſtrong iron bolts, A A, B B; theſe ſtand perpendicular, and form the frame, to retain the rollers at the proper diſtance, being fitted through the carriages E with heads below, ſo that they cannot draw out. The upper ends of the bolts are cut with ſcrews, upon which nuts, *a*, *a*, are fitted; and theſe being turned round by iron handles or wrenches, ſcrew down the pieces D, D, and advance the rollers nearer together; or, by a contrary motion, increaſe the diſtance between them: *i* (*fig*. 6) is a ſtrong iron bar, extended from one bolt, A, to the other, B, and fixed faſt; it ſupports an iron plate, forming a kind of table before the rollers, to guide the iron through them. The rollers have ſquare heads upon the ends of their gudgeons; and upon theſe ſquares, large caſt-iron ſockets or boxes, as L, are fitted, and theſe, at the other ends, are fitted upon ſimilar ſquares on the ends of the water-wheel axis. A little play or looſeneſs is admitted in all theſe ſquares, becauſe the upper roller is ſet at different heights, according to the thickneſs of the work which is to be rolled between them: this play is required to allow the rollers to move freely, when they are not exactly in the line of the water-wheel axis: it is to accommodate this circumſtance that the principal care is required in conſtructing a rolling-mill. Our readers will gain a good idea of the beſt proportions of a mill, with two independent water-wheels, from the following directions for building one in Northumberland, which were given by Mr. Smeaton near 40 years ago. The two water-wheels are to be under-ſhot, and of different ſizes, *viz*. 15 ft. 4 in. and 14 ft. 8 in., the mean diameter being 15 ft. The breadths in their float-boards are to be three feet each, the ſmall wheel being laid lower than the other by ſeven inches: this, with the differences of their diameters, will make the centre of the large wheel 11 inches higher than the other. The different heights of the crowns of the falls or breaſts, down which the water deſcends to act upon the wheels, and the poſitions of the water-ſhuttles, are to be ſo adjuſted, that the gates or ſhuttles being equally drawn up by their ſtarts, the wheels will, as near as poſſible, revolve in equal times, and with equal power. The rings of the water-wheels are to be made of caſt iron, that their weight may act as flies: the ring of the leſſer wheel is to be made ſix inches in thickneſs by ſix inches deep, while that of the larger is to be only five by ſix. The greater quantity of matter in the leſſer wheel, therefore, will give it nearly the ſame momentum as the larger wheel.

The rings of the water-wheels are each to be formed by eight pieces or fellies, the exterior circle of the greater wheel being thirteen feet diameter, and that of the leſs twelve feet four inches: the length of the fellies is to be about half an inch ſhorter than their true length, in order to admit an oak wedge of one inch thick to be introduced into every joint after the rings are ſcrewed together by the joint-plates of wrought iron, which unite the fellies. Theſe plates are to lay upon the plain ſurface of the felly, and not to be let in as the common wooden rings of water-wheels, in order that the oak wedges may completely fill the joints at the ends of the fellies. The wheels are to have wooden arms, and it muſt be obſerved, that the mortiſes through each of the iron fellies, for receiving the ends of the arms of the wheels, are to be about two inches and a half in width, and that they are to be a little dove-tailed, in their length only, ſo that the mortiſes being longer on the outſide of the ring, and the wood of the arm being ſpread into them with wedges, will produce firm ties to the centre; but as a farther ſecurity, pins are to be put in after the wedging is completed. The mortiſes in the rings for the ſtarts, which ſupport the float-boards, are to be four inches by two, without dove-tailing, or rather they ſhould be larger outſide than inſide. The breaſt or float-boards will fix by nails into the joints and arms, where they fall; but that the breaſt-boards for the intermediate floats may alſo have a faſtening, holes of about one inch diameter, and about four inches deep, muſt be caſt in the ring, at the places for every other float; theſe holes, being filled up with pieces of oak, will afford places to drive the nails for ſecuring the boards. The axles of the water-wheel are to be of caſt-iron, with flaunches to ſcrew the arms of the wheel againſt. The total length of each axis is to be ſeven feet one inch, and the diameter throughout the axis is to be a circle of nine inches. The manner of fixing the arms upon flaunches is to be found in *Plate* XXXIV. *Mechanics*, in our article MILL.

The braſſes upon which the necks of the water-wheel axles are ſupported, are intended to be let into caſt-iron ſtocks, which are again ſupported upon wooden bed-planks, and thoſe upon the cap-ſtones of the walls, which (under theſe at leaſt) are ſuppoſed to reach all acroſs the thickneſs of the walls, thoſe necks being firſt truly and ſmoothly turned; at each end, beyond the neck, is formed an aſtragal or moulding, to keep the wheel in its place from moving endways. The ends of the axis are terminated by an indented head, ſhaped ſomewhat like a ſquare citadel in fortification, and an iron box is fitted upon this to communicate the motion to the rollers, the ſurface lines of the indented head being formed a little rounding, that the box may not only be certain of taking its bearing in the middle, but likewiſe be capable of complying with the motion of the rollers: and in order to give ſtill more liberty, the end of the box which is fartheſt from the water-wheel, is formed into a ſquare of eight inches, which is again ſurrounded by another box, whoſe external ſurface is round. This box is formed at the end of a round ſpindle or axis three feet long, and terminated at the other end with a ſquare of eight inches, which enters one end of a ſquare box, and at its other end receives the ſquare of the roller, ſuppoſed to be of ſix inches, but may be of any other ſize which is thought neceſſary. It is to be noted, that all the ſquares are to be made larger than thoſe of the rollers, in order that they may wear longer; and all the inſertions are to be leſs than thoſe at the end of the water-wheel axles, that the axis may not be rendered uſeleſs by the wear or failure of the citadel heads which are introduced, as they are expected to laſt many years; and if any thing ſhould happen to them, the axes are made alike on both ſides of the water-wheels, that they may change ends; therefore, there is nothing of conſequence likely to fail by wear or breakage, except the ſmaller intermediate work between the axis and the rolls, which is eaſily replaced. Holes are to be made through the boxes and joint parts for iron bolts to paſs through rather looſely, ſo as to prevent the boxes and ſquares ſeparating, but not to confine the joints from yielding to the motion of the rolls. The water-wheels are ſuppoſed to be cloſely adapted to their conduits, and their axes to remain immoveable as to height, at the difference of eleven inches in level, while the rolls are ſuppoſed to vary in their diameter from twelve inches to nine. This will be allowed for, by the diſtance that the ſquares upon the rolls are from the end of the axis; for though the houſe is ſuppoſed no more than ten feet wide between the walls, the diſtance between the middle of the citadel heads at the end of the water-wheel axis, and the middle of the ſquares of the rolls reſpectively, is upwards of four feet; and in that length no leſs than four joints are introduced, every one of which complying a little, a ſmall difference in the height of the roll will produce no ſenſible difference in the communication of the motion from that of a right line; all the joints being kept oiled or greaſed, which will be not leſs proper on that account than to keep the parts from wearing. In order to preſerve the directions as near as poſſible to a right line, Mr. Smeaton propoſes that the lower roll ſhall be placed originally half an inch below the centre of the axis which turns it: ſuppoſe the rolls were firſt made of twelve inches diameter, while the difference of the height of the axis is only eleven, the upper roll will be juſt half an inch too high, ſo that the compliance in each will be equal, and no more than half an inch in four feet length. Thus it appears, that when the rolls are reduced by wearing from twelve inches to eleven each, then the upper roll as well as the lower will be half an inch too low for its axis; ſtill neither will need to comply or vacillate more than half an inch. The roll being now of a juſt diameter to anſwer the different heights of the axis, let the lower roll be raiſed to its juſt height, and then both the rolls will work true till they are further reduced; but when they become reduced to ten inches and a half diameter, the upper roll will become half an inch too low; then raiſe the under roll half an inch above the line, and the upper roll will then be truly in the line; ſo that when the upper roll is come down to be half an inch below the line, the rolls will be reduced to ten inches; then raiſing the under roll a quarter of an inch more, it will be three quarters above the line, and the upper roll will be a quarter of an inch under the line; and when it comes down to three quarters below the line, the rolls will be reduced to nine inches and a half; therefore, laſtly, raiſe the under roll another quarter, ſo as to be an inch above the line, and the upper roll will be reduced to half an inch below it, ſo that when it is come down to an inch below it, the rolls will be reduced to nine inches. In this way the departure of the rolls from a right line will never become more than half an inch, while they are reducing from twelve to ten inches; nor more than three quarters, while they are reducing from ten to nine and a half inches; at the worſt they will be no more than an inch, while they are reducing from nine and a half to nine inches. The greateſt inequality is purpoſely made at this place, both becauſe the purchaſe of the wheels is then greateſt and moſt able to overcome an addition of friction, and becauſe the time that they will continue in this ſtate is the leaſt. If the axles are placed at ten and a half inches diſtance inſtead of eleven, the vacillation each way will never exceed three quarters of an inch; nor more than one inch to reduce the rolls to eight and a half diameter.

The raiſing of the under roll is not to be done by raiſing the whole of the bed of the roller-frame; this is to be ſet originally half an inch lower than the true line; and when the lower roll requires raiſing, it is to be effected by putting iron plates under the carriages of the lower roll gudgeons, ſo that they will ſtand as much higher than before, and not to make the ſeveral riſes by additional plates, but to have plates of the different gages, ſo that each will lay in one ſolid piece.

Mills, on this conſtruction, are ſtill uſed in many iron-works for rolling coarſe iron bars, but are unfit for any better purpoſe, from the difficulty of adjuſting the two water-wheels to an equal velocity; and if one roller moves quicker than the other, the metal becomes more extended on that ſide than upon the other, and is thus rendered convex. Another defect is, the want of proper fly-wheels to regulate the mill; for the caſt-iron rims to the water-wheels by no means anſwers the purpoſe of fly-wheels, unleſs they are made to revolve ſo quickly that the water loſes much of its effect upon the floats. Fly-wheels are, perhaps, more uſeful for rolling than in any other kind of mills, becauſe the reſiſtance to be overcome is ſo variable; being at one moment very great for a large piece of iron, then ſmaller whilſt it is paſſed through a ſecond time, becauſe the iron is to be leſs reduced: and in the interval of returning the iron, to put it through again, there is no other reſiſtance than that of the friction of the machinery. Again, when the iron has been paſſed through ſeveral times, the reſiſtance is greateſt of all, becauſe the metal has become harder, both by the compreſſion it has undergone, and from being gradually cooled; alſo, the metal, being thinner, will not yield ſo readily to the preſſure, as when in a larger maſs. By the proper addition of a heavy fly-wheel, great advantages, in point of power, are gained, as it tends to

equalize all these irregularities; and in every interval, when the resistance is removed, the water-wheel gives a rapid motion to the fly, the force of which will be returned when the work is applied: in such a mill, if the workmen have an extraordinary large piece of metal to roll, they suffer the mill to work for a few seconds without any resistance, then putting in the iron, it is carried through at once by the momentum of the fly, though requiring a power far beyond the ordinary force of the water-wheel. The most approved method of applying a fly-wheel to a rolling-mill, is to have a large cog-wheel upon the axis of the water-wheel, to give motion to a pinion, upon the axis of which a heavy iron fly-wheel is fixed: the wheel and pinion are of such a size as to make the fly revolve about three times to one of the water-wheel: at the opposite side of the great cog-wheel another pinion, of about half its size, is placed, and to the extremity of its axis produced, the rollers are connected, the two rollers being made to turn together by means of pinions upon the ends of their gudgeons, in the manner shewn at *d e*, *fig.* 6. *Plate* V. If more than one pair of rollers is to be worked, a cog-wheel is fixed upon the axis which turns the rollers, and works another equal wheel upon the axis of the second pair, placed parallel to the former; in this case the lengths of the two axes must be different, so that the lines in which the bars will come through the different rollers, will not interfere with each other, but leave sufficient room between for the men to work. In most common mills, rollers, such as are represented at *figs.* 3, 5, 6, of *Plate* V. are employed; but to these there are some objections; first, the four nuts *a*, *a*, cannot all be turned at once with such precision as to bring the upper roller exactly parallel to the other; the means the workmen use for this, is to have a small iron wrench, or handle, fitted upon two of the nuts, *a*, *a*, and these they turn round a small quantity every time the metal has passed through, in the interval whilst it is returned to be put through again. The workman who stands in front to introduce the metal between the rollers, turns the nut on his left-hand side which is nearest to him; whilst his comrade, who receives the metal, and hands it back again to him over the roller, turns the nut on the opposite corner of the frame: by this means, as only two, instead of four, of the nuts are turned, the pieces D are constantly put out of the horizontal position, in which alone they can take a proper bearing; also, in these frames there is no support for the weight of the upper roll; but when there is no metal beneath it, it falls down, and rests upon the other; when the metal is suddenly introduced, it lifts the roll up to its bearing with a jerk, which endangers the breaking of some of the parts, and generally causes the nuts to start a little before they settle themselves to the strain. In the modern mills, the frames for the rollers are made of cast-iron, as shewn at *figs.* 1 and 2. *Plate* V. The cheeks, A, are cast in one piece, and form a bed for the reception of the brass of the lower roller H; a piece, C, is fitted upon the top of the cast-iron cheeks, and is held down by two strong wrought-iron bolts, with nuts, *a*, *b*, to screw it down, and regulate the distance between the two rollers, the gudgeon of the upper roller, G, being confined by a brass let into the piece C, but to bear it up from falling: when there is no iron between the two rollers, another brass is placed beneath the gudgeon, G, and suspended by bolts, *d*, *d*, from the piece C; by this means the two rollers are retained always at a proper distance asunder. The two standards A, B, *fig.* 2, at the opposite ends of the rollers, have broad feet at bottom, by means of which they are bolted down to massive ground-sills, which extend all across the mill-house. The rollers E and F are caused to move together equably by means of pinions *a*, *b*, which, that they may work well, are made with accurate teeth, of not more than $1\frac{1}{2}$ or 2 inches pitch, or distance asunder; and, to give the requisite strength, they are made of considerable breadth, as the figure shews. Two large flat iron plates, I and K, are screwed to the two standards, both to strengthen them, and to form a table, upon which the masses to be rolled are laid to be presented to the rollers, and having passed through, are received on that at the opposite side.

The rollers shewn in *figs.* 1 and 2, have a number of grooves in them, which being opposite to each other, leave openings of a determinate figure for the purpose of rolling square bars, with the angles upwards; they do not therefore require to be adjusted in distance, as other plain rollers do, but are always, after the first erection, retained at the same distance; in this case the pinions *a* and *b* serve very well to connect the motions of two rollers together; but when the rollers are required to be adjusted during the working, as in the *Plate Rollers*, *fig.* 6, the pinions must necessarily have very coarse and long cogs, that they may not be so much affected by increasing or diminishing the distance between their centres; in this case they work very indifferently, and frequently break by the awkward manner in which such coarse teeth always meet each other when upon wheels or pinions of small radius, particularly when the proper distance between their centres is not preserved. As a partial remedy for this difficulty, the pinions are, in some mills, made very broad, with fine teeth, and mounted in a separate frame, exactly similar, except in its strength, to that of the rollers; this is placed at a distance of three or four feet from the rollers; then a coupling, or short shaft, being interposed between the squares at the ends of the axis of the pinions, and those of the rollers, they permit the latter to be adjusted without disturbing the pinions; and the length of the shafts will accommodate for the differences between them.

In *Plate* IV. of *Iron Manufacture*, we have given three figures of a very capital rolling-mill in Messrs. Walker's extensive iron-works at Rotherham, in Yorkshire, where they have several mills worked by the same river. The one in question is employed in reducing iron to small rods for nail-making, by first rolling the pieces to flat bars, and then passing them through a pair of slitting rollers, which divides each into several small square rods: it is, therefore, much smaller in its dimensions than the great mills used for rolling thick iron plate; but we have selected it on account of the arrangement of its wheels, which renders it superior to the mills in common use, as it works without the pinions of which we have spoken. A A, in the plan, (*fig.* 1.) is the water-wheel, 17 feet diameter, and five feet six inches broad: it is of the under-shot or rather breast-kind, the water being delivered below the centre, but confined to act upon the wheel by a breast of masonry, curved to correspond with the wheel very exactly. The pivots or gudgeons, *n*, of its axis rest on bearings, supported by the walls N. At one end of the axis a clutch-piece, M, is fixed, to give motion to a second axis *k*, which, being in the same line as that of the water-wheel, may be considered as a continuation thereof. It is carried under the floor of the mill. It has two large cog-wheels, one marked *b*, and another of the same dimensions at the opposite end, which is only seen in *fig.* 2, as it is concealed in *fig.* 1, beneath the wheel *f*, which it turns. The first of these wheels, *b*, gives motion to two wheels, *a* and *c*, which are on the axes I and H, and give motion to the lower of each of the two pair of rollers, situated in the frames at E F and C D. This wheel-work is shewn in

fig.

fig. 3. The wheel at the other end of the ſhaft, *k*, (ſee *fig.* 2.) turns the wheel *f*, ſituated directly above it; and this gives motion to two wheels, *e* and *g*, of the ſame dimenſions as *a* and *c*. Their axles, L and K, are connected with the upper of each pair of the rollers. By the introduction of the wheel *f*, the ſmall wheels, *e* and *g*, are made to revolve in a contrary direction to the wheels *a* and *c*; and, at the ſame time, the centres of the former are raiſed a ſufficient height above the latter, to allow for the difference in height of the centres of the upper and lower rollers of each pair. The coupling-boxes, L K and *p p*, which unite the axles of the wheels to their reſpective rollers, have ſufficient play in the joints to allow for that ſmall deviation which takes place in ſeparating the rollers, to adjuſt them to different thickneſſes of the metal they are intended to roll; though theſe ſhanks ſhould be repreſented longer than the limits of our plate have allowed, the ſpace between the frames for the wheels being in reality eight feet, inſtead of five feet nine inches, as given in the drawing.

By this arrangement of the wheels of the mill, the contrary motions of the two rollers are communicated from the ſame water-wheel, without the intervention of ſmall pinions, which, in works requiring ſuch heavy ſtrains as that of rolling iron, always work with difficulty and enormous friction; ſo that they break and wear out conſtantly, making great interruptions to the work. In the preſent inſtance, the wheels are all of conſiderable ſize, and, therefore, tranſmit the power more equably, at the ſame time that they give the two rollers preciſely the ſame velocity, which is a circumſtance of ſome importance in making good rolling for plates or bars, which will be irregular, if one roller turns faſter than the other, in conſequence of one ſide of the metal being more expanded. The framing of the mill (*Plate* IV.) is very clearly expreſſed by the drawing. The axles H and I, of the wheels *a* and *c*, are ſupported in bearings, ſcrewed down to iron frames, which are ſecurely fixed to the ſolid maſonry. On the other ſide, the iron frame, O O, is erected to ſupport the axles of the wheel L K, and alſo that of the wheel *f*, as ſhewn in *fig.* 2. The main axis *k*, and the wheels upon it, are carried under ground, and ſupported on the walls, as ſhewn by the plan. The roller-frames, C D and E F, (*fig.* 1.) are fixed down upon ſtrong beams, extended acroſs from the frame, O, to the frame on the oppoſite ſide. The poſition of one of theſe beams is ſhewn by dotted lines on the right-hand ſide, in *fig.* 1. The rollers, C, D, are exactly the ſame as ſhewn in *Plate* V. *figs.* 3, 5, and 6, except that the pinions, *d* and *e*, are omitted, being unneceſſary, from the arrangement of the wheels, which we have deſcribed. The other rollers at E F are made on a very different conſtruction, and are called ſlitters, becauſe they ſlit or cut up a bar of iron into ſeveral ſmall ſquare bars, of a ſize proper for nail-makers, or to form hoops for barrels. Theſe ſlitters conſiſt of two ſtrong axles, mounted in a ſimilar frame to the other rollers; but inſtead of carrying plain cylindrical rollers, they have rollers compoſed of ſteel rims or edges, of the ſame breadth as the rods they are to ſlit, and leaving between them deep grooves. The two ſlitters, or cutters, are ſo placed in their frame, that the rims of one roller will enter into the grooves between the rims of the other. This will be underſtood by an examination of *fig.* 4. *Plate* V.; though the rollers there ſhewn are for a totally different purpoſe, ſtill the manner in which the rings of one roller enter the grooves of the other is the ſame as the ſlitters: but the proportion of breadth is different, the ſlitters being made with grooves of half an inch, three quarters, or one inch wide, and many intermediate ſizes, correſponding to the rods to be cut; and they are not made from a ſolid roller, but are formed of ſeparate circular plates of ſteel of the juſt thickneſs, fitted ſide by ſide upon the axis, with circular iron plates of equal thickneſs between them, which form the ſpaces; and being of a leſs diameter than the ſteel plates, or cutters, they leave deep grooves between the edges. A number of crooked guide-bars are extended acroſs the frame, and paſs through the grooves, between the cutters; but lying at the very bottom of the grooves, and not being very thick, they do not fill up the grooves, the circles of the cutters projecting through theſe bars, which appear like a grate, and one is applied to each roller. Thoſe which are called the guides of the ſlitters are intended to prevent the iron adhering in the grooves between the rims, or cutters, when preſſed down into them; for the action of the ſlitters is to divide the iron which is paſſed through them into ſeparate pieces, by the rim of one roller (for inſtance, the lower) forcing one piece of the bar down into the groove of the lower roller, whilſt the adjacent part is forced up, by the rim of the lower roller, into the groove of the upper: the bar is thus divided into as many rods as there are grooves in the width which it covers. The angle at which the circles of the cutters interſect each other, is that in which the edges of a pair of ſhears are found the moſt favourable for cutting; and the ſlitters cut upon the ſame principle, but with ſeveral edges at the ſame time.

A rolling-mill generally contains a pair of ſhears, of a ſufficient ſtrength to clip off the ends of the largeſt iron bars, to reduce them to lengths or pieces of a ſufficient ſize for laminating into thin plates. Theſe are made different from other kinds of ſhears, in the circumſtance that the cutting parts, or edges, are ſituated between the centre pin or joint, and the part or handle where the power is applied: the latter is of great ſtrength, and made exceeding ſtrong in iron. The ſhears are fixed in a vertical poſition, the upper blade being firmly fixed by the framing, and the lower one, which is the long lever, is lifted up by the mill when the cut is to be made; therefore it deſcends when the ſhears are to open, and its own weight is ſufficient for that purpoſe. The frame conſiſts of a very large and thick iron plate, which is ſecurely bolted down to the foundations: at one end is an upright, which has a groove through it, to receive the moving blade, and guide it; alſo the end of the handle of the ſtationary or upper blade is ſupported by the upper end of this upright. The joint-pin of the two blades is ſupported in a ſtrong ſocket, or iron frame, alſo erected from the ſame large plate, which carries the upright guide at its other end. The two blades, therefore, lie ſide by ſide, and having cutters, or blades, of ſteel, let into the adjacent ſides of the iron levers or blades, the edges of theſe paſs by each other when the cut is made, and will thus cut any thing which is interpoſed between them, in the ſame manner as ſhears or ſciſſars; and in this circumſtance is their only reſemblance to thoſe inſtruments. The lower or moving blade, which is a long lever, reſts at the extremity, upon the periphery of an elliptical wheel, or camm, (*figs.* 1, and 3.) fixed upon the axis, I, of the rollers, (or, in other caſes, upon the ſhaft of the water-wheel,) in an excentric manner, ſo that, in turning round, it will lift up the lever, and cloſe the ſhears; but when its oppoſite or ſhorteſt radius comes beneath the lever, it is ſuffered to deſcend, and open the blades. At this moment the workman introduces the end of the iron-bar between the blades, puſhing the end of it up to a ſtop, which regulates the length to be cut off; then as the camm turns, it cloſes the blades, and cuts at once through the bar, although ſome of the largeſt are as much as three inches broad, and an inch thick.

Rollers are usually made of cast-iron, and are very exactly turned on their surfaces, and also their necks, that they may turn truly when put in their places. The most common way of turning them is, first to mount the roller in a strong turning lathe, by holes or centre points made in its ends; then to turn the two necks truly cylindrical; and afterwards putting the roller in its proper place in the roller-frame, and placing brasses over the necks, they are held down by blocks, fitted under the pieces which retain the gudgeons of the upper roller: in this situation it is put in motion by the mill, and a bar of iron being fixed up for a rest, the surface of the roll is turned true, in the same manner as if it was in a lathe, and will be certain to be exact, being formed from the same necks on which it is afterwards to work. In casting a roller, the mould should always be placed at a considerable depth beneath the orifice where the metal is poured in, so that the pressure of a column of the fluid metal may be obtained to consolidate the casting, and render it free from those air-holes, or porous places, which will sometimes occur in metals cast without the pressure of a column. The long piece of metal which filled the aperture through which the metal ran, is left adhering to the roller, and is cut off afterwards. This is the same mode of casting that is practised for *cannon* (see that article). Case-hardened rollers must be used when it is required to have a very fair surface; *viz.* for such purposes as rolling iron to make thin plates for tinning; also the large rollers for gold or silver, such as are now used in the Royal Mint; rollers for making tin-foil, steel-plate for saws, and for many other purposes. These rollers are not hardened by a subsequent process, as in case-hardening wrought iron, but are cast in that state. This is effected by employing iron moulds: a cast-iron cylinder of three inches thick, and its diameter equal to that of the roller, is bored out with great accuracy, and fitted with ends proper to form moulds for the necks required at each end of the roller; this is buried in the sand of the foundry, and when the metal is run into it, the rapid transmission of the heat through the iron mould causes the metal which is in contact with it to cool sooner than the other parts of the mass, and renders the surface of the roller very hard. In turning a roller of this kind, the centres must be chosen so that the circumference turns as true as it will admit, and then a very small quantity being taken off, will render it perfect: this care should be taken for two reasons; first, that less will be required to be removed to make it true, which is a difficult operation, as only the best steel tools will cut it; also, that if the metal is unequally reduced, or more on one side than the other, the hardest part will there be cut away, and the roller will have a hard and a soft side, and soon wear out of the circular figure, and require a second turning. The less metal there is turned off a case-hardened roller the better it will be, because the hard part is only a case of slight thickness, and most hard at the surface.

The operation of the rolling-mill is so simple, as scarcely to require any description: the metal is heated in reverberating furnaces when it is in large masses, and for smaller pieces a kind of oven is used, in which the cokes are laid on the bottom or floor of the oven without any grate-bars, and therefore the draft of air being less rapid, it gives a slight, but very regular heat, which rises to a bright red, but no farther, and therefore it does not waste the iron by burning it to scales, as a greater heat and current of air will do. This oven is proper for heating plates, hoops, or small bars, to be rolled a second and third time: but for rolling large masses, a strong welding heat is requisite, that the metal may be consolidated, and all flaws or cracks securely closed. The reverberating furnace is used for this purpose; it is made the same as an air-furnace for melting large quantities of iron, except that the floor is horizontal; indeed it is as near as possible similar to the balling furnace. (See *Plate* II. *Iron Manufacture.*) The furnaces are placed as near as convenient to the rollers.

The iron, being heated in the furnace to the proper degree for the purpose which is intended, is taken out by a pair of pincers, the mill put in motion by drawing the shuttle, and the iron is presented to the rollers, which are previously adjusted to the thickness of the piece which is to be passed. If this is not attended to, and the workmen attempt to reduce the iron too much at one time, there is danger of breaking some of the machinery, or of stopping the mill whilst the iron is only half passed through: this is a disagreeable accident, as it will require four or five men, with an enormous wrench applied to the nuts of the roller, to turn them back sufficiently to relieve the rollers, so forcibly are the screws pressed whilst the iron is passing through: this is indeed evinced by the circumstance of solid cast-iron rollers, of ten inches in diameter, being sometimes broken in the middle; and the necks of eight and nine inches are frequently snapped. When the iron is placed on the shelf or table before them, their motion will draw it through, and as they cannot recede from each other, because of the nuts of the bolts, the metal is reduced to the exact thickness of the space between them, increasing in length, but not at all in breadth: the iron is caught by another workman behind the rollers, and returned over the top roller to the first man, who puts it through again, first giving the handles of the nuts a small turn, to bring the rolls nearer together. In this manner it is repeatedly rolled, till it is reduced to any required length and thickness, but the breadth is not at all increased by rolling; and if it is required to increase the breadth, it is done by putting the iron obliquely through the rollers; or if a great increase is wanted, the iron is put through breadthwise two or three times, till it is extended to the length of a gauge which the workman has marked upon the table in front.

Rolling of black Plate, such as is used for making the boilers of steam-engines, tanks, or other large vessels, in wrought iron. Such plates, when large, and of considerable thickness, are rolled from the blooms, or half blooms, which are made under the forge-hammer. These blooms, which are also called slabs, are nearly the length of the intended plate; their breadth about one-half or one-third as much as their length, and of a thickness to contain as much metal as will make two, three, or four plates. These pieces, when heated to a white heat, are presented breadthwise to the rollers, and passed through several times at the same heat, until what was the breadth of the bloom, being extended two or three times as great, becomes equal to its length. The thick square plate, thus formed, is now cut up by the shears across into two or three pieces, of about the same size as the first, but in a direction which will make what was the length of the first piece to be the breadth of the second. These pieces, being heated and rolled again, become extended to the size of the required plates: the reason of thus dividing the operation is, that the rolling only extends the metal in the direction in which it moves, and not at all in breadth: by this means, the particles of iron being drawn by the sides of one another, acquire something of a fibrous texture, or an approach thereto, which is desirable in bars, rods, and hoops, but not at all in plate, as it should be equally strong in either direction; therefore, by rolling it first one way, and then the other, the grain, as far as it is produced at all, is in both directions. There is no doubt that better plate would

be

be made, if the ſlabs or original pieces were cut to the proper proportions of length and breadth, and of a thickneſs to form only one piece; then rolling it alternately length and breadth ways every time it is paſſed between the rolls, and continuing this till the plate is finiſhed, at one heat; a better grain or texture will be thus acquired, becauſe in the former method it will be weaker one way, having ſomething of a grain in the direction of the laſt rolling.

Rolling iron Plates which are to be Tinned.—Theſe are made from the beſt Engliſh iron, and ſome of the very thinneſt from foreign iron; the bars are drawn out, by the forge hammer, to five inches broad, and half an inch thick, and are cut into lengths of eleven inches by the ſhears; theſe are heated in an oven, and paſſed breadthways through caſe-hardened rolls: this is repeated till they are extended to twice the length of the intended plates: the pieces are then folded, and ſet on edge in the furnace till properly heated, when they are rolled double, the fold being put in firſt; they are thus extended to twice the length of the folded plate. Now two men, with ſtrong tongs, tear the two leaves aſunder at the fold, and fold each again ſeparately, putting one into the other, like two ſheets of paper; in this ſtate they are heated, and rolled four thickneſſes together, the next time eight, and ſo on, till the plate is reduced to the required thickneſs: in the very thinneſt plate, ſuch as is uſed for tagging laces, ſixteen leaves are rolled together. In folding the plates, care is taken every time to put a new ſurface of metal outſide, otherwiſe, thoſe which were conſtantly reduced by the preſſure of the adjacent leaves, would, at length, become grained on the ſurface; but by continually gaining new ſurfaces, which are ſmoothed by the immediate contact of the rollers, thoſe which are laid againſt them are alſo rendered ſmooth. A ſmall quantity of oil is ſprinkled between the leaves, when they are firſt put in, and inſtantly ſpreading over the whole ſurface, prevents any adheſion; the plates are dreſſed ſquare by the ſhears every time before they are folded, to remove thoſe parts which, by projecting over the edges of the other leaves, are not ſo much reduced.

After being finiſhed, dreſſed ſquare, and the ſurface ſcowered, the plates are rolled, ſingly, between a pair of poliſhed caſe-hardened rolls, without being heated; they are therefore extended but little in ſize, though rendered much harder, and more ſtiff. *Tin-foil* is rolled much in the ſame manner as the plates for tinning, but of courſe without heating.

Rolling, or Shingling Iron by Rollers.—This is a modern invention in the manufacturing of bar-iron, the rollers being ſubſtituted for the forge hammer to work the metal, in the proceſs of rendering it malleable. This method is only uſed in conjunction with the *puddling* proceſs, that is, puddling, or converting, caſt-iron into a malleable ſtate, by decarbonating it in a reverberating furnace; in this proceſs the metal becomes divided into grains the ſize of muſtard ſeeds, with a very ſlight coheſion, and full of interſtices between the grains; it therefore requires to be ſtamped, or hammered, at a welding heat, into a ſolid maſs; but rolling will alſo anſwer the purpoſe.

This was firſt diſcovered by the late Mr. Wilkinſon, who had, in his extenſive works at Broſely, in Shropſhire, a pair of enormous rollers, moved by the beam of the ſteam-engine, not with a rotatory, but with a reciprocating motion; they were five feet diameter, near ten feet long, and weighed almoſt five tons each, although caſt hollow, like garden rollers; ſectors were fixed on the ends of the gudgeons, to turn each other, as they did not make above one-third of a revolution, and then moved back again. The circumference of the rolls were grooved with grooves, gradually diminiſhing from one end to the other, in the ſame manner as the rollers ſhewn in *Plate* V. *fig.* 1. The maſs of iron to be rolled was collected into a ball in the furnace, which was taken out, and paſſed through the greateſt of the grooves. When it came through, a workman at the oppoſite ſide removed the ball to the next ſmalleſt groove, and by the returning motion of the rollers, it was carried back again to the front: the front workman then returned it in another groove, and ſo on, paſſing ſucceſſively through the different grooves, until, by gradual conſolidation, it was reduced to an imperfect bar of malleable iron. A number of theſe, being cut into lengths, were made up into faggots, or piles, and by a pair of rotatory rollers finiſhed into bars. Mr. Wilkinſon had a patent for this machine, but it was afterwards found that other rollers would effect the purpoſe better. In *fig.* 1. of *Plate* V. is a view of a pair taken from Mr. Samuel Smith's works, at Sheffield, Yorkſhire, a gentleman who, we believe, was the firſt who brought them into uſe; the two grooves *e* and *f* are very coarſe, and have teeth, that they may, more certainly, draw in the balls. The two next grooves are plain but concave, and the remainder are angular, to form ſquare bars when the ball becomes conſolidated. The uſe of theſe rollers is very ſimilar to thoſe we have juſt deſcribed, the ball of metal being taken from the furnace, and preſented to the rolls. As ſoon as the metal comes through the rollers, a workman behind lifts it over the upper roll to the firſt workman, who puts it between them again: in this manner the metal is rolled ten or twelve times, being put through a ſmaller groove of the rollers at each time, ſo as to compreſs it in a greater degree every time, till at laſt it is reduced to a tolerable ſquare bar; but the laſt groove E, *fig.* 2, has teeth in different parts of the groove, and at ſuch diſtances from each other, that they will indent ſo deeply upon the angles of the bars, at every eight or ten inches of their length, as to render it eaſy to break them into ſhort pieces when they come through. The pieces, thus formed, are piled four together, and put into a ball furnace, and, when heated, they are rolled into bars, by rollers ſhewn at *fig.* 4, which, at the firſt five grooves, *e*, *f*, are ſimilar to the former, but the ſucceeding grooves, *k*, *k*, are made to receive the rings of the oppoſite roll, leaving ſmall rectangular ſpaces, as is ſhewn by the light parts, *fig.* 4, through which the iron, being paſſed, is reduced to a parallel ſmooth bar. The ſucceſſive grooves through which it is paſſed are each made narrower than the preceding, ſo as to reduce the bars to the width and thickneſs intended, in which ſtate they are ſent to market, or if required for the nail rods, or hoops, are cut up by the ſlitters. The rollers are thought to incloſe the impurities in the iron, rather than expel them; but as rollers require much leſs power to give them motion than the hammer, it becomes worth the conſideration of manufacturers to improve their conſtruction, and render them equal in effect to the hammer. At preſent the rolled iron is not always ſo good in quality as the hammered, though this circumſtance ſhould not deter manufacturers from uſing it, as it is ſcarcely poſſible that a newly invented proceſs ſhould be at firſt brought to equal perfection with another which has exerciſed the ingenuity of manufacturers for ages paſt. But in the courſe of practice many improvements may ariſe, which will remain undiſcovered if the proceſs, in its preſent ſtate, is neglected; even in this ſtate the puddled iron, made with rollers, is by no means to be deſpiſed, when its price and quality are compared; it is for iron requiring the fibrous texture that this proceſs is beſt adapted.

Rolling and ſlitting iron for nail rods or ſmall hoops. The iron

iron which is ſubjected to this proceſs is brought to the mill, *Plate* IV. before deſcribed, from the forge hammer, in bars of a ſize proportionate to the nail rod it is intended to make; theſe are cut into lengths by the ſhears, and heated in the furnace, then rolled repeatedly through the rollers, C, D, which are reduced every time it paſſes, until the bar becomes of the thickneſs for the ſquare of the intended rod, half an inch for inſtance, and two, or two and a half, inches wide: it is, in this ſtate, preſented to the ſlitters E, F, and one end being introduced between the guide-bars of the ſlitters, is drawn in between them by the motion, and, by this means the ring of one roller preſſes a correſponding breadth of the hot metal into the ſpace between the rings of the other roller; this being performed by both rollers, completely divides the bar into ſeveral rods of the ſame breadth with the rings of the rollers. A ſmall leaden pipe is fixed over the cutters, and being perforated with holes, conſtantly lets fall a ſupply of cold water on the rollers, to prevent their becoming hot, and thus loſing their hardneſs, which alone preſerves their circular figure under the intenſe preſſure they have to ſuſtain in dividing the iron. The guide-bars are intended to force the iron rods, when cut, out of the grooves between the rings of the collar, which they would not otherwiſe quit, after being ſo forcibly preſſed into them by the rings of the oppoſite roller. For making ſmall hoops, the rods, as ſoon as they are formed, are put through the plain rolls again, and flattened into a hoop.

Rolling of Iron Hoops.—In the country theſe are made from iron bars, which are reduced in rollers, ſimilar to *fig.* 4, to a ſize proper to produce the hoops required; theſe are cut into lengths, heated, and paſſed through the ſlitters, which divide them into three or four rods, which are immediately preſented to the caſe-hardened rolls, and flattened out into a proper hoop. The mill ſhewn in *Plate* IV. is equally adapted for this work as for nail-rod; but for hoops, the addition of a proper fly-wheel would be an improvement, as the work is ſo much heavier.

In London, where a vaſt quantity of old hoops is to be procured, they are re-manufactured, and make the very beſt ſort. The victualling-board alone conſume many hundred tons annually for the ſervice of the navy: the old hoops are made up into faggots, and ſhingled, or welded into bloom at one heat, by a forge-hammer, or in ſmall works by rollers like *Plate* V. *fig.* 1. The blooms, being again heated, are rolled out into bars by the bar rollers, *fig.* 4, and theſe are cut into two or three lengths, according to the ſizes of the intended hoops; theſe pieces are heated a third time, ſlit into rods as above deſcribed, and then formed into hoops by the caſe-hardened rolls. By ſucceſſive improvements it has been found, that two heats are ſufficient, the firſt for ſhingling and forming the bars, and the ſecond for ſlitting and flattening the hoops; but in either method the grand object is by faggoting and rolling, always in the direction of the length, to gain a fibrous texture to the iron.

Old hoops have been lately made up into new at one operation; by employing a greater power and velocity, and making up a ſmaller quantity at once, it may be effected at a ſingle heat, inſtead of two or three. For this purpoſe the old hoops are cut into ſhort lengths and faggoted in piles, the rivets being firſt cut out and the pieces ſtraightened, that the piles may be more cloſe and compact: theſe piles are heated in the uſual kind of furnace to a good welding heat, and are rolled between the ſhingling rollers, being paſſed through two or three grooves till they are properly reduced to go through the flat-grooved bar rollers: after rolling through the three grooves thereof, they are put through the flat parts, and a guide is uſed to direct them ſtraight forwards, without care or attention from the workman. The bar is then carried to the cutters, and ſlit into two or more rods, which are immediately and ſucceſſively paſſed between a pair of plain, caſe-hardened rolls, to finiſh the hoops.

Vat-hoops, or others above two inches in width, do not require to be ſlit, but are at once carried from the bar rollers to the plain rollers, which finiſh them. The piles for ſhingling muſt not be made too large, or the hoops will not retain ſufficient heat to be ſound; about 42lbs. will be a proper quantity. The mill for this manufacture muſt of courſe have great power, and the rollers ſhould move with a ſufficient velocity to enable the iron to be got through the whole proceſs whilſt ſufficiently hot. The bar and ſhingling rollers ſhould be placed cloſe together in a line, and muſt make about 90 revolutions *per* minute; the caſe-hardened rollers ſhould make 140 *per* minute, and ſhould be placed in ſuch relative ſituations as will be moſt convenient to convey the iron in the quickeſt manner from one pair to the next. A patent has been taken out by ſome, who pretend to the invention of the above method; but they cannot prevent other manufacturers uſing it, as it is no new invention, conſiſting only in taking more care, and uſing rollers with a greater velocity.

The rolling-mill is not confined to the laminating of iron, but is likewiſe employed very extenſively for reducing braſs, copper, tin, lead, as well as gold and ſilver, into plates and bars. The latter metals are ſcarcely ever reduced by any other means than rolling; as this method makes no waſte, is the moſt expeditious, and produces better work than hammering, or any other method, particularly when an equality of thickneſs and an even ſurface are deſired; ſuch, for example, as gold or ſilver, which is always to receive a poliſh; in theſe caſes the rollers are made of ſteel hardened and poliſhed on the ſurface with the moſt ſcrupulous nicety, that they may produce a perfect ſurface on the matters which have been paſſed through them.

Rolling-*Preſs Printing.* See Printing.

Rolling, in *Sea Language*, that motion by which a ſhip vibrates from ſide to ſide. Rolling is, therefore, a ſort of revolution about an imaginary axis, paſſing through the centre of gravity of the ſhip; ſo that the nearer the centre of gravity is to the keel, the more violent will be the roll; becauſe the centre about which the vibrations are made is placed ſo low in the bottom, that the reſiſtance made by the keel to the volume of water which it diſplaces in rolling, bears very little proportion to the force of the vibration above the centre of gravity, the radius of which extends as high as the maſt-heads. But if the centre of gravity is placed higher above the keel, the radius of the vibration will not only be diminiſhed, but ſuch an additional force to oppoſe the motion of rolling will be communicated to that part of the ſhip's bottom as may contribute to diminiſh this movement conſiderably.

It may be obſerved, that, with reſpect to the formation of a ſhip's body, that ſhape which approaches neareſt to a circle is the moſt liable to roll; as it is evident, that if this be agitated in the water, it will have nothing to reſtrain it; becauſe the rolling or rotation about its centre diſplaces no more water than when it remains upright; and hence it becomes neceſſary to increaſe the depth of the hold, the riſing of the floors, and dead or riſing-wood afore and abaft. See Ship-building.

Rolling-*Tackle.* See Tackle.

Rolling *Fork*, in *Geography*, a river of Kentucky, which runs into the Ohio, N. lat. 37° 47′. W. long. 86° 18′.

ROLLO, in *Biography*, the firſt duke of Normandy, was originally

originally a chieftain or petty prince of Denmark: the king of that country having in vain endeavoured by force to subdue his small territory, lulled him into security by a treaty which he never intended to keep, and then falling perfidiously upon him, killed his brother and many of his officers, and obliged him to take refuge in Scandinavia. Rollo here collected a body of troops, whom he farther attached to his cause by a pretended vision which predicted the certainty of future success; and then he made a bold attempt upon England, in the latter end of Alfred's reign. The order introduced by that prince having completely foiled the designs of the adventurer, he directed his enterprises to France; and sailing up the Seine, committed great ravages, and obtained possession of the city of Rouen. He proved himself so formidable an enemy to Charles the Simple, at that time king of France, that he was glad to make a treaty with Rollo, by which he gave him his daughter in marriage, with that part of Neustria called Normandy, for her dower, on the condition that Rollo should do homage for his territory, and embrace the Christian religion. Rollo very readily submitted to the ceremony of baptism, in which he had Robert duke of France for his sponsor, whose name he assumed. In governing the dukedom which he had gained by his sword, the Dane shewed nothing of the barbarian. He divided the land among his followers upon the feudal tenure, established magistracies in the different districts, and took care that law and justice were exactly administered. He severely punished robbery; treated his French subjects with mildness and equity; founded bishoprics and religious houses; and acted, in all respects, like an enlightened sovereign. Such was the reputation of his government, that the country shortly recovered its population and wealth, and many of his roving countrymen settled in Normandy, and became useful and regular subjects. To him is attributed the institution of the exchequer, or ambulatory parliament, which, at a later period, became stationary at Rouen. He died, worn out with the cares of government, in 932, having, five years before this, abdicated his throne in favour of his son William.

Rollo, in *Geography*, an island in the North sea, near the coast of Lapland. N. lat. 68° 15′.

Rollo's *Head*, a cape on the W. coast of the island of Dominica; three miles S. of Prince Rupert's Hand.

ROLLOCK, Robert, in *Biography*, a learned Scotch divine, was born near Stirling in the year 1556. He studied the classics and belles-lettres under Thomas Buchanan, who has been characterised by Spotswood as learned and wise, and a strong defender of the church's rights, and who then kept a school of considerable reputation. From Buchanan's school Rollock went to the university of St. Andrew's, where he went through a course of philosophy, and, having greatly distinguished himself, he took his degree, and was made regent of his college. In 1580 the magistrates of Edinburgh obtained permission of the king, James VI., to build a college, which being accomplished, Mr. Rollock was, in 1583, chosen the principal, and first theological professor. His high character, though not thirty years of age, brought numerous students to the new university. His reputation extended to foreign countries, where he was greatly respected by the reformed churches. He died in the year 1598, when he had only reached his forty-third year. He was author of many works, among which are the following: "In selectos aliquot Psalmos Davidis Commentarius;" "In Danielem Prophetam Commentarius;" "In Epistolam sec. Sanctum Johannem Comment." He published commentaries on some of the other epistles; also "Analysis Logica in Epistolam ad Hebræos."

ROLPACH, in *Geography*, a town of Thibet, capital of a district; 150 miles N. of Fyzabad. N. lat. 29° 21′. E. long. 82° 5′.

ROLSHUGARDE, a town of Norway; 46 miles S.S.E. of Drontheim.

ROM, an island in the North sea, near the coast of North Jutland, about eight miles long and two wide. N. lat. 55° 9′. E. long. 8° 31′.

Rom, a town of France, in the department of the Vienne; 10 miles S. of Lusignan.

ROMA, an island in the East Indian sea; about 20 miles long, and from 6 to 12 broad. S. lat. 7° 12′. E. long. 127° 12′.

ROMAGNA, a late province of Italy, bounded on the N. by the Ferrarese, on the E. by the Adriatic, on the S. by the duchy of Urbino and Tuscany, and on the W. by Bologna; about 45 miles long and 30 broad. This country, which was part of the ancient Flaminia, fell, in the fifth century, under the dominion of the Ostrogoths; whose king, Theodoric, after having taken the city of Ravenna, in the year 493, made it the place of his usual residence. In the following century, the Goths, being driven out by Belisarius and Narses, generals of the emperors of the East, Ravenna became the residence of the emperor's exarch, till the Lombards made themselves masters of it, and dispossessed the last exarch. In the year 755, Pepin, king of the Franks, having compelled Istulphus, king of the Lombards, to cede the whole exarchate, conferred it on the see of Rome. It now forms the departments of the Amone or Lamone, and the Rubicon, in the kingdom of Italy, being surrendered by the pope in 1797. See Exarch, and Ravenna.

ROMAGNANO, a town of Italy, in the department of the Gogna, on the Sesia; 15 miles N.N.W. of Novara.

ROMAGNE, La, a town of France, in the department of the Mayne and Loire; 6 miles W. of Chollet.

Romagne *sous les Côtes*, a town of France, in the department of the Meuse; 9 miles N.W. of Estain.

ROMAGNO, a town of Italy, in the Feltrin; 6 miles N.E. of Feltri.—Also, a town of the island of Sardinia; 12 miles N.N.E. of Sassari.

ROMAHIE′, a town of the Arabian Irac, on the Euphrates; 100 miles S. of Bagdad. N. lat. 31° 40′. E. long. 44° 15′.

ROMAIN, in *Husbandry*, the name of a plant, cultivated in the fields, in many parts of the world, particularly in France, and called, by our farmers, *French vetches*, or *French tares*. It is an annual plant, but a very quick grower, and is extremely good food for cattle, particularly for horses: they let these creatures feed on it all the former part of the summer, and then cut it for hay in August or September. Its short continuance in the ground makes it less valuable than saint-foin and clover; but it has this advantage over them, that it will grow on poor ground.

Romain, *Cape*, in *Geography*, a cape on the south coast of Madagascar. S. lat. 35° 38′. E. long. 49° 29′.

Romain, *St.*, a town of France, in the department of the Charente; 3 miles N.W. of Aubeterre.—Also, a town of France, in the department of the Lower Seine, and chief place of a canton, in the district of La Havre; 7 miles E. of Montivilliers. The place contains 1200, and the canton 11,569 inhabitants, on a territory of 155 kiliometres, in 28 communes.

Romain *d'Alban*, *St.*, a town of France, in the department of the Drôme; 15 miles N.N.W. of Romans.

Romain *en Jarest*, *St.*, a town of France, in the department

ment of the Rhone and Loire; 12 miles N.N.E. of St. Etienne.

ROMAINE, William, in *Biography*, a very popular divine of the church of England, was born at Durham in 1714, and educated at Hertford college, Oxford; from whence he removed to Chrift-church, where he took his degrees in arts. On entering into holy orders, he became a frequent preacher before the univerfity, and was noted for his zeal in behalf of what were deemed the orthodox doctrines. He removed to London in 1749, and became lecturer at St. Dunftan's church, Fleet-ftreet. He was, for a fhort time, morning preacher at St. George, Hanover-fquare, and profeffor of aftronomy at Grefham college, which fituation he foon refigned. In 1764 he was chofen rector of St. Anne, Blackfriars, where, and at St. Dunftan's, he continued to preach to large and very crowded congregations almoft to his death, which happened in the year 1795. Towards the clofe of life his voice was feeble, but his manner was very impreffive. His works, which are theological, and on the Calviniftical fcheme, have been collected in 8 vols. 8vo. He was editor of Calafio's Concordance to the Hebrew Bible, in 4 vols. folio, in 1749; in which, it is faid, he made fome unwarrantable alterations to ferve the Hutchinfonian doctrine.

ROMAINMOTIER, in *Geography*, a town of Switzerland, in the canton of Berne, from which a bailiwic derives its name; 11 miles S.W. of Yverdun.

ROMAINVILLE, a town of France, in the department of Paris; 5 miles E. of Paris.

ROMALE, a town of Sweden, in Weft Gothland; 35 miles W.S.W. of Skara.

ROMAN, a town of European Turkey, in Moldavia, on the Siret, the fee of a Greek bifhop; 145 miles W. of Bender.

Roman, *Cape*, a cape on the weft coaft of Eaft Florida. N. lat. 25° 40′. W. long. 82° 25′.—Alfo, a cape on the coaft of Chili, in the South Pacific ocean. S. lat. 48° 20′. W. long. 76° 40′.—Alfo, a cape on the coaft of South Carolina. N. lat. 33° 5′. W. long. 79° 30′.—Alfo, a cape on the coaft of Florida, 20½ leagues N.W. by N. from Cape Sable, the S.W. point of the peninfula of Florida.—Alfo, a cape on the north coaft of Terra Firma, being the north point of the peninfula, which is the eaft limit of the gulf of Venezuela. Due north of it is the ifland of Orua, or Araba, at eight or nine leagues diftance, belonging to the Dutch.

Roman *County*, a county of North Carolina, containing 21,543 inhabitants.

Roman, fomething belonging to the city of Rome.

Roman *Monarchy*. See Monarchy, and Rome, infra.

Roman, or *Romifh Church*, is that of which the pope is head, fo called in oppofition to the reformed churches. See Papists, and Popery. See alfo Church and Reformation.

The Roman law is the civil law, or the written law, as compiled by the emperor Juftinian.

Roman *Ecclefiaftical Singing* and *Mufic*, during the middle ages. Thefe were in fuch general favour throughout Europe, that it was the cuftom, during the times of the greateft mufical and mental darknefs, when reafon and reflection were the leaft cultivated, for the priefts, of almoft every part of Europe, to vifit Rome, in order to learn canto fermo, and the manner of performing thofe rites of the church, in which mufic had any concern. Even thofe hiftorians who are the leaft friends to bigotry, and the moft ready to combat fuperftition and papal ufurpations, allow that it was only at the court of Rome that the arts of elegance and refinement were at all cherifhed, during thefe times. King Pepin, Charlemagne, and Alfred, had applied to the Roman pontiffs for finging-maffers to inftruct their fubjects.

The learned Jufquin went thither as a finger, during the pontificate of Sixtus IV. And before the year 1600, the names of near twenty Spanifh fingers and compofers are recorded, who were employed in the pontifical chapel. Yet all this proves nothing more than that muficians of great abilities, from whatever part of the world they came, were certain of encouragement there. For more facts to this purpofe, fee Italy.

Roman *Games*, *Ludi Romani*, were folemn games, held in ancient Rome, thus called by way of eminence, and on account of their antiquity, as having been inftituted by Romulus.

They were fometimes alfo called *magni ludi*, from the great pomp and expence of them; and fometimes *confualia*, becaufe performed in honour of the god Neptune, who was alfo called *Confus*, in his quality of god of fecret counfels.

They alfo bore the denomination of *ludi Circenfes*, becaufe held in the Circus.

This folemnity, Halicarnaffeus obferves, was originally inftituted by Evander, in honour of Neptune, under the name of Ἵππιος, whence the feftival itfelf was called Ἱππιοκρέλια; and was afterwards renewed by Romulus, in honour of the fame deity, only under another name.

For Romulus, needing the advice of a god to counfel him in the defign he had to furnifh his new citizens with wives, applied to the god of fecret counfel himfelf, Confus; proclaimed the Confualia; and invited his neighbours all around to the firft celebration thereof. The confequence was the rape of the Sabine women, who came to be fpectators of it.

The great ceremony, in thefe games, confifted in a cavalcade of horfes and affes, adorned with garlands; Neptune being reputed the firft author of riding on horfeback.

Their horfes here were of two kinds; *viz.* πομπικοι, or fuch as were merely led up and down for ftate; and δρομικοι, which were for race and exercife.

The other diverfions were fencing, and that till one of the combatants was killed on the fpot; fighting with beafts, and with the cæftus, or whirlbats; wreftling, running, leaping, fea-fights, horfe-races, chariot-races, &c.

Thefe games, Livy tells us, were improved, and rendered much more magnificent, by Tarquinius Prifcus. Manutius fays, they were held on the eve of the nones of September; *i. e.* on the 14th day of the month.

Roman *Operas*. In treating of the progrefs of the mufical drama, in that ancient and renowned capital, during the former part of the 17th century, it does not appear that any regular theatre was opened there for the performance of operas; nor, indeed, can we difcover that any fecular mufical drama was exhibited there till the year 1632, when "Il Ritorno di Angelica nell' Indie, Drama Muficale," is recorded by Leo Allacci, in his Drammaturgia, to have been performed in that city; but without informing us where, or by whom fet to mufic or fung. Several mufical dramas, however, were performed there at the palaces of ambaffadors, and other great perfonages, between 1632 and 1661, when "Clearco," fet by Tenaglia, a Roman maffer, was performed. This compofer, who had diftinguifhed himfelf by his productions for the church, is celebrated by P. Della Valle among great Roman muficians in 1640.

The firft public theatre, opened for the exhibition of mufical dramas at Rome, in modern times, was il Torre di Nona, where "Giafone" was performed, 1671. No

other theatre ſeems to have been uſed for this purpoſe in that city till 1679, when the opera of "Dov' è Amore, è Pietà," ſet by Bernardo Paſquini, the famous organiſt, was repreſented Nella Sala de' Signori Capranica. This theatre ſtill ſubſiſts.

Romans, *King of the*, in *Modern Hiſtory*, is a prince elected and deſigned ſucceſſor to the German empire.

Roman *Alum*. See *Roman* Alum.

Roman *Balance*, *Statera Romana*, the ſteel-yard.

A Roman *Charity*, among *Painters*, is a picture of a woman ſuckling an old man.

Roman *Indiction*. See Indiction.

Roman *Knight*, &c. See Knight, &c.

Roman *Language*, &c. See Latin, &c.

Roman *Order*, in *Architecture*, is that more uſually called the Compoſite.

Roman *Purple* now denotes the dignity of a cardinal.

Roman *Roads*. See Road and Way.

Roman *Year*, &c. See Year, &c.

ROMANCE, anciently *Romaunt*, and *Romant*, a fabulous relation of certain intrigues and adventures in the way of love and gallantry, invented to entertain and inſtruct the readers.

M. Fontenelle calls romances poems in proſe; and Boſſu is not averſe to their being admitted as poetical pieces, though not written in verſe.

Setting aſide the verſification, it is certain an epic poem and a romance are almoſt the ſame thing. The juſt notion, therefore, of a romance is, that it is a diſcourſe invented with art to pleaſe and improve the mind, and to form or mend the manners, by inſtructions, diſguiſed under the allegory of an action, or ſeries of actions, related in proſe, in a delightful and probable, yet ſurpriſing manner.

A juſt romance conſiſts of two parts: *viz.* a moral, as its foundation, and end; and a fable, or action, as the ſuperſtructure and means.

It muſt alſo have the manners; that is, the characters muſt be diſtinguiſhed, and the manners muſt be neceſſary; and it muſt have all the other qualities of poetical manners.

The incidents muſt be delightful, and, to that end, rightly diſpoſed and ſurpriſing. The ſentiments fall under the ſame rules as in the drama.

But the diction is allowed to be more lofty and figurative; as being a narration, and not having terror or pity, but admiration for its end.

A romance of chivalry, according to the definition of a late writer, is any fabulous narration, in verſe or proſe, in which the principal characters are knights, conducting themſelves, in their ſeveral ſituations and adventures, agreeably to the inſtitutions and cuſtoms of chivalry.

As compoſitions of this kind have a long time been little elſe but hiſtories of amorous adventures, and feats of knight-errantry, the origin of romances is referred to that of love-hiſtories; and accordingly Dearchus, a diſciple of Ariſtotle, who firſt wrote of thoſe matters, is uſually termed the original author of romances. Though Photius is of opinion, that Antonius Diogenes's book on the errors and amours of Dinias and Dercyllis gave birth to moſt of the works of this kind. Be this as it will, it is certain the ancients have had their romances as well as we. Such are the amours of Rhodanis and Simonides, deſcribed in iambics; ſuch is the romance of Leucippe and Clitophon, compoſed by Achilles Tatius, a Greek writer, afterwards a biſhop; ſuch are the Four Books of Incredible Things, written by Damaſcius; ſuch are the Ethiopics of Heliodorus, in which he relates the amours of Theagenes and Chariclea. Laſtly, under the ſame claſs may be ranked the Fables of Parthenius Nicenus, of Athenagoras, Theodorus Prodromus, Euſtathius, and Longus.

Indeed antiquity could ſcarce be reconciled to ſuch pieces, and always looked on them as abuſes. Photius, in his Bibliotheca, cod. lxxxvii. gives a frightful account of that of Tatius; and the Ethiopics of Heliodorus, though one of the moſt modeſt and moſt reſerved pieces of the kind, met with a very ſevere treatment. The author was biſhop of Tricca, in Theſſalia, in the fourth century. Nicephorus tells us, that a ſynod, conſidering the danger which might accrue to youth from reading his romance, authoriſed as it was by the dignity of its author, propoſed it to him, either to ſuppreſs his book, or renounce his biſhopric; and that he choſe the latter. But this hiſtory is a little doubtful.

Be this as it will, Heliodorus has ſerved as a model to all the romances written ſince; and the marriage of Theagenes and Chariclea has produced a very numerous iſſue, even all the romances now extant in the world.

Mr. T. Warton, in his "Diſſertation on the Origin of Romantic Fiction in Europe," prefixed to the "Hiſtory of Engliſh Poetry," vol. i. is of opinion, that the peculiar and arbitrary ſpecies of fiction, which we call romantic, was entirely unknown to the writers of Greece and Rome; and it appears to have been imported into Europe by a people, whoſe modes of thinking, and habits of invention, are not natural to that country. Whatever be their origin, which will be a ſubject of inquiry in the ſequel of this article, it muſt be allowed that the ancient metrical romances were very early ſuperſeded by proſe works upon the ſame ſubjects. Theſe laſt, although far inferior, in intereſt and merit, to the poetical tales which preceded them, claimed and obtained a ſuperior degree of credit, founded upon the fiction alleged to be inſeparable from metre; upon the degraded ſtate of the minſtrels, whoſe province it was to recite theſe diſparaged rhyming legends; and, above all, upon a grave pretext ſet up by the author of each proſe work, that he had tranſlated it *verbatim et literatim* from an ancient Greek or Latin original. As no ſuch Greek or Latin original for a romance of chivalry has ever been produced, we may be ſafely allowed to doubt whether any ſuch ever exiſted. But our anceſtors received theſe accounts with unheſitating credulity, and gravely read the voluminous romances of Lancelot du Lac, and Palmerin of England, as tranſlations from ancient annals, while they rejected with ſcorn the rhyming legends of the minſtrels on the ſame ſubjects. Thus the metrical romances were obliged to give way to the proſe works, which were, in fact, borrowed from them; and ſo complete was the ſubſtitution of the one ſpecies of fable for the other, that the preſs, which was then invented about the period of this revolution in public taſte, groaned under the ſplendid folios of the former, while the latter remained in obſcure manuſcripts, or were only printed in the meaneſt manner, and for the meaneſt of the people. Thus the very exiſtence of the metrical romance, as a diſtinct, ſeparate, and more ancient kind of compoſition, was unknown and unnoticed till the publication of the works of ſome modern writers.

Biſhop Percy, the venerable editor of the "Reliques of Ancient Poetry," ſeems to have been the firſt perſon in our country who directed the public attention to this ſubject, by an "Eſſay upon Metrical Romance," prefixed to the third volume of his work, in which the merits and qualities of the poetry and chivalry are critically inveſtigated, and a liſt given of ſuch metrical romances as had come to his knowledge. The learned prelate was followed by Mr. T. Warton; and not to mention the collectors and publiſhers of ſome of the ſhorter and more ancient of our metrical tales

of

of chivalry, both in London and Edinburgh, the first comprehensive and general work upon this interesting subject was undertaken by Mr. Ritson, which was soon succeeded by the more popular and elegant performance of Mr. George Ellis, entitled "Specimens of early English Metrical Romances, chiefly written during the early Part of the 14th Century: to which is prefixed a historical Introduction, intended to illustrate the Rise and Progress of Romantic Composition in France and England." Mr. Ritson's work is a selection of "Ancient English Metrical Romances," containing twelve metrical romances of chivalry; to which is prefixed a long and elaborate dissertation on Romance and Minstrelsy.

In imitation of the archbishop Turpinus, who passed for author of the romance of the Feasts of Charlemagne and Orlando, a great number of histories, of the like kind, were written in France, during the time of Philip the Fair; the authors of which seemed to improve on each other, contending who should go farthest in the merveilleux. These books, being intended for polite people, were written in the court language of that age, which was called the *romans*, *romant*, or *romantic;* whence the books themselves were called by those names: and thus, by degrees, *romans*, &c. became the general name of all books of this kind; whence, at length, our *romance*.

To this purpose, Crescimbeni, reciting the several opinions respecting the name *romanza*, derives it from the word *Roma*, and tells us, that it means that vulgar idiom which, with colonies of Romans, passed into Provence, and elsewhere, and was esteemed, even by the barbarians who inhabited those kingdoms, and called *Romano* and *Romanzo;* and in this they wrote the acts and achievements of knights; which writings were, therefore, styled *romanzi*, or *romances*.

Others derive the word from the Spanish *romansero, I invent;* as intimating romances to be mere fictions. And hence it is that the ancient poets of Provence, who were the first great dealers in romances, are called *troubadours*, *q. d.* finders, or inventors.

Crescimbeni remarks, that the Italians derived from Provence, not only the origin and art of writing romances, but also the very subjects on which they were founded; and though it is not precisely known who were the romance writers of Provence, yet many of their romances are found in the Italian libraries; and, indeed, from such a source of poetical fiction as the country of Provence appears to have been, nothing less could be expected than a vast profusion of romances, and other works of invention. See PROVENÇAL *Poets*, and also MINSTRELS, with whose history that of romances, of which they were the composers, is nearly connected.

It has been a received opinion amongst modern critics, that the fictions of romance, borrowed from the Arabians, were communicated to the Western world by means of the Crusades. Mr. Warton (ubi supra) is of opinion, that although these expeditions greatly contributed to propagate this mode of fabling in Europe, they were introduced at a much earlier period by the Saracens, or Arabians, who came from the northern coasts of Africa, and settled in Spain, about the beginning of the eighth century. From Spain, he imagines, they found an easy passage into France and Italy; and the close connection which subsisted for many centuries between the Welsh and their colonists, the Armoricans, might have been the means of bringing them from France into this island. (See ARMORICA.) A strict intimacy also subsisted between Cornwall and Wales; and hence we are able to account for Cornwall's being made the scene and the subject of so many romantic adventures in the French romances. Their language, customs, and alliances were the same; and by British writers, Cornwall, separated from Wales only by a strait of inconsiderable breadth, is frequently styled West Wales. At the invasion of the Saxons, both countries became indiscriminately the receptacle of the fugitive Britons. We find the Welsh and Cornish, as one people, often uniting themselves as in a national cause against the Saxons. They were frequently subject to the same prince, who sometimes resided in Wales, and sometimes in Cornwall; and the kings or dukes of Cornwall were perpetually celebrated in song by the Welsh bards. Traditions about king Arthur are as popular in Cornwall as in Wales; and most of the romantic castles, rocks, rivers, and caves, of both nations are alike distinguished at this day by some noble achievements, at least by the name of that celebrated champion.

Arthur and Charlemagne, according to Warton, are the first and original heroes of romance. And as Geoffroy's history is the grand repository of the acts of Arthur, so a fabulous history, ascribed to Turpin above-mentioned, is the ground-work of all the chimerical legends which have been related concerning the conquests of Charlemagne, and his twelve peers. Its subject is the expulsion of the Saracens from Spain: and it is filled with fictions evidently congenial with those which characterize Geoffroy's history. Some have supposed this romance to have been written by Turpin, a monk of the eighth century, who for his learning, and sanctity, and gallant exploits against the Saracens of Spain, was preferred by Charlemagne to the archbishopric of Rheims. Others suppose it to have been forged under archbishop Turpin's name, about that time; others, very soon afterwards, in the reign of Charles the Bald, that is, about the year 870. Historical evidence concurs with numerous internal arguments to prove, that it must have been compiled after the crusades, or about the year 1110. In the two fabulous chronicles now mentioned, the foundations of romance seem, in Mr. Warton's opinion, to be laid. The principal characters, the leading subjects, and the fundamental features, which have supplied such ample matter to this singular species of composition, are here first displayed. And although the long continuance of the crusades imported innumerable inventions of a similar complexion, and substituted the achievements of new champions, and the wonders of other countries; yet the tales of Arthur and Charlemagne, diversified indeed, or enlarged with additional embellishments, still continued to prevail, and to be the favourite topics. Upon the whole Mr. Warton concludes, that these volumes are the first specimens extant in this mode of writing; but he considers the Saracens, either at their immigration into Spain, about the ninth century, or at the time of the crusades, as the first authors of romantic fiction among the Europeans.

In examining the hypothesis of Dr. Percy and Mr. Mallet, who derive these fictions, in a lineal descent, from the ancient historical songs of the Gothic bards and scalds, he allows this opinion to be in some measure well founded, and that so far it is also reconcileable with his own system.

The scaldic inventions, he says, had undoubtedly taken deep root in Europe, and prepared the way for the more easy admission of the Arabian fabling, about the ninth century, by which they were, however, in a great measure superseded. As a proof of which he observes, that the enchantments of the Runic poetry are very different from those in our romances of chivalry. The former chiefly deals in spells and charms, such as would preserve from poisons, blunt the weapons

weapons of an enemy, procure victory, allay a tempeſt, cure bodily diſeaſes, or call the dead from their tombs, in uttering a form of myſterious words, or inſcribing Runic characters. The magicians of romance are chiefly employed in forming and conducting a train of deceptions. There is an air of barbaric horror in the incantations of the ſcaldic fablers: the magicians of romance often preſent viſions of pleaſure and delight: and although, not without their alarming terrors, ſometimes lead us through flowery foreſts, and raiſe up palaces glittering with gold and precious ſtones. The Runic magic is more like that of Canidia in Horace, the romantic reſembles that of Armida in Taſſo. The operations of the one are frequently but mere tricks, in compariſon of that ſublime ſolemnity of necromantic machinery which the other ſo awfully diſplays.

He adds, it is alſo remarkable, that in the earlier ſcaldic odes we find but few dragons, giants, and fairies. Theſe were introduced afterwards, and are the progeny of Arabian fancy. Nor, indeed, do theſe imaginary beings often occur in any of the compoſitions which preceded the introduction of that ſpecies of fabling.

That the ideas of chivalry, the appendage and the ſubſtance of romance, ſubſiſted among the Goths, our author readily allows, but not without certain limitations. It was under the feudal eſtabliſhments, which were ſoon afterwards erected in Europe, that it received new vigour, and was inveſted with the formalities of a regular inſtitution.

From the whole of his obſervations, the author deduces the following general concluſion.

Amid the gloom of ſuperſtition, in an age of the groſſeſt ignorance and credulity, a taſte for the wonders of oriental fiction was introduced by the Arabians into Europe, many countries of which were already ſeaſoned to a reception of its extravagancies by means of the poetry of the Gothic ſcalds, who, perhaps, originally derived their ideas from the ſame fruitful region of invention. Theſe fictions, coinciding with the reigning manners, and perpetually kept up and improved in the tales of troubadours and minſtrels, ſeemed to have centered, about the eleventh century, in the ideal hiſtories of Turpin and Geoffrey of Monmouth, which record the ſuppoſititious achievements of Charlemagne and king Arthur, where they formed the ground-work of that ſpecies of fabulous narrative called romance. And from theſe beginnings, or cauſes, afterwards enlarged and enriched by kindred fancies, fetched from the cruſades, that ſingular aud capricious mode of imagination aroſe, which at length compoſed the marvellous machineries of the more ſublime Italian poets, and their diſciple Spenſer.

Hearne imagines, that the old metrical romance, called "Richarde cuer de Lyon," was written by Robert de Brunne. It is probable, however, that the leiſure of monaſtic life produced many rhymers, nor is it at all unlikely, but that the monks often wrote for the minſtrels, and that many of our ancient tales in verſe, containing fictitious adventures, were written, although not invented, in the religious houſes. The romantic hiſtory of "Guy earl of Warwick" is expreſsly ſaid, on good authority, to have been written by Walter of Exeter, a Franciſcan friar of Carocus in Cornwall, about the year 1292. (Carew's Survey of Cornwall, p. 59.) The libraries of the monaſteries were full of romances. Among the many French minſtrels invited into England by Richard I., it is natural to ſuppoſe that ſome of them made their magnificent and heroic patron a principal ſubject of their compoſitions. We have a romance now remaining in Engliſh rhyme (which we have juſt mentioned) that celebrates the achievements of this illuſtrious monarch. It is called "Richard, &c." and was probably tranſlated from the French about this period. That this romance, either in French or Engliſh, exiſted before the year 1300, is evident from its being cited by Robert of Glouceſter, in his relation of Richard's reign, and alſo by Robert de Brunne, who wrote much about the ſame time with Robert of Glouceſter; and hence we may infer that Hearne muſt be miſtaken in ſuppoſing that he was the author of it.

The French, above all other nations, have applied themſelves to this kind of writing; whether it be owing to the natural taſte and genius of the people, or to the freedom, &c. with which they converſe with the women. They appear to have written metrical romances before or about the year 1200. Some of theſe ſeem to have been formed from proſe hiſtories, enlarged and improved with new adventures and embelliſhments from earlier and more ſimple tales in verſe on the ſame ſubject. They began chiefly with romances of chivalry: hence their Amadis, in twenty-four volumes; Palmerin d'Oliva; and of England, king Arthur, &c. of which we have an agreeable critique in Don Quixote.

Chreſtien of Troys wrote "Le Romans du Graal," or the adventures of Sangrale, which included the deeds of king Arthur, ſir Triſtram, Lancelot du Lake, and the reſt of the knights of the round table, before 1191. Chreſtien alſo wrote the romance of "Sir Percival," and left unfiniſhed "La Charette," containing the adventures of Lanucelot. The firſt French writers of romance were the *Troubadours*; which ſee.

The later romances are much more polite; the beſt of which are the Aſtrea of d'Urfe; the Cyrus and Clelie of Mademoiſelle de Scuderi; the Caſſandre and Cleopatre of La Calprenede; Ariane, Francion; and the Adventures of Telemachus, by the late archbiſhop of Cambray, worth all the reſt.

The Germans, too, have their romances; eſpecially Hercules and Herculiſcus, the Aramena, Octavia, Arminius, Otbert, &c.

The Italians have their Eromena, by Biondi; the works of Loredano, Marino, &c. The Spaniards, who, from their temper and conſtitution, were extravagantly fond of chivalrous exerciſes, had their Amadis of Gaul, their Diana, and Don Quixote. Some critics have even ſuppoſed, that Spain, having learned the art of romance-writing from their naturalized gueſts the Arabians, communicated it at an early period to the reſt of Europe. The Engliſh, their Arcadia, &c. And in modern times, the number has been ſo great, that our circulating libraries are full of them.

The Argenis of Barclay is rather a ſatire than a romance.

Although we owe to the Norman minſtrels the greater part of the romances now extant, which were avowedly tranſlated into Engliſh, as ſoon as that language ſuperſeded the French; yet ſome few were moſt probably originally compoſed in Engliſh for the uſe of the Scottiſh court, where French was never excluſively ſpoken, and afterwards imitated or tranſlated by French minſtrels. Hence it is curious to obſerve, that as the earlieſt French romances were written in England, ſo the earlieſt Engliſh romances were compoſed in Scotland.

Mr. Ellis makes an arrangement of romances into claſſes, introducing each with appropriate remarks. The firſt claſs comprehends romances relating to king Arthur; which were probably the earlieſt in order, and were moſt popular and numerous. The next claſs included what he has ventured to call Saxon romances, that is, romances referring to Saxon ſubjects, and claiming, perhaps, ſome foundation in the hiſtory of that people. Guy of Warwick and Bevis

of

of Hamptoun occupy this ſtation entirely. Theſe two, notwithſtanding their demerits, equalled, or excelled in popularity, almoſt all the romances of the middle ages. The next is entitled an Anglo-Norman romance, and recites the adventures of no leſs a perſon than Richard Cœur de Lion. The next claſs of romances comprehend ſuch as relate to Charlemagne and his Paladins. Under this head Mr. Ellis has enumerated three, *viz.* Roland and Ferragus, Sir Otuel, and Sir Ferumbras. The next romance is of oriental origin, being the earlieſt tradition of the Seven Wiſe Maſters, long known among the ſchool-boys of this country. To this he has added ten miſcellaneous romances, which we muſt content ourſelves to paſs over without mentioning their names. The importance of the ancient metrical romances in an hiſtorical point of view muſt be acknowledged. They hold out to us, like Shakſpeare's plays, the abſtract and brief chronicles of the time, and demand the conſideration of every hiſtorian. Even in a literary point of view, their merit is not contemptible. It is true, the ſtory is generally rambling and deſultory, utterly incapable conſequently of exciting the pleaſure ariſing from a well-conducted plan, all the parts of which depend upon each other, and tend, each in due degree, to bring on the cataſtrophe. So far is this from being the caſe, that in a long romance, the adventures uſually are all ſeparated and inſulated; only connected with each other, by their having happened to the ſame hero; juſt as a necklace of beads is combined by the thread on which they are ſtrung. This arrangement, in fact, beſt ſuited the reciters, whoſe narration was to be proportioned to the time and patience of their audience; and whom this looſe ſtructure of ſtory permitted to uſe freedom of compreſſion or dilatation as beſt ſuited their purpoſe, ſince any ſingle adventure might be inſerted without impropriety, or left out without being miſſed. The ſame cauſe accounts for the looſe and often tedious ſtyle in which the minſtrels indulged. It was of conſequence that their ſtanza ſhould be ſo ſimple, as to be eaſily recollected, and their diction ſo copious, as not to ſuffer by any occaſional deficiency of memory. For theſe reaſons, Robert de Brunne tells us, that the common minſtrels were unable to repeat tales written in a conciſe ſtyle and complicated ſtanza, and that ſuch became *naught* in their imperfect recitation. To theſe faults, we have often to add thoſe of extreme awkwardneſs of contrivance and improbability of incident; but which neither offended the taſte, nor ſhocked the faith of our plain and hardy anceſtors. On the other hand, there is a ſort of *keeping* in theſe ancient tales, which did not depend upon the minſtrel's inclination, and from which he could not have departed, if he had a mind to do ſo. This ariſes from his painting the manners of his own time, as they paſſed before his eyes, and thus giving a truth and unity to the chivalrous events he relates, which the modern labourers in the vineyard of romance are utterly unable to imitate. With all the pains theſe laſt can uſe to deck their champions in the antique taſte, they are perpetually confounding the paſt time with the preſent, and are guilty of anachroniſms almoſt as groſs as his who introduced a tea-table ſcene into the hiſtory of John of Gaunt. Neither is the language in which theſe legends are told altogether unworthy of our applauſe. There often occur paſſages, which, from the ſpirit of the poet riſing with the ſituation, may juſtly claim a rank among the higher and more maſculine orders of poetry. And although, as we have already noticed, the general conduct of the ſtory is deſultory and ſlightly put together, yet many of the individual adventures, of which each long romance is compoſed, are happily conceived and artfully executed. The gloom of ſuperſtition likewiſe added a wild and diſmal effect to the wonders of the minſtrel; and occaſionally his deſcription of ſupernatural events amounts nearly to ſublimity. See Warton, Ritſon, Ellis, ubi ſupra, and Edinb. Review, N° XIV.

ROMANCHE, La, in *Geography*, a river of France, which runs into the Drac, a little above Grenoble.

ROMANENGO, a town of Italy, in the department of the Upper Po; 4 miles E. of Crema.

ROMANIA, a province of European Turkey, containing the territory anciently denominated "Thrace," and deriving its preſent name from New Rome, by which Conſtantinople was diſtinguiſhed. The Turks call it "Rumelia" or "Rumili," and "Icella;" and it is alſo denominated "Romelia." This province is bounded on the N. by Bulgaria, on the E. by the Black ſea, on the S. by the ſea of Marmora and the Archipelago, and on the W. by Macedonia. It is upon the whole a level country, though famous for ſome of its mountains: ſuch are mount Hæmus, which ſeparates it on the N. from Bulgaria; Rhodope, celebrated among the ancients for the cataſtrophe of Orpheus; and mount Pangæus, which divides this country from Macedonia. The two former are long ridges of mountains, that extend from the frontiers of Macedonia to the Black ſea. The territories that lie among the mountains are cold and barren; but thoſe near the ſea are pleaſant and fertile, producing all kinds of grain, and particularly rice of good quality. This country was anciently divided into ſeveral independent kingdoms: and the Thracian Cherſoneſus was alſo governed by its own kings. The preſent inhabitants are Greeks, deſcended from the ancient Thracians, interſperſed with Turks. Thrace (which ſee) was formerly diſtinguiſhed by the cultivation of the ſciences and fine arts: but the preſent ſtate of Romania is very different, being wholly deſtitute of perſons of literature. It is governed by three Sangiaks, and divided into as many diſtricts under the denomination Sangiacates. The capital is *Conſtantinople*, which ſee.

Romania, *Cape*, a cape on the S.E. point of Malacca. N. lat. 1° 18′. E. long. 104° 15′.

ROMANO, Giulio, in *Biography*, the cognomen of Giulio Pippi, the moſt renowned among the immediate ſcholars of Raphael d'Urbino, his heir, and the continuator of his works. He was born at Rome in the year 1492. While a pupil, he followed leſs his maſter's delicacy than energy of character, and chiefly ſignalized himſelf in ſubjects of war and battles, which he repreſented with equal ſpirit and erudition. As a deſigner, he commands the whole mechaniſm of the human body; and, without fear of error, turns and winds it about to ſerve his purpoſes, but ſometimes overſteps the modeſty of nature. Vaſari, who viſited him at Mantua, prefers his drawings to his pictures, as being more full of that original fire which diſtinguiſhes his conception, and was apt to evaporate in the longer proceſs of finiſh: ſome have, with better evidence, objected to the character of his phyſiognomies, as more ſagacious than enamoured, leſs ſimple than vulgar, and often diſmal and horrid, without being terrible. In colour, whether freſco or oil, his hand was as expeditious, and his touch, eſpecially in the former, as decided, as his eye and choice were congenial. Bricky lights, violet demi-teints, and black ſhades, compoſe in general the raw, opaque tone of his oil pictures; far different from that characteriſtic tone which ſignalizes the Battle of Conſtantine, painted by him from the deſign and after the death of Raphael, and which was by Pouſſin admired as being moſt happily adapted to the ſubject. The ſtyle of his draperies is claſſic, but the arrangement of the folds generally arbitrary and mannered; the hair and head-dreſſes of his women are always fanciful and luxurious, but not

not always arranged by taste; whilst those of his men frequently border on the grotesque.

After he had completed the Hall of Constantine in the Vatican from the design of his master Raphael, he went to Mantua, where the increased practice and authority, derived from the superintendance of the great works he had just completed, established his reliance on himself; and the patronage of the Gonzaghi roused that loftiness of conception, and gave birth to those magnificent plans, from which Mantua and the palace *del T.*, as from enchantment, rose. To the stores of antique treasures belonging to this great family, of which the statues, busts, and basso-relievos at present in the academy are but insignificant remains, he added his own; rich in designs of Raphael, and in studies and plans from the antique. No designer ever possessed such industry with so much fire, so much consideration with such fecundity, or combined with equal rapidity such correctness, with great recondite knowledge in mythology and history, and that popularity and care in treating it.

The palace *del T.* furnishes specimens in every class of picturesque imagery. Whatever be the dimension, the subject, or the scenery, minute or colossal, simple or complex, terrible or pleasing, we trace a mind bent to surprise or to dazzle by poetic splendour; but sure to strike by the originality of his conception, he often neglects propriety in conducting his subjects, considered as a series: and in the arrangement or choice of the connecting parts, hurried into extremes by the torrent of a fancy more lyric than epic, he disdains to fill the intermediate chasms, and too often leaves the task of connection to the spectator.

In this palace, Giulio adopted the method of his master. He prepared the cartoons, and the pictures were executed by his pupils; but he retouched, corrected, and gave the last finish to them: unfortunately, his master-strokes have been covered again by modern pencils; and the fable of Psyche, the Allegories of Human Life, the Giants storming Heaven, exhibit now indeed his composition and design, but not his hand: this is better preserved in the paintings of the old palace, or, as it is now called, the Corte of Mantua; which are in fresco, and relate chiefly the histories of the Trojan war. They have the same beauties and defects as those of the palace *del T.*: each singly considered is a proof of the poetic spirit and the practical powers of the master; as a cyclus they want connection and evidence. Helen sleeping, Vulcan forging Arms for Achilles, are beautiful; and Minerva in the act of slaying Ajax, the son of Oileus, sublime. Nor is his versatility less admirable in the Bacchic or amorous subjects; the *capricci* and grotesque conceits with which he decorated the small cabinets of the same palace.

The altar-pieces of Giulio are not numerous. He did not live to finish those which he had begun for the cathedral of Mantua. The most remarkable of those which he finished with his own hand, are the three frescoes at St. Marco; and in the church of St. Cristofero, the athletic figure of that saint, groaning under the weight of the divine Infant on his shoulders. They are, however, far inferior, for genuine pathos and classic execution, to the Martyrdom of St. Stephen, on the head altar of the church of St. Stephen at Genoa.

Of Giulio's scholars and assistants, the most celebrated were F. Primaticcio, chiefly employed in the stuccoes and ornaments of the palace *del T.*; Benedetto Pagni of Pescia, who accompanied Giulio from Rome to Mantua; and Rinaldo Mantovano, the most expert of the three, and in the opinion of Vasari, who laments the shortness of his life, the greatest painter that Mantua ever produced; the altar-piece of Sta. Agostina alla Trinita has a grandeur of style above his age, and has by some been suspected to be the design of Giulio. To these may be added Fermo Guisoni, who coloured in the cathedral the Call of St. Peter and St. Andrew, from the most studied and most beautiful cartoon of the master; and Theodore Ghigi, or as he subscribes himself, Theodore Mantovano, a great designer, and so practised in the style of Giulio, that after his death he was selected by the prince to finish several of his works.

In addition to his powers as a painter, Giulio Romano possessed a very considerable knowledge of the principles of architecture; and was employed in plans for several of the palaces at Rome and Mantua. His last architectural exertion was the erection of a splendid mansion for himself at Mantua. Vasari relates, that upon the death of San Gallo, the architect of St. Peter's, Guilio was selected by the pope for his successor, but was prevented leaving Mantua by the interest of the cardinal Duke, and the entreaties of his wife and her immediate friends and relations; and whilst he was endeavouring to surmount these difficulties, and enjoy the proffered honour and emolument, he was seized with illness, and borne to the grave in the year 1546, and in the 54th of his age. He left a son, called, after his respected master, Raphael, of whom nothing remains, but the tradition that he possessed talents worthy of his father. He died in 1560, at the age of 30. Fuseli's Pilkington.

Romano, in *Geography*, a town of Italy, in the department of the Adda and Oglio; 11 miles S.S.E. of Bergamo.

Romano, or *Ramano Cayo*, a small island off the N. shore of the island of Cuba; it is long and narrow, and lies at the E. extremity of the cluster of isles called the King's Garden.

Romano, *St.*, a town of Italy, in the department of the Panaro; 18 miles S.W. of Modena.

ROMANOV, a town of Russia, in the government of Jaroslavl, on the Volga; 16 miles W.N.W. of Jaroslavl. N. lat. 57° 46′. E. long. 39° 40′.

ROMANOVA, a town of Russia, in the government of Irkutsk, on the Angara; 60 miles W.S.W. of Ilimsk. —Also, a town of Russia, in the government of Tambov, on the Olonetz; 16 miles S. of Lipetzk.

ROMANOVKA, a town of Russia, in the country of the Cossacks, on the Don; 116 miles E.N.E. of Azoph.—Also, a town of Russia, in the government of Upha; 64 miles N.E. of Orenburg.

ROMANOW, a town of Russian Poland, in the palatinate of Kiev; 8 miles N.E. of Zytomiers.—Also, a town of Austrian Poland, in Galicia; 33 miles W. of Przemyl. —Also, a town of Lithuania, called also Romanowo, in the palatinate of Novogrodek; 18 miles N. of Sluck.

ROMANS, a town of France, in the department of the Drôme, and chief place of a canton, seated on the Isere; two posts N.E. of Valence. The place contains 6173, and the canton 15,180 inhabitants, on a territory of 225 kiliometres, in 11 communes. N. lat. 45° 2′. E. long. 5° 8′.

Romans, *Romant*, *Romanic*, or *Romance*, the polite language formerly spoken at the court of France; in contradistinction to the *Walloon*, or ancient Gaulish, spoken by the common people.

The Romans having subdued the Gauls, introduced part of their language among them; and a mixture of half Latin, half Gaulish, or Celtic, constituted the Romans; of which the modern French is only an improvement.

Hence, to *enromance* was to write in romance, &c. See Romance.

Covarruvias, a learned Spanish writer, observes, that the name

name romance is generical, and belongs alike to the Tuſcan, French, and Spaniſh; inaſmuch as all theſe were derived from the purity of the Latin tongue, which the Romans, being conquerors, introduced into theſe provinces, and which, at firſt, the nobles ſpoke and wrote. He further ſays, that the Latin tongue, being admitted into Spain, was ſpoken as in Rome, and that there were men well ſkilled in it, who ſpoke and wrote it with greater refinement than the vulgar; but upon the irruption of the Goths it was remarkably corrupted: that which was before *Roman* was converted into *Romance*, which is equivalent to its being derived from the Romans. And it farther appears, that the name *Romance* was given to the Spaniſh language, to diſtinguiſh it from the Gothic.

Mr. Planta, in his elaborate account of the Romanſh language (Phil. Tranſ. vol. lxvi. part i. p. 129, &c.), which is now ſpoken in the moſt mountainous parts of the country of the Griſons, near the ſources of the Rhine and the En, informs us, that this language conſiſts of two principal dialects; which, though partaking of the ſame general name, differ ſo widely as to conſtitute in a manner two diſtinct languages. One dialect, he ſays, which is ſpoken in the Engadine, a valley extending from the ſource of the En to the frontiers of the Tyroleſe, is by the inhabitants called *Ladin*. And he obſerves, that the Romanſh has never been uſed in any regular compoſition in writing, till the ſixteenth century, nor affected by any foreign invaſion, or intimate connection: but that it is at preſent the identical language that was ſpoken two hundred years ago.

This learned writer obſerves, that notwithſtanding the variety of conjectures and controverſies, which have occurred with regard to the Gallic Romance, it is agreed on all hands, that the vocabulary of the Roman, and the idiom of the Celtic, have chiefly contributed to its formation; and, therefore, that it partakes of a common origin with that of the Griſons. He adds, that there are inconteſtible proofs that this language was once univerſal through France, and that this, and not immediately the Latin, hath been the parent of the Provençal, and afterwards of the modern French, the Italian, and the Spaniſh.

From a compariſon of the two Romances, as well as from the ſimilarity of their origin, Mr. Planta infers, that they are one and the ſame language.

However, whilſt the Griſons neglected to improve their language, or had no opportunity for this purpoſe, the taſte and fertile genius of the troubadours, foſtered by the countenance and elegance of the brilliant courts and ſplendid nobility of Provence, did not leave theirs long in the rude ſtate in which we find it in the ninth century. But the change being gradual, and almoſt imperceptible, the French hiſtorians have fixed no epocha for the tranſition of the Romance into the Provençal. Nevertheleſs, it appears, that the former language had received no conſiderable alteration in the twelfth century, and it ſtill bore the ſame name. But after this era, though the name occurs, the language diſtinguiſhed by it is very different from the Romance of the ninth century. Allowing, however, the univerſal uſe of the Romance all over France till the twelfth century, and that what the writers of thoſe times ſay of the Gallic, is to be underſtood of the Romance, of which there is ſufficient evidence, it follows, ſays Mr. Planta, that the language introduced into England under Alfred, and afterwards more univerſally eſtabliſhed by Edward the Confeſſor, and William the Conqueror, muſt have been an emanation of the Romance, very near akin to that which is now ſpoken in the Alps.

According to Du-Cange, the Romance had alſo penetrated into Scotland before the twelfth century. The ſame corruption, or coaleſcence, which gave riſe to the Gallic Romance, and that of the Griſons, muſt alſo have produced, in Italy, a language much reſembling, if not perfectly ſimilar, to thoſe two idioms. It appears alſo, from what has been already ſaid, that the language of the Romans penetrated very early into Spain, and that the Romance was very common in that kingdom. The univerſality of the Romance in the French dominions, during the eleventh century, accounts for its introduction into Paleſtine, and many other parts of the Levant, by Godfrey de Bouillon, and other adventurers, who engaged under him in the cruſades.

This writer farther adds, that the heroic achievements and gallantry of the knights of the Croſs gave riſe to a ſwarm of fabulous narrations, which, though not an invention of thoſe days, were yet, from the name of the language in which they were written, ever after diſtinguiſhed by the appellation of Romances. And he preſumes, that the Romance hath been preſerved ſo near its primitive ſtate, not only in the country of the Griſons, but in ſeveral other remote and unfrequented parts.

Mr. Berington, in his "Literary Hiſtory of the Middle Ages," recently publiſhed, obſerves, that the language afterwards known by the name of French, was divided into two dialects, both of which bore the name of "Romane," or Romance, becauſe each was formed on the baſis of the Roman: that to the north being adulterated by a mixture of Frankiſh and Norman words; whilſt the dialect of the ſouth was vitiated by words transferred from the language of the Oſtrogoths, Viſigoths, and Alani. The river Loire, not rigidly taken, was their common boundary. The firſt might be called the "French Romane," the latter the "Provençal," becauſe it was ſpoken by the ſubjects of Raimond, count of Provence, well known in the armies of the cruſaders. The characters of theſe dialects, however, though owning a common ſource, were marked by ſtrong lines of difference. The Provençal, from a milder climate, from a more conſtant intercourſe with ſtrangers, and from a cloſer affinity to the mother tongue, was ſoft and harmonious: the French more harſh, as retaining more of its northern mixture. But if we mention the countries in which theſe languages were current in the 13th century, it will be ſeen that the Provençal was confined within the limits above aſſigned it; while the French Romane, overflowing its natural boundaries, became familiar to diſtant nations. It paſſed with the conquerors into England, where it was previouſly faſhionable. The Norman ſettlers rendered it familiar at Naples and in Sicily; though here it was ſoon vanquiſhed by the ſuperior faſcination of the Italian dialect. The cruſaders carried it into the Eaſt, and planted it in Syria, in Paleſtine, in Cyprus, and at Conſtantinople, where it was at leaſt as permanent as the conqueſts which they had made.

ROMANTRINO, in *Geography*, a town of Italy, in the Novareſe; 4 miles E.N.E. of Novara.

ROMANUS I., Lecapenus, in *Biography*, emperor of the Eaſt, roſe from an obſcure origin to various employments under Leo the philoſopher, and was, at one time, poſſeſſed of the command of the naval armies. Having rendered himſelf all-powerful at court, he perſuaded the prince Conſtantine to marry his daughter, baniſhed the empreſs-mother Zoe to a monaſtery, and in 919 cauſed himſelf to be crowned emperor by the patriarch. He aſſociated his three ſons in the imperial authority, and ordered their names, with his own, to be placed in all edicts before that of the lawful emperor Conſtantine. The adherents of the latter made ſome attempts to free him from this ſervitude, but they were

were frustrated and punished. During these intestine disturbances, Simeon, king of Bulgaria, renewed his inroads on the empire, and penetrated to the gates of Constantinople. Romanus brought him to accede to terms of peace, and the Roman admiral, about this time, entirely destroyed a Saracen fleet in the harbour of Lemnos. Simeon dying in 927, his son Peter resumed hostilities, and broke into the Constantinopolitan territory, but peace was concluded, and a marriage entered into with the emperor's grand-daughter to the Bulgarian king. An invasion of the Roman dominions in Asia by the Syrian Saracens was repulsed by the imperial general; and the commanders of the armies of Romanus had equal success against the Russians, who had ravaged the empire with a numerous fleet. In the mean time, Romanus lost his eldest son Christopher, and the two remaining brothers quarrelled with each other, and with their father. The youngest son of Romanus formed a conspiracy for his father's dethronement, and in December 944, his apartment was entered by night, and he was conveyed to an island of the Propontis. He there assumed the religious habit and life, and died in 946 in this retreat, a true penitent for the injustice which he had inflicted upon Constantine. Previously to his decease, his two sons were banished to the same island, whom he reproached, when he met them on the beach, for their ingratitude and unkindness to him, nevertheless he very readily allowed them to share of his water and vegetable diet. Lecapenus does not appear, says Gibbon, to have possessed either the virtues or vices of a tyrant. The spirit and activity of his private life dissolved away in the sun-shine of the throne; and in his licentious pleasures, he forgot the safety both of the republic and of his family. Of a mild and religious character, he respected the sanctity, the innocence of youth, the memory of his parents, and the attachment of the people. Univer Hist. Gibbon.

Romanus II., called *the Young*, succeeded his father, Constantine Porphyrogenitus, in 959. He had married Theophano, a woman of mean origin, who was charged with having been chiefly instrumental in the alleged crime of poisoning his father. Romanus was supposed to possess considerable talents, but he was habitually attached to frivolous amusements and dissolute pleasures, and resigned all care of the state to his chief chamberlain. In the morning, this luxurious emperor visited the circus; at noon he feasted the senators; the greatest part of the afternoon he spent in the tennis-court, the only theatre of his victories; from thence he passed over to the Asiatic side of the Bosphorus, hunted and killed four wild boars of the largest size, and returned to the palace, proudly content with the labours of the day. He banished from court his mother Helena, and his two sisters, who were reduced to a state of great indigence.

During the short reign of this emperor, the two brothers, Nicephorus Phocas and Leo, obtained great successes against the Saracens in Crete and the East, while the emperor was wasting his time in indolence. According to some historians, debauchery, but according to others, the evil practices of Theophano, brought his life to a close in the year 963, at the age of twenty-four, and in the fourth year of his reign. Univer. Hist. Gibbon, vol. ix.

Romanus III., named *Argyrus*, a patrician of an ancient family, was nearly related to Constantine IX. During the last illness of that emperor, he was offered his daughter Zoe for a wife, with the title of Cæsar. He would readily have declined the high honour intended for him, but was told the loss of his eyes or his life must be the consequence of his refusal. His wife, devoted to his welfare, as well as ardently attached to his person, made way for a new marriage, by retiring herself to a convent, and in 1028 Romanus espoused the princess Zoe. On the death of Constantine he succeeded to the imperial throne, and began his reign by easing the people of some of their taxes, and performing other popular acts. In the second year of his reign, the Saracens having invaded Syria, the emperor resolved to march in person against them, but he was defeated, with the loss of his baggage, and a great part of his army. After his return, several public calamities in the empire followed, which occasioned him entirely to apply his mind to works of piety. In the mean time the empress Zoe, who, at an advanced age, continued to follow a licentious course of life, attached herself to a new lover of mean birth, whom she wished to raise to the purple, and she justified the Roman maxim, that every adulteress is capable of poisoning her husband. To effect her purpose, she caused the deadly cup to be administered to her husband; and finding it too slow in its operation, she employed an assassin, who suffocated him in the bath. He died in 1034, after a reign of five years and a half. Gibbon. Univer. Hist.

Romanus IV., named *Diogenes*, a descendant of Romanus Argyrus, in the regency of Eudocia, widow of Constantine Ducas, engaged in a conspiracy for raising himself to the throne, for which he was tried and condemned to death. This punishment, on account of his fine person, was commuted for a short exile, after which the imperial widow nominated him to the command of her armies, and in 1067 she married him, and he was proclaimed emperor. He had not occupied the throne more than two months, before he put himself at the head of the few troops he could assemble, and crossed the Hellespont to attack the Turkish sultan, who had made incursions into his territories. He came up with the Turks, who were retiring loaded with rich spoils. He attacked and routed them with great slaughter, and pursuing his blow, recovered Aleppo and Hierapolis. In the two following campaigns, Romanus displayed his military talents to great advantage, and finally drove the Turks across the Euphrates. In the fourth campaign he led a numerous army to the deliverance of Armenia. After this he shared in defeat, and was, in a general engagement, left alone, almost in the midst of his enemies, and was taken prisoner by the Turkish sultan, who obliged him to sign an humiliating treaty, and then set him at liberty. During his misfortunes, a revolution was effected at Constantinople: Eudocia had been driven from the throne, and shut up in a monastery; and her eldest son, Michael Ducas, had been proclaimed emperor. Romanus was dethroned, and his eyes torn out with circumstances of so much cruelty that he soon died. This happened in 1071, after a reign of three years and eight months. Univer. Hist.

Romanus, pope, was elected to that dignity in the year 897, upon the expulsion of Stephen VI. and VII. Little is recorded of him: he is said by Platina to have annulled the acts of his predecessor, and, in particular, to have declared his proceedings against the corpse and memory of pope Formosus unjust and illegal. Romanus' dignity was of very short duration; he died before he had been in possession of it quite four months. Bower.

ROMAON, St., in *Geography*, a town of Portugal, in the province of Beira; 19 miles S.S.E. of Viseu.

ROMBACH, a town of the duchy of Wurzburg; 2 miles N. of Hasfurt.

ROMBLON, or Romblino, one of the smaller of the Philippine islands, about 30 miles in circumference. N. lat. 12° 40′. E. long. 121° 58′.

ROMBOUTS, Theodore, in *Biography*, a native of Antwerp, and born in 1597, was a painter of very considerable merit. At first he studied under Abraham Jansens; but

but in his 20th year he went to Italy, and there began his career as an hiſtorical painter. He was patronized by the duke of Tuſcany, and painted ſeveral large compoſitions for that prince, who honoured and rewarded him handſomely. On his return to Antwerp he found Rubens in poſſeſſion of full fame; and ſoon perceived how difficult it was for him to meet with that degree of eſtimation at home which he had received abroad. A noble emulation, however, ſtimulated him to enter the lists with that great maſter; and though he certainly was not adequate to the combat, yet he exhibited conſiderable proweſs, which even Rubens acknowledged.

As he died at the age of 40, his works are not numerous. The principal ones, among thoſe executed after his return from Italy, were painted for the court-houſe of Ghent.

He likewiſe painted pictures of low ſubjects, ſuch as mountebanks and their attendants, ſoldiers playing at cards, &c. &c.; which he did as paſtime, or merely to acquire money, but they are not among his beſt performances. On the hiſtorical pictures he produced, his reputation reſts for ſupport, and is upheld to a conſiderable rank.

ROME, ROMAN EMPIRE, &c. } in *Geography* and *Hiſtory*. The ancient city of Rome, ſituated on the river Tiber, in eaſt longitude 13°, and about 41¾° of north latitude, though in its origin one of the moſt humble of cities, was deſtined to become the capital of the largeſt empire in the ancient world. In modern hiſtory it has been famous for being the centre of an eccleſiaſtical tyranny, under which, for many centuries, the greater part of what may be denominated the civilized world was held in ſubjection. The city of Rome, without diſpute, was founded by Romulus; but we may trace the origin of its inhabitants, that is, of the ancient Romans, to Æneas, the hero celebrated in Trojan ſtory. When the Greeks became maſters of Troy, Æneas, with the forces under his command, retired into the fortreſs, which, for ſome time, they defended with great bravery; but being at length compelled to yield, he conveyed away his gods, his father, wife, and children, and fled, with a numerous crowd of Trojans attached to him, to the ſtrong places of mount Ida. Here, however, his enemies followed him, and he was obliged to negociate a peace, the terms of which forced him to quit the Trojan territories altogether: the Greeks, on their part, engaged not to moleſt him in his retreat. Æneas accordingly equipped a fleet, in order to ſeek a ſettlement in ſome foreign land. The Trojan having croſſed the Helleſpont, arrived in the peninſula of Pallene, where he built a city, calling it, from himſelf, Æneia, and left in it a part of his followers. From thence he ſailed to Delos, and thence to Cythera, where he erected a temple to Venus. He built another, to the ſame goddeſs, in Zacynthus, and in this iſland he inſtituted games, named "the races of Venus and Æneas." Wherever the Trojan hero went he left memorials of himſelf, and in the time of Dionyſius theſe were ſtill exiſting in the places already mentioned, and in many others, as at Leucas, Actium, Dodona, &c. which were accordingly regarded as indiſputable proofs of the reality of Æneas' voyage to Epirus: and "that he came into Italy," ſays Dionyſius, "we have the concurrent teſtimony of all the Romans; the ceremonies they obſerve in their ſacrifices and feſtivals bear witneſs to it; alſo the Sibylline books, the Pythian oracles, and many other things that nobody can reaſonably reject as fable."

Æneas firſt landed in Italy, after croſſing the Ionian ſea, at Cape Minerva, in Japygia; from thence he went to Drepanum in Sicily, to which place Elymus and Ægyſtus, who had eſcaped from Troy a little before him, had brought a Trojan colony. Æneas augmented this colony, by leaving a part of his own followers; and then croſſing the Tyrrhenian ſea, he bent his courſe for Italy. He gave the name of Palinurus to the cape at which he firſt landed, from one of his pilots, who died there. From this place he ſailed to ſeveral other parts, till at length the Trojan prince, and his faithful attendants, finiſhed their long voyages on the coaſt of Latium, a ſmall territory on the eaſt ſide of the river Tiber, which now contains a part of the preſent Campagna di Roma. Latinus was the king of the country, and the people of it were called Latins. Here Æneas and his followers undertook to raiſe a ſecond Troy, hoping that they had arrived at the end of their adventures.

When Æneas arrived in Italy, Latinus was engaged in a war with the Rutuli, but his ſucceſs was very doubtful: he accordingly aſſigned to Æneas and his followers a track of land for their ſettlement, upon condition that they ſhould join their arms to his againſt the Rutuli, who were to be conſidered as their common enemy. Æneas accepted the conditions offered, and complied with his engagement ſo faithfully, that Latinus repoſed in him the moſt unbounded confidence, and gave him in marriage his only daughter, Lavinia, thus ſecuring to him the ſucceſſion to the throne of Latium; hence Æneas changed the name of his camp from Troy, and called it Lavinium, in honour of his wife. The Trojans followed the example of their leader, by making alliances with Latin families; ſo that in a very ſhort time they became one nation, united by the cloſeſt bonds.

There was, however, a cauſe for conſiderable ſtrife excited by this union: Turnus, nearly related to the queen, and who had been brought up by Latinus, had entertained hopes of having Lavinia for his wife; when, therefore, he ſaw that princeſs given to Æneas, he inſtantly joined the Rutuli; but in the firſt battle after this confederacy, both Turnus and Latinus were ſlain: the conſequence of this was, that Æneas came into quiet poſſeſſion of the kingdom of Latium, which he governed with great wiſdom, and tranſmitted to poſterity. His reign was, however, ſhort; but during that period he eſtabliſhed the worſhip of the gods of his own country, and to the religion of the Latins he added that of Troy. The two palladiums, which had been the protectors of that city, became the tutelary deities of Lavinium, and, in after ages, of the whole Roman empire. He introduced, likewiſe, the worſhip of Veſta, and appointed certain virgins, called, from her, Veſtals, to keep a fire burning in honour of the goddeſs. Many other deities, who had been reverenced in Troy, became probably known to the Latins by means of Æneas, which might be the occaſion of his being deſignated by the appellation of the *pious* Æneas. This hero was, at length, obliged to head the united forces of the Latins and Trojans againſt the Rutuli, who had formed an alliance with Mezentius, king of the Tyrrhenians. A battle enſued, which laſted till night, when Æneas, being puſhed to the banks of the Numicus, which was a boundary of Lavinium, and being forced into that river, was unfortunately drowned. The Trojans had, however, addreſs enough not only to conceal his body, but to pretend that, inſtead of his having been drowned, he was ſuddenly taken up to heaven, where, in the character of a deity, he was overlooking the conduct of his ſubjects: who, in honour of the newly-formed god, erected to him a temple, under the title of "Jupiter Indiges."

Upon the death of Æneas, he was ſucceeded by his ſon Euryleon, named alſo Aſcanius and Iulus, who contended with Mezentius, and in the end obliged him to ſue for peace, which was granted, upon condition that for the future the river Tiber ſhould be the boundary between the Latin

and Etrurian territories. Aſcanius was the ſon of Æneas by his firſt wife, and of him Lavinia, who was left pregnant by Æneas, began to be jealous, and retired to the woods, where ſhe was delivered of a ſon, which, from the place of his birth, ſhe named Silvius. Aſcanius after a time diſcovered the place of Lavinia's retreat, and perſuaded her to return; from this time he treated Silvius not only as a brother, but reſigned to him the kingdom as his rightful inheritance, and built for himſelf a capital to a new ſtate, which he called *Alba Longa*. After he had reigned twelve years in his new kingdom, Aſcanius died, leaving a ſon, named Iulus, between whom and Silvius the right of ſucceſſion lay, the latter being the ſon, and the former the grandſon of Æneas. At length the two kingdoms were united under Silvius; and as a compenſation to Iulus, he was appointed to ſovereign power in matters relating to religion, a power which thenceforward continued in his family. Silvius was ſucceeded by thirteen kings of the ſame race, who reigned, it is ſaid, though with no great probability, during a ſpace of 400 years. Of theſe little certain can be known; one of them, it appears, was named Tiberinus, who engaged in a war which proved fatal to him; for, in a battle which was fought on the banks of the Albula, he was forced into that river and drowned, whence the river was afterwards named the Tiber, which appellation it has borne ever ſince. Agrippa ſucceeded Tiberinus, and after him Alladius reigned, who was followed by Aventinus, who left his name to a certain hill, in which he was interred. Procas, the ſucceſſor of Aventinus, was father of Numitor and Amulius, and at his death he bequeathed the throne to Numitor. This prince was driven from the government by Amulius, who, to ſecure it for himſelf, murdered Ægeſtus, Numitor's only ſon, and forced his daughter, Rhea Sylvia, to devote herſelf to the worſhip of Veſta, by which ſhe was obliged to perpetual virginity. Her virtue, it was feigned, was violated by the god Mars; the conſequence of which was, that ſhe was delivered of two ſons, who were placed in a wooden trough, and ſent floating down the Tiber. From this dangerous ſituation they were reſcued by Fauſtulus, the king's ſhepherd, and ſuckled by his wife Acca Laurentia, who, for her want of good conduct, was named *Lupa*, a circumſtance that gave riſe to the fable of the twins having been ſuckled by a ſhe-wolf.

Great care was taken of their education, and as they grew up they exhibited ſomething in their appearance and behaviour, that denoted them to be above the common race of ſhepherds: and at length Fauſtulus diſcloſed to them their real deſcent, which inſpired them with the ambition of doing ſomething worthy of their high birth. They had already obtained the names of Romulus and Remus, and before they had arrived at the age of manhood they had taken part in a quarrel between Amulius and Numitor, in which the former was depoſed and killed, and the latter placed on the throne of Alba. Numitor, in gratitude for their ſervice, adviſed them to undertake the founding of a new colony; and to aſſiſt them in the project, he beſtowed upon them thoſe lands near the Tiber where they had been brought up, ſupplied them with all kinds of implements for breaking up the ground, and with ſlaves and cattle, and granted full liberty to his ſubjects to join them.

For the more ſpeedily carrying on their work, it was thought proper to divide thoſe who were employed in it into two companies, one under each brother; a circumſtance which, however well intended, gave birth to two rival factions, which openly manifeſted themſelves when the choice was to be made of a place for the building of their new city, the one being for the mount Aventine, and the other for the Palatine mountain: diſputes on the ſubject came at laſt to open hoſtilities, and Remus was killed. By what means his death happened is not certain; but according to Livy he was killed by the hand of his brother.

Regal State of Rome.—Romulus, being now at the head of the colony, applied all his talents to the rearing of the new city, which he propoſed to call after his own name. He fixed upon mount Palatine for its ſituation, and performed all thoſe ceremonies which were connected with the ſuperſtition of the Etrurians. As to the exact year of the foundation of Rome, there is a conſiderable diſagreement among chronologers, but it is generally referred to 753 before the birth of Chriſt. When the city was finiſhed, which probably conſiſted of about a thouſand houſes, or rude huts, the people, being aſſembled to make choice of a government moſt agreeable to their wiſhes, determined upon a monarchy, and reſolved to take Romulus as their king. Being, unqueſtionably, a man of a vigorous mind, he immediately applied himſelf to the eſtabliſhment of good order, and to the formation of certain rules or laws by which his ſubjects were to be bound. He aſſumed a habit of diſtinction for himſelf, appointed twelve lictors to attend him as guards, and divided his ſubjects into different ranks. The lands he diſtributed into three portions, one for the ſupport of government; another for the maintenance of religion; and the third he divided into equal portions of two acres to each Roman citizen. After this he formed a ſenate, conſiſting of a hundred perſons, afterwards increaſed to 200, choſen from among the ſuperior claſs of the people, and from whom the Patrician families were deſcended. This aſſembly were not only to be judges in matters of ſmall importance, but to debate and reſolve upon ſuch public affairs as the king propoſed, and to determine them by a plurality of voices. The people at large were allowed to create magiſtrates, enact laws, and reſolve upon any war in which the king ſhould propoſe to engage. Romulus next proceeded to ſettle the religious affairs of his people, and he added many of the Trojan deities to thoſe whom the aborigines, or Italian natives, already worſhipped. He choſe prieſts, inſtituted feſtivals, and laid the foundation of a regular ſyſtem of religion.

After all that has been attributed to the political ſagacity and talents of Romulus, it is probable that the great outlines of the firſt conſtitution had a natural foundation in the uſages of barbarous nations; though many of his inſtitutions, it will be readily admitted, bear the traces of a diſcerning and active mind.

The Sabines were the moſt formidable enemies of the early Romans; but after the death of Romulus, who reigned 37 years, Numa, a Sabine, was elected king. He was, in his own nature, formed for pacific meaſures, and a worſhipper of the gods; he endeavoured to give his people the ſame character. To increaſe his influence, and render his government more powerful, he pretended to divine inſpiration. As we have ſeen in ſome preceding articles, ſee CALENDAR, NUMA, &c. he reformed the calendar, divided the year into twelve months, following the courſe of the moon; and diſtinguiſhed the days into thoſe in which civil occupations might be carried on, and thoſe that were to be devoted to religious purpoſes. The buſineſs of agriculture was lawful on the latter, as a religious duty. This wiſe prince reigned forty-three years; and was ſucceeded by

Tullius Hoſtilius, whoſe reign commenced in the year 670 B.C. His diſpoſition was the reverſe of that of Numa. He made frequent wars upon his neighbours; and alienated the

the Sabines from the Romans, who became the moſt powerful of their enemies. Tullius reigned thirty-three years.

Ancus Martius, the fourth king of Rome, grandſon to Numa, inherited his virtues, to which he joined the talents of a warrior. He greatly increaſed the population of Rome, by naturalizing the conquered ſtates; and he built the port of Oſtia, at the mouth of the Tiber. His reign continued twenty-four years. See ANCUS.

The fifth king of Rome, Tarquinius Priſcus, a citizen of Corinth, noted for his great liberality and vaſt wealth, was victorious in his wars, and he adorned the city with works of utility and magnificence. Such were the CIRCUS, the CAPITOL, and the CLOACÆ, thoſe immenſe common ſewers which led to the belief that Rome had been built on the ruins of an ancient city of much greater magnitude. This king was aſſaſſinated in the 38th year of his reign; and was ſucceeded by

Servius Tullius, his ſon-in-law, who very much improved the city with uſeful edifices, and by extending its boundaries. He alſo made ſome new arrangements in the diviſion of the citizens; of which we ſhall have occaſion to ſay more under the biographical article SERVIUS *Tullius*. This king was aſſaſſinated, after a reign of forty-four years, by his own daughter Tullia, who had married Tarquinius, the grandſon of Priſcus, and who thus paved the way for her huſband to aſcend the vacant throne.

The government of this Tarquin was ſyſtematically tyrannical, and from his haughtineſs he obtained the ſurname of *Proud*. By his ill conduct he at length rouſed the vengeance of the people againſt him, and they not only expelled the tyrant, but at one blow aboliſhed the regal government at Rome. See TARQUINIUS.

The regal form of government ſubſiſted 244 years, during which there were only ſeven kings, of whom two died violent deaths, and one was depoſed. Theſe circumſtances throw a conſiderable degree of doubt on the authenticity of the Roman hiſtory, as the reigns of monarchs who die in the common courſe of nature cannot be averaged ſo high as thirty years, whereas, notwithſtanding the violent deaths and depoſition of three of the kings, the average length of their reigns is more than thirty-four years each. Beſides, it is admitted that for the firſt five centuries after the building of Rome, there were no hiſtorians, and, according to Livy, almoſt all the ancient records were deſtroyed when Rome was taken by the Gauls.

At the period of the abolition of the regal government, the territory of the Romans was extremely limited. The chief uſe which they made of their victories was to naturalize the inhabitants of ſome of the conquered ſtates, and ſo increaſe their population; thus their ſtrength being always ſuperior to their enterprizes, they laid a ſolid foundation of their empire.

Conſular State of Rome.—When the regal government was aboliſhed, it was agreed to commit the ſupreme authority to two magiſtrates, who ſhould be annually elected by the people from the Patrician order. To theſe officers they gave the title of conſuls, a name, as it has been ſaid, that was intended to deſignate the counſellors of the republic, rather than its ſovereigns, though, in point of fact, their authority differed ſcarcely in any thing from that of kings. They had the ſupreme adminiſtration of juſtice, the diſpoſal of the public money, the power of convoking the ſenate and aſſembling the people, raiſing the armies, and the right of making peace and war. Their authority was, however, limited to a year. The firſt conſuls were Brutus and Collatinus, the huſband of that Lucretia whoſe death had occaſioned the revolution which deſtroyed the regal power. Tarquin was, at this time, in Etruria, where he got two of the moſt powerful cities, Veii and Tarquinii, to eſpouſe his cauſe. He had alſo numerous and powerful partizans at Rome, and a plot was contrived to open the gates to admit him. The conſpiracy was diſcovered, and Brutus had the mortification to find his two ſons in the number of conſpirators. He felt it his duty to forget the affection of the parent, and to conſider their caſes as conſul; he accordingly condemned them to be beheaded in his preſence. This act of ſevere juſtice ſtruck ſuch terror into the Romans, that ſcarcely any perſon ventured to oppoſe the conſul; and the efforts that were made to bring back monarchy, proved unſucceſsful. To ſecure themſelves againſt the aſſaults of every invader, the Romans formed an alliance with the Carthaginians, which ſubſiſted 250 years. All precautions, however, that were uſed for the preſervation of the tranquillity of the ſtate, could not guard the people againſt the oppreſſion of the nobility. The former ſoon found that they had only changed their maſters, and embraced the mere ſhadow of liberty. They made heavy complaints; theſe were followed by acts of rebellion, which occurred about the year B.C. 498. Peace was reſtored by the creation of a dictator, a magiſtrate who was elected for the period of ſix months, and who was inveſted with abſolute and unlimited authority. Lartius, nominated to this office, armed the lictors with axes, ſummoned the whole people to the public aſſemblies, and calling over the names, enrolled all ſuch as he judged moſt fit for the ſervice of his country, inflicting, without heſitation, capital puniſhment upon thoſe who dared to reſiſt the order.

The ſpirit of the people, though checked for a time, was not ſubdued; they again complained, remonſtrated, and even rebelled; and Rome, for ſome years, was the ſcene of anarchy and ſedition. At length the ſenate, alarmed by the idea of a general revolt, abated their former rigour, in ſome meaſure eaſed the burdens of the people, and ſecured their future intereſts by the creation of five new magiſtrates, called tribunes, who were to be elected annually by the people, whoſe perſons were to be ſacred, whoſe buſineſs it was to defend the oppreſſed, to pardon offences, to arraign the enemies of the people; and, when they judged it neceſſary, to ſtop, by their fiat, the whole machine of government.

The tribunes demanded, and obtained, two other magiſtrates to aſſiſt them, who were named Ediles, from the charge of the public buildings of the city being committed to them. From this era, which was about 493 years before the birth of Chriſt, the commencement of the popular conſtitution of the Roman republic may be dated.

The power of the tribunes ſoon roſe to an unexpected height, and proved the ſource of perpetual diſſentions in Rome. The nobles and patricians had ſtill in view an ariſtocratical form of government, while the tribunes aimed at nothing ſhort of a complete democracy, hoping thereby to increaſe their own power and influence. The tribunes prevailed, and Coriolanus, a patrician of inflexible virtue, was, in the year 491 B.C., baniſhed. Encouraged by the ſucceſs of the tribunes, Spurius Caſſius Viſcellinus, an ambitious patrician, aſpired to the ſupreme power. To accompliſh his purpoſe, he flattered the people by propoſing the Agrarian law, which cauſed the moſt violent commotions in the ſtate. His ambition was, in the end, puniſhed with death, and from this time perpetual contentions and diſcords ſubſiſted between the tribunes and patricians. The number of the former was increaſed to ten, and the people procured the right of electing them in an aſſembly convened by the tribes. From this period the ſupreme authority in the

the Roman republic may be considered as having passed completely from the higher order into the hands of the people.

Hitherto the Romans had no written laws. So long as the monarchy subsisted, the will of their kings was to them instead of laws: while the ancient usages, the decisions of the consuls and of the senate were founded, or supposed to be founded, on the principles of natural equity. To supply this defect in the government, the tribunes proposed an establishment of laws, to which, but with great reluctance, the senate assented. Commissioners were accordingly appointed to bring from Athens the laws of Solon, that such of them might be adopted as were suited to the existing constitution of the Roman republic. Ten persons were chosen out of the senatorial order to compose a code of laws from those of Greece, and from the ancient usages of Rome. This system was divided into twelve tables, fragments of which are still to be found in the history of that early period, and which are the basis of the great structure of the Roman jurisprudence. An acquaintance therefore with these ancient laws is deemed of importance. Even in the most flourishing times of the republic, they continued to be of the highest authority. Cicero passed upon them a very high encomium, and from him we learn, that to commit these laws to memory was an essential part of a liberal education. From the twelve tables the jurisconsulti composed a system of judicial forms for the regulation of the different tribunals. The Decemviri were invested with all the powers of government; each decemvir presided in his turn a single day, and was during that period invested with sovereign authority, with its insignia the fasces. The other nine officiated solely as judges in the determination of law-suits, and the correction of abuses. An abuse, however, of the most flagrant nature, committed by Appius CLAUDIUS, (see his article,) the chief of their number, was destined to bring their office to an end. Prompted also by the ambition and artifices of this man, the whole body conspired against the public liberty, and even bound themselves by an oath to endeavour to make the government perpetual. The senators, the soldiers, and the people, roused by the tyranny of these usurpers, inflicted the punishment which their crimes so justly merited, and at the same time restored the consular and tribunitian power. This was in the year 449 B.C.

The scale of the people was daily acquiring weight at the expence of that of the highest order. There were however two barriers, which still separated the patricians and plebeians; the one a law, which prevented their intermarriage, and the other, the limitation of all the higher offices to the order of patricians. It was the object of the people to remove these restraints, because then the patricians and plebeians would be on an equality. The first, after a long contest, was agreed to by the senate. This concession stimulated the people to inflexible perseverance in their struggle for the latter. The senate sought a palliative by the creation of six military tribunes instead of consuls, of whom three were to be patricians, and three plebeians. This measure satisfied the people for a short time: the consuls were, however, soon restored. The disorders of the republic, and the frequent wars in which the country was engaged, had interrupted the regular survey of the citizens. This was remedied by the creation of two officers, under the title of Censors, 437 B.C. whose business was not only to make the census every five years, but to inspect the morals, and regulate the duties of the people. The dissentions continued with but little variation, and the people uniformly, as their last resource, refused to enrol themselves, till overawed by the supreme authority of a dictator. To obviate the frequent necessity of this measure, which enforced but an unwilling obedience, the senate had recourse to the expedient of paying the soldiery, who before had served without hire, as was usual in other countries under the feudal system. To defray this expence, a tax was levied from every person in proportion to his means, and thus a fund was established for the maintenance of the army. The Roman system of warfare now assumed a new aspect. The senate always found soldiers at command, and the army was under its controul: the enterprizes of the republic were more extensive, and its successes more signal and important.

One of the early effects of the new system was a war declared against the Veii, the proud rival of Rome, and its equal in extent and population. After a siege of several years their capital was taken by Camillus, and the Veian territory was added to the Roman empire, in the year B.C. 396. Their dominions, till now confined to the territory of a few leagues, was at this period rapidly extended, and the Romans were, from this circumstance, an overmatch for all their neighbours.

The glory, and other good effects of the conquest over the Veii, were more than overbalanced by the subsequent fatal catastrophe in a war with the Gauls, who, under the command of Brennus, invaded Italy, plundered Rome, and actually burnt it to the ground, B.C. 390. They then retired to their own country loaded with spoils. To the burning of the city, on this occasion, as we have before observed, the Roman writers attribute the loss of all the records and monuments of their early history. The city was speedily rebuilt, but the effects of this calamitous event were long felt. The neighbouring states combined to prevent the Romans from recovering their former power; "but," says the historian, "neither the united efforts of foreign enemies, nor intestine divisions, could ruin a city destined to be the mistress of the world." The Gauls in 367 returned to Italy, but they were no longer successful, and were forced to retreat with the utmost precipitation. About the same time a plebeian was raised to the consulship, and the offices of Prætor and Edile were created; the one to administer justice, and the other to inspect the temples and public places. In the mean time hostilities were carried on by the Romans against those provinces that refused to submit to their power, or who made the least attempt at revolt. The war with the Samnites, a hardy nation, who inhabited a large track of southern Italy, which began about this period, was continued for half a century: but its successful termination was speedily followed by the reduction of all the Italian states. In the course of this important war, the Tarentines, allies of the Samnites, sought the aid of Pyrrhus, king of Epirus, one of the most illustrious generals of his age. Pyrrhus landed in Italy with 30,000 men and a train of elephants, about the year 280 B.C. For a few years he was successful, but so soon as the Romans understood his mode of warfare, they became more than a match for him; and when he was making a last effort near Beneventum, he was totally defeated with the loss of 26,000 men. He then abandoned all further views to Italy, and returned with precipitation to his own country, 274 B.C. The hostile states submitted to the victorious power, and Rome, 480 years from its foundation, was now sovereign of all Italy. It may be observed, that the extent of their conquests was as much the effect of wise policy, as of power. They removed to Rome all the leading men of the principal conquered cities, admitting them into their tribes, and thus, in a measure, soothed the pride

pride of the vanquiſhed, by giving them an apparent ſhare in their own domeſtic government; while, in arranging the conſtitution of the cities themſelves, they filled their magiſtracies with illuſtrious Romans, whoſe abilities and influence were fitted to command allegiance, reſpect, and attachment to the Roman government.

The command of the continent did not ſatisfy the Roman ambition. The Carthaginian ſtate excited their jealouſy, and the aid which it had granted to the Tarentines was the pretext for commencing hoſtilities. Sicily had long been conſidered as the granary of Italy, and in that iſland the Carthaginians poſſeſſed conſiderable ſettlements, and they were ambitious of acquiring its entire dominion. An obvious policy led the Romans to diſpute with them this important acquiſition, which gave riſe to the Punic wars. Sicily was at firſt the theatre of war between theſe two nations, which was afterwards removed into Africa, and thence into Spain and Italy. We have however, under the words CARTHAGE and CARTHAGINIANS, entered ſo much at large into this ſubject, as to preclude the neceſſity of doing here more than adding a few lines to render the Roman hiſtory connected. For ſome time the event was doubtful, but in the year 242 B.C. the Carthaginians were conſtrained to ſue for peace, which they obtained on hard and ignominious terms. Rankling under the diſgrace, they ſoon repaired their loſſes, collected a numerous army, and entruſted the ſupreme command to HANNIBAL; ſee his article. In 218 the war was renewed and proſecuted with vigour. The Romans were defeated in ſeveral battles, and Rome itſelf threatened with inſtant deſtruction. The prudent and cautious Fabius, then appointed dictator, averted the impending blow. In the courſe of this ſecond Punic war Maſſiniſſa declared in favour of the Romans; and Syphax, king of Numidia, took up arms againſt them. Scipio, the celebrated Roman general, who carried the war into Africa, defeated the combined forces of Aſdrubal and Syphax in ſeveral battles, and Carthage in its turn trembled for its ſafety. Hannibal was recalled from Italy, and defeated with prodigious loſs in the year B.C. 202, and peace was concluded between the Romans and Carthaginians in the following year.

Elated with ſucceſs the moſt complete, the Roman ambition now exceeded all limits, and aſpired at the domination of the whole world. War was proclaimed againſt Philip of Macedon, who was defeated by Flaminius in Theſſaly in the year 197 B.C. and obtained peace by agreeing to pay a tribute. The ſubjection of Macedon portended the ruin of all the Grecian ſtates.

Antiochus, king of Syria, ſurnamed the Great, by the perſuaſion of Hannibal, declared war againſt the Romans, but after three years he was under the neceſſity of imploring peace, and to accept of terms the moſt rigorous. The Aſiatic war, however, in the event proved fatal to the Romans, whoſe habits and manners were corrupted by the vices which accompanied the luxury of the Eaſt. Previouſly to this, Perſeus, the Macedonian monarch, refuſing to ſubmit to the conditions that had been impoſed on his father, was attacked and defeated by Paulus Æmilius, and his kingdom, which had ſubſiſted ſeven centuries, was reduced to the form of a Roman province.

The moſt frivolous pretexts were aſſigned as the cauſes of the third Punic war, in the year 149 B.C., which ended in the deſtruction of Carthage, long renowned for arts, opulence, and extent of dominion. Conſcious of their utter inability to reſiſt this formidable power, the Carthaginians, after a ſhort conteſt, offered every ſubmiſſion to ſave their city, but the Romans inſiſted that Carthage ſhould be razed to its very foundation. Deſpair inſpired this miſerable people with courage: they determined to make one effort at leaſt, and then, if neceſſary, to die in the defence of their altars and gods. The effort was in vain, and Carthage, in 146, was taken by ſtorm, its inhabitants cruelly maſſacred, and the city burnt to the ground. In the ſame year, the ruin of Corinth, and of the Grecian ſtates, was effected. Greece became a Roman province under the name of Achaia. Many other kingdoms ſhared the ſame fate, among which were Numantia and Luſitania. Thus, in the ſpace of about a century, the Romans extended their conqueſts in Europe, Aſia, and Africa.

"This," ſays Mr. Tytler, "was the era of the dawn of luxury and taſte at Rome, the natural fruit of foreign wealth, and an acquaintance with foreign manners. In the unequal diſtribution of this imported wealth, the vices to which it gave riſe, the corruption and venality of which it became the inſtrument, we ſee the remoter cauſes of thoſe fatal diſorders to which the republic owed its diſſolution."

All diſſentions between the ſenate and the people had been ſuſpended during their victories and triumphs, but when they had no foreign enemy to contend with, they turned their weapons againſt themſelves. Sentiments of honour and virtue among the great maſs of the people were well nigh extinguiſhed; and pride, luxury, and ſelf-intereſt, ſucceeded to temperance, ſeverity of life, and public ſpirit. Tiberius and Caius GRACCHUS, (ſee their articles,) beheld, with concern, the univerſal corruption of the ſtate, and attempted to introduce thoſe reforms that might bring back the people to the former habits of moral diſcipline. They, however, both fell victims to their zeal for the public good. The tumults which attended, or were ſubſequent to the exertions of theſe noble youths, were but the prelude to thoſe civil diſorders which followed in quick ſucceſſion. The Numidian war, which commenced in the year 111 B.C., and which laſted five years, afforded many inſtances of the injuſtice, inſolence, and venality of the Roman people. In this, JUGURTHA, (ſee his article,) who ſought to uſurp the crown of Numidia by the moſt cruel means, obtained the friendſhip and aid of the Roman ſenate, who having been bribed for the purpoſe, declared him innocent of every crime of which he was charged, and decreed to him the ſovereignty of half the kingdom.

About this time, 105 B.C. an immenſe body of fierce barbarians ruſhed, like a mighty torrent, from the northern regions of Europe, and threatened all before them with utter ruin and deſolation. Marius alone was able to avert the impending deſtruction. He defeated the barbarians with great ſlaughter: but he fought and triumphed merely with a view of furthering his own ambition, which was ſoon proved to be unbounded. Sylla, an artful and aſpiring patrician, jealous of the glory and popularity which Marius had acquired, boldly ſtood forward to oppoſe him. Factions were formed, and preparations made for the doubtful conteſt. The effects, however, of domeſtic animoſities were ſuſpended by the *Social* war, which was occaſioned by the anxiety of the allied ſtates of Italy to attain the rights of citizenſhip; but the immediate cauſe of the war was the murder of Druſius the tribune. This war, which ended in the conceſſion of thoſe rights to ſuch of the confederates as ſhould return peaceably to their allegiance, was followed by the more dreadful conteſt between the oppoſing factions of Sylla and Marius. Sylla, commanding in a war againſt Mithridates, the moſt powerful monarch of the Eaſt, was ſuperſeded, and recalled from Aſia. He refuſed to ſubmit to the order, and having founded his army, found it well diſpoſed to ſupport him

him in all his meafures. "Let us march to Rome," they exclaimed with one voice; "lead us on to avenge the caufe of oppreffed liberty." Sylla readily liftened to the cry, and led his conquering army towards Rome: they entered the city fword in hand; Marius and his partifans fled with precipitation, and Sylla ruled for a time triumphant. He fullied the glory of his victories by many acts of cruelty and barbarity; affumed the title and power of perpetual dictator in the year 82; and after maffacring many thoufands in cold blood, returned to the ftation of a private man. It fhould, however, be obferved, that previoufly to this he had engaged perfonally in the Mithridatic war, and that during his abfence, Marius returned to Italy, and joining his forces to thofe of Cinna, laid fiege to Rome, and compelled the city to abfolute fubmiffion. After a tremendous and unfparing maffacre of all whom they regarded as their enemies, Marius and Cinna proclaimed themfelves confuls, without the formality of an election, but Marius died within a very few days after this had happened.

The death of thefe rivals did not give peace to Rome: Lepidus afpired to fucceed Sylla in his power, and Pompey, who was, by much, his fuperior in talents, cherifhed the fame ambition. While Pompey was employed in the reduction of the revolted provinces of Afia, the confpiracy of Catiline threatened the entire deftruction of Rome. It was, however, extinguifhed by the prudence, forefight, and patriotic zeal of Cicero. The next confiderable candidate for popularity and fovereign power was Julius Cæfar, who in the reign of Sylla had been numbered among the profcribed. From the danger attached to his fituation he had learned prudence; and while Pompey and Craffus were contending for the command of the republic, Cæfar, who, by attaching himfelf to either rival, would infallibly make the other his enemy, fhewed his talents and wifdom by reconciling them, and thus acquiring the favour and friendfhip of both. They accordingly agreed to a partition of power, and hence the firft triumvirate was formed. Cæfar was elected conful: and he had the command of four legions, and the government of Tranfalpine Gaul and Illyria. The death of Craffus, in an expedition againft the Parthians, diffolved the triumvirate, and the others, Pompey and Cæfar, afpired, as rivals, to an undivided dominion. The term of Cæfar's government was near expiring, but to fecure to himfelf that power which was the object of his ambition, he procured a propofal to be made in the fenate by one of his friends, which had the appearance of moderation and juftice, namely, that Cæfar and Pompey fhould either both continue in their governments, or both be deprived of them, as they were equally capable of endangering public liberty by an abufe of power. The motion paffed, and Cæfar offered to refign, but Pompey refufed, and refolved to maintain his right by force of arms; a civil war was the neceffary confequence. The fenate were chiefly attached to Pompey, but Cæfar had on his fide a victorious army, confifting of ten legions, and the great body of the Roman citizens, whom he had won to his intereft by his liberality. Mark Antony and Caffius, at that time tribunes of the people, left Rome for Cæfar's camp. The fenate, apprehenfive of his defigns, and dreading the effects of his power and popularity, paffed a decree, branding with the crime of parricide any commander who fhould dare to pafs the Rubicon, a river which was the boundary between Italy and the Gauls, with a fingle cohort without their permiffion. Cæfar fet at defiance their decree, and marched direct to Rome. Pompey, to whom the fenate had committed the defence of the ftate, was without an army. He quitted Rome, followed by the confuls and a part of the fenate, and endeavoured haftily to levy troops over all Italy and Greece, while Cæfar had triumphantly entered the city, amidft the acclamations of the people, feized the public treafury, and poffeffed himfelf of fupreme authority without any oppofition. Having fecured the capital, he fet out to meet the lieutenants of Pompey, who had poffeffion of Spain. He defeated them, and fubdued the whole country in the fpace of forty days. On his return, he found he had, during his abfence, been nominated dictator; and in the fucceeding election he was chofen conful, and thus invefted by a double title, with the right of acting in the name of the republic. Pompey had now raifed a uumerous army, and in the field of Pharfalia the rival armies met: Cæfar was victorious, leaving 15,000 of his enemies dead, while 24,000 furrendered themfelves as his prifoners. The battle of Pharfalia, for fo it has been named, which happened in the year B.C. 48, decided the fate of the rival chiefs, and that of the empire.

In the fpace of two years Cæfar gave law to the known world; but his fuccefs accelerated his ruin. He took part with Cleopatra againft Ptolemy: a war enfued, in which Ptolemy was killed, and Egypt was fubdued by the Roman arms. In this war the famous library at Alexandria was burnt to afhes. A revolt of the Afiatic provinces, under Pharnaces, the fon of Mithridates, was fignally chaftifed; and the report of the conqueror to the Roman fenate was conveyed in three words, *veni, vidi, vici.* Cæfar having added Mauritania to the number of the Roman provinces, returned to Rome abfolute mafter of the empire. It is, however, much to his credit, that from this moment his attention was directed folely to the profperity and happinefs of the people. He remembered no longer that there had been oppofite parties: he was beneficent alike to the friends of Pompey as to thofe attached to himfelf. He laboured to reform every fpecies of abufe and grievance: and in return he was hailed "the father of his country"—was created conful for ten years, and perpetual dictator. His perfon was declared facred, and he had the title of *Imperator* beftowed upon him. Thus the Roman republic finally, by its own acts, refigned its liberties. A confpiracy was formed againft him by fixty of the fenators, at the head of whom were Brutus and Caffius, and the dictator was ftabbed, in the year 44, at the foot of Pompey's ftatue. Mark Antony improved this favourable opportunity, and became mafter of the commonwealth: he found, however, a formidable competitor in Octavius, the grand nephew and adopted heir of Cæfar, who, at this critical moment, arrived in Rome, and who gained the fenate to his intereft. The conteft terminated in a civil war, in the courfe of which Octavius and Antony were reconciled, and they ftrengthened their hands by admitting Lepidus into their affociation. Thus was formed the fecond triumvirate, the effects of whofe union were beyond meafure deftructive. They divided among themfelves the provinces, and cemented their union by a deliberate facrifice, made by each, of his friends to the vengeance of his affociates. Antony gave up his uncle Lucius to death; Lepidus his brother Paulus; and Octavius his guardian Toranius and his friend Cicero. Befides thefe illuftrious characters, 300 fenators and 3000 knights were put to death. A confpiracy was excited againft the triumvirs. Octavius and Antony marched againft them; an engagement enfued at Philippi, which decided the fate of the empire: the republican party was annihilated. Antony now fought a recompence for his troops by the plunder of the Eaft. He became the willing conqueft of Cleopatra, for whom he abandoned, and even forgot, glory, ambition, and fame. Octavius faw this phrenzy with delight, and contemplated in it his rival's ruin; and from Lepidus he had nothing to dread,

dread, whose insignificant character drew on him the contempt of his own friends, and whose folly, in attempting an invasion of the province of his colleague, was punished by his deposition and banishment. Antony had lavished the provinces of the empire, in gifts to his paramour and her children. At these enormities the Roman people were justly indignant, and the divorce of his wife Octavia, the sister of his colleague, was the signal of declared hostility between them. An immense armament, chiefly naval, came to a decisive conflict near Actium, on the coast of Epirus. Fortune was favourable to Octavius, and the battle of Actium gave him the empire of the world.

Thus have we traced the history of Rome from its commencement, through all its revolutions, till the final extinction of the republic: before we come to an account of the emperors, we shall notice some particulars relating to the character of the ancient Romans, beginning with the mode of their education, upon which almost every thing depends, with regard to character, in the largest extent of the word.

Roman Education and Literature.—A rigid severity of manners was the characteristic of the Romans under their kings, and in the first ages of the republic. The private life of the citizens, which was frugal, temperate, and laborious, had its influence on their public character. The head of every family had sovereign authority over all the members that composed it, and this power, there is every reason to believe, was seldom, if ever, abused. The Roman laws did not prescribe a system and rules for the education of the young, but the manners of the people supplied this want, and the utmost attention was bestowed on the early formation of mind and character. The Roman matrons did not abandon their infants to mercenary nurses. They esteemed those duties connected with the nurture of their offspring and the rudiments of their education as the highest points of female merit. A remarkable degree of attention was paid to the language of children, and to the attainment of correctness and purity of expression; thus, the Gracchi, the sons of the virtuous and excellent Cornelia, were said to be educated "non tam in grœmio, quam in sermone matris." This was the more necessary, because it was by eloquence more than by the exercise of any other talent that the young Roman could rise to the highest offices and dignities of the state. The exercises of the body were likewise particularly attended to, and whatever had a tendency to harden the temperament, and to confer strength and agility, was regarded as of prime importance. At seventeen a youth was consigned to the care of a master in rhetoric, whom he attended constantly to the forum, or to the courts of justice, for it was necessary to be an orator, to be regarded as an accomplished gentleman.

Before the intercourse with Greece, which took place after the Punic wars, the Roman people were rude and illiterate, and it was not till five hundred years had elapsed, that the regular drama was introduced at Rome, and the earliest Roman plays were, no doubt, translations from the Greek. Of the early Roman drama, Ennius was a great ornament, and from his time the art made a rapid advancement. The comedies of Plautus, the contemporary of Ennius, display much knowledge of human nature, and are still read with pleasure. Cæcilius improved so much on the comedies of Plautus, that he is mentioned by Cicero as, perhaps, the best of the Roman comic writers, but none of his compositions remain. The "Andria" of Terence, the first of his comedies, was performed in the year 587 from the building of the city. The comedies of this writer are chiefly borrowed from the Greek of Menander and Apollodorus, and their merit lies in that nature and simplicity which are observable in the structure of the fable; in the delineation of the characters, and in the delicacy and purity of the sentiments. The Roman comedy was of four different species; the *first* admitted serious scenes and personages; the *second* was a representation of ordinary life and manners; the *third* was where the dialogue was not committed to writing, but the subject of the scene was prescribed, and the dialogue was filled up by the talents of the actors: and the *last* included pieces of comedy of the lowest species; farces, or entertainments of buffoonery. The Roman tragedy kept pace in its advancement with comedy; of the best, namely, of Actius and Pacuvius, there are no remains; those under the name of Seneca are probably the work of different hands.

The most perfect era of Roman literature was the age of Cicero, comprehending all, of the preceding times, whom Cicero might have seen, and all, of the succeeding, who might have seen him. These will include, among others, Sallust, Cæsar, Livy, and Tacitus, as historians. Among the poets were Lucretius, Catullus, Virgil, Horace, Ovid, Tibullus, and Martial. See the several articles in the alphabetical arrangement of the New Cyclopædia.

State of Philosophy and the Arts among the Romans.—In the earlier periods of the republic, the Romans had little leisure to bestow on the cultivation of the sciences, and had no conception of philosophical speculation. It was not till the interval between the war with Perseus and the third Punic war, that philosophy made its appearance at Rome. Some learned Achaians, banished from their country, had settled in various parts of Italy, and applied themselves to the cultivation of literature, and the education of youth, diffusing a taste for those studies hitherto unknown to the Romans. Jealous of the introduction of foreign manners with foreign studies, the senate banished the Greek philosophers from Rome. But Carneades and Critolaus came afterwards in the train of an Athenian embassy, who revived the taste for the Greek philosophy, and left behind them many able disciples who publicly taught their doctrines. As the Roman manners had still a tincture of their ancient severity, the Stoical system prevailed. The philosophy of Aristotle was little known in Rome till the age of Cicero, and even then the great orator complains that Peripatetic philosophy was but little understood at Rome, and, on that account, he sent his son to study its doctrines in the schools of Athens. Lucullus, whose residence in Greece gave him an opportunity of being acquainted with all the different sects, disseminated, on his return to Rome, a very general taste for philosophy. The old and new academy had each their partisans; of the former, the most illustrious disciples were Marcus Brutus and Terentius Varro. Cicero, who must be deemed the most eminent of all the Roman philosophers, is usually classed among the supporters of the new school.

The cultivation of physics, or natural philosophy, seems to have been but little attended to, either by the Greeks or Romans. The natural history of Pliny is the most valuable storehouse of the knowledge of the ancients in physics, economics, and the arts and sciences. The Romans had no natural taste in the fine arts. On the conquest of Greece, an immense field opened at once to their eyes, and they were almost instantly surrounded with the master-pieces of art; but their minds were not sufficiently cultivated to appreciate their excellencies.

The Romans seem to have invented or perfected no art, but that of war. The rest they had from Egypt, Greece, Sicily, and Etruria. In our articles, therefore, concerning the

the *Music of the Ancients*, and *Musical Instruments* of the Greeks, (see MUSIC, and INSTRUMENT, in *Music*,) those of the Romans are generally included. They, indeed, imitated and adopted many customs, religious rites and ceremonies of the Etrurians; and Plutarch (Vita Romuli) mentions it as a prevailing opinion, that the Greek language, which was spoken by the Romans in the time of Romulus, was not corrupted by Italian words. From these accounts it appears that the Romans had not only vocal and instrumental music as well as other arts and sciences from Greece, but even their alphabet, language, religion, and all the learning of which they were possessed during the time of their kings, and the first ages of their republic, these having been originally Greek, though the Romans had them through Etruscan strainers.

The first Roman triumph, according to Dionysius (lib. ii.), was that of Romulus over the Cæninenses; in which, clad in a purple robe, he was drawn in a chariot by four horses. The rest of the army, both horse and foot, followed, ranged in three several divisions, hymning their gods in songs of their country, and celebrating their general with extemporary verses: this account affords a very venerable origin to the improvisatori of Italy; as the event happened in the fourth year of Rome, 749 years before Christ, and the fourth year of the seventh olympiad.

Indeed the Romans were later in cultivating arts and sciences than any other great and powerful people; and none of them seem to have been the natural growth of the soil, except the military art; all others were brought in by conquest.

During the reign of Augustus, except Vitruvius, it does not appear that the Romans had one architect, sculptor, painter, or musician; those who have been celebrated in the arts at Rome, having been Asiatics, or European Greeks, who came to exercise such arts among the Latins, as the Latins had not among themselves; this custom was continued under the successors of Augustus, and those Romans who were prevented by more important concerns from going into Greece, contrived in a manner to bring Greece to Rome, by receiving into their service the most able professors of Greece and Asia, in all the arts. We find too, not only that each of the best Roman writers was an imitator of some great Grecian model, but are certain that the finest remains in painting, sculpture, and architecture, which still subsist in Italy, were either brought thither from Greece, or were the works of Greek artists, who had left their own ruined and oppressed country, to bask in the warm sun-shine of power and affluence at Rome.

Vitruvius, in his Treatise on Architecture, has inserted a chapter on music, in which he has given the harmonical system of Aristoxenus; but he introduces it with a complaint of the unavoidable obscurity of musical literature, on account of the deficiency of terms in the Latin tongue, to explain his ideas. "The science of music, in itself obscure," says he, "is particularly so to such as understand not the Greek language." This writer, therefore, who seems to have been the first that had treated of music in the Roman language, confesses the necessity he was under of using Greek appellatives, not only for the notes, but for other parts of the art; which shews, if not the low state of music at Rome when he wrote, which was in the Augustan age, at least whence their music came; and *borrowing* implies *inferiority*. Indeed, the writings of Cicero shew that philosophy, and all the arts and sciences, were wholly furnished to the Romans from Greece, even in the most enlightened times.

Music was, however, in great favour at Rome during the latter end of the republic, and the voluptuous times of the emperors; the stage then flourished; the temples were crowded; festivals frequent; and banquets splendid; so that we may suppose it to have been very much used both upon public and private occasions, in so rich, populous, and flourishing a city as Rome, the mistress of the world. But this music must have differed as little from that of the Greeks, as the descriptions of it in Horace and Virgil differ from those to be found in Homer, and the Greek lyric poets.

Notwithstanding the Romans had the Greeks, Etrurians, and Sicilians to imitate in the polite arts, they never advanced so far in them as the modern Italians have done; who, without any foreign help, have greatly surpassed not only their forefathers the ancient Romans, but even the Greeks themselves, in several of the arts, and in no one so much as that of music, in which every people of Europe have, at different times, consented to become their scholars.

From the success which attended the arms of the Romans, and that dominion which they acquired over the greatest part of the known world, it is natural to conclude that they must have carried the military art to a higher degree of perfection than any other nation of that period. It is the discipline of an army that makes the multitude act as one man; it moreover increases the courage of troops, because each individual confides in the steady co-operation of his associates. From the constant practice of athletic exercises, the Romans were inured from infancy to hardiness and fatigue, and bred to that species of life which a soldier leads in the most active campaign.

Among the ancient nations there were usually but two different arrangements of the troops in order of battle. The one the Phalanx, or close arrangement in parallelograms, interfected only by great divisions; the other the Quincunx, consisting of small companies or platoons, disposed in three straight lines, with alternate spaces between them equal to the space occupied by each company. The military tactics of the Romans are supposed to have been at their highest pitch of excellence during the Punic wars. Hannibal was a master in the science, and the Romans understood how to profit from the instructions of an enemy. The art of intrenchment was carried to great perfection by the Romans, particularly by Julius Cæsar. Their intrenchments consisted of a ditch from nine to fifteen feet in depth and width, fenced on the inside by the mound of excavated earth, and on the outside by strong stakes with pointed branches.

In besieging a town, several camps were formed around the place, joined to each other by lines of circumvallation and countervallation. A mound of earth was raised, gradually rising in elevation as it approached the city. The front, where workmen were employed, was defended by a curtain of hides. On this mound the engines of attack were advanced, till they played on the very spot which the besiegers wished to assail. The same machines were used by the besieged for annoying the enemy. When the batteries from the terrace had silenced those on the walls, the battering ram was brought up, and if it once reached the walls, it was generally decisive of the fate of the town. The great object, therefore, of the besieged, was to prevent its approach by every power of annoyance.

The naval military art was utterly unknown among the Romans till the first Punic war. A Carthaginian galley was the first model; and in the space of two months they equipped a fleet of 100 gallies of five banks of oars, and 20 with three banks. In the times of the empire, which we are going, very briefly, to describe, the Romans maintained their different conquests, not by their armies, but by their fleets, which were moored in the large rivers and bays, and

and generally preſerved a fixed ſtation, as well as the legions.

Rome under the Emperors.—The battle of Actium, as we have already obſerved, decided the fate of the commonwealth, and Octavius, now having aſſumed the name of Auguſtus, was maſter of the Roman empire. This emperor new-modelled the ſtate, flattered the people, and rendered monarchy ſupportable to republicans. Auguſtus poſſeſſed the talent of diſcerning what character was beſt fitted for gaining the affections of the people he governed, and verſatility of temper and genius to aſſume it. His virtues, though the reſult of policy, not of nature, were certainly favourable to the happineſs, and even the liberties, of his ſubjects. The fate of Cæſar might, and probably did, warn him of the inſecurity of an uſurped dominion; and, therefore, while he ſtudiouſly imitated what was excellent in his predeceſſor, he affected a much higher degree of moderation and reſpect for the rights of the people. Long peace, in which the temple of Janus was ſhut, which had been open nearly two centuries, ſince the beginning of the ſecond Punic war; an uniform and temperate government, and prevailing luxury, introduced a ſlow poiſon into the vitals of the empire. The national character was changed. The outward form remained; but the animating ſpirit and vigour had vaniſhed. The Romans thought themſelves free, becauſe they had no longer to fight for their liberty. The ſovereign kept up the deluſion, by maintaining the ancient forms of the republican conſtitution, in the election of magiſtrates, &c. though they were nothing more than mere forms. He even pretended to conſider his own functions as temporary, exerted for the benefits of the people, and depending upon their will. Five times, in the courſe of his protracted reign, did he ſubmit to a ſort of election. The emperor repoſed the moſt unlimited confidence in Mecænas, by whoſe counſels all public affairs were conducted, and the moſt ſalutary laws enacted for the remedy of public grievances, and even the correction of the morals of the people. By his influence and wiſe inſtructions, Auguſtus aſſumed thoſe virtues to which his heart was a ſtranger; and which, in their tendency to the happineſs of his ſubjects, were equally effectual as if they had been the genuine fruits of his nature. On the death of Marcellus, the nephew and ſon-in-law of the emperor, he beſtowed his chief favour on Marcus Agrippa, who married Julia, the widow of Marcellus; and on his deceaſe, Julia took Tiberius for her third huſband, who became the emperor's ſon-in-law by a double tie, for Auguſtus had previouſly married his mother, Livia. On the death of the emperor, in the 14th year of the Chriſtian era, and in the 44th of his reign, Tiberius ſucceeded to the throne.

The government eſtabliſhed by Auguſtus, founded, as it unqueſtionably was, on the power of the ſword, not on the conſent of the ſenate and people, degenerated in proportion as the army became corrupted. This prince had reſolved to confine the boundaries of the empire to the limits which, he aſſumed, Nature had pointed out, *viz.* on the weſt the Atlantic ocean; the Rhine and Danube on the north; the Euphrates on the eaſt; and towards the ſouth, the ſandy deſerts of Arabia and Africa. His immediate ſucceſſors adopted this reſolution. Britain and Dacia were the ſole acceſſions to the empire during the firſt century of the Chriſtian era. A military ſpirit was, in ſome degree, preſerved and cheriſhed, when almoſt every virtue was extinguiſhed; but the diſcipline of the legions was greatly corrupted by the ambition, or relaxed by the weakneſs, of the emperors, who confided in the army, and particularly in the ſtrength and fidelity of the Prætorian guards, which had been formed by Auguſtus, and were kept up for the protection of the emperor's perſon. The ſoldiers were, however, ſoon rouſed to a ſenſe of their own power, and of the impotency of the civil authority.

Tiberius, the ſecond emperor, was an unfeeling tyrant, and he took for his counſellor Sejanus, prefect of the Prætorian guards, a man ſtill more cruel and tyrannical than himſelf. Sejanus conceived the project of placing himſelf on the throne: for the furtherance of his plans, he cauſed Druſus, the ſon of the emperor, to be poiſoned, and removed from the ſight of the people the ſons of Germanicus, who were the natural heirs to the crown. He even perſuaded Tiberius himſelf, under the pretence of a diſcovery of plots for his aſſaſſination, to retire from Rome to the iſle of Capreæ, and devolve the government upon himſelf. He had but one ſtep more to the attainment of the object of his ambition: he was on the point of aſſaſſinating his maſter when he was detected, and inſtantly executed. Tiberius now became negligent of the cares of government, and the imperial power was diſplayed only in ſcenes of cruelty and rapine. At length he fell ſick, and was ſtrangled in his bed by Macro, the præfect of the Prætorian guards, in the 78th year of his age, and the 23d of his reign.

Caligula, the ſon of Germanicus, who was Tiberius's nephew, was the third emperor of Rome. The commencement of his reign was ſignalized by a few acts of clemency and good policy. But tyrannical and cruel by nature, he ſubſtituted military execution for legal puniſhment. The provinces were loaded with the moſt oppreſſive taxes, and daily confiſcations filled the imperial coffers. He was aſſaſſinated in the 4th year of his reign, and was ſucceeded by his uncle

Claudius, the ſon of Octavia, the ſiſter of Auguſtus, whoſe ſhort reign, though he was a man of weak intellects, and of little education, was marked by an enterpriſe of importance. He undertook the reduction of Britain, and after viſiting the iſland in perſon, left his generals, Plautius and Veſpaſian, to proſecute a war, which was carried on for ſeveral years with various ſucceſs. The inhabitants of Wales, then denominated the Silures, under their king Caractacus, made a noble reſiſtance, but were finally defeated, and Caractacus was led captive to Rome. The civil adminiſtration of Claudius was weak and contemptible; he was the ſlave even of his domeſtics, and the dupe of his abandoned wives Meſſalina and Agrippina. Claudius was put to death in the 15th year of his reign.

Nero, the ſcourge of mankind, ſucceeded his father Claudius, and for the firſt five years he reigned with great applauſe, whence Trajan, ſaid "cunctos principes longè abeſſe a Neronis quinquennio;" but when his character began to unfold itſelf, he was found to be a compound of every thing that was baſe and inhuman. (See his article.) He periſhed in the 30th year of his age, and the 14th of his reign.

The two ſucceeding emperors, Galba and Otho, did not reign a year between them; the former was murdered by the ſoldiers, and the latter died by his own hand.

The reign of Vitellius, the next emperor, was of eight months' duration. He is ſaid to have propoſed Nero for his model, and it was juſt that he ſhould reſemble him in his fate. Veſpaſian, who had obtained from Nero the charge of the war againſt the Jews, which he had conducted with ability and ſucceſs, was proclaimed emperor by his troops in the Eaſt, and a great part of Italy ſubmitting to his generals, Vitellius capitulated to ſave his life; but as ſoon as Rome was taken, the depoſed emperor was ſeized, maſſacred, and his body thrown into the Tiber.

Veſpaſian reigned with great popularity for ten years.

the *Music of the Ancients*, and *Musical Instruments* of the Greeks, (see MUSIC, and INSTRUMENT, in *Music*,) those of the Romans are generally included. They, indeed, imitated and adopted many customs, religious rites and ceremonies of the Etrurians; and Plutarch (Vita Romuli) mentions it as a prevailing opinion, that the Greek language, which was spoken by the Romans in the time of Romulus, was not corrupted by Italian words. From these accounts it appears that the Romans had not only vocal and instrumental music as well as other arts and sciences from Greece, but even their alphabet, language, religion, and all the learning of which they were possessed during the time of their kings, and the first ages of their republic, these having been originally Greek, though the Romans had them through Etruscan strainers.

The first Roman triumph, according to Dionysius (lib. ii.), was that of Romulus over the Cæninenses; in which, clad in a purple robe, he was drawn in a chariot by four horses. The rest of the army, both horse and foot, followed, ranged in three several divisions, hymning their gods in songs of their country, and celebrating their general with extemporary verses: this account affords a very venerable origin to the improvisatori of Italy; as the event happened in the fourth year of Rome, 749 years before Christ, and the fourth year of the seventh olympiad.

Indeed the Romans were later in cultivating arts and sciences than any other great and powerful people; and none of them seem to have been the natural growth of the soil, except the military art; all others were brought in by conquest.

During the reign of Augustus, except Vitruvius, it does not appear that the Romans had one architect, sculptor, painter, or musician; those who have been celebrated in the arts at Rome, having been Asiatics, or European Greeks, who came to exercise such arts among the Latins, as the Latins had not among themselves; this custom was continued under the successors of Augustus, and those Romans who were prevented by more important concerns from going into Greece, contrived in a manner to bring Greece to Rome, by receiving into their service the most able professors of Greece and Asia, in all the arts. We find too, not only that each of the best Roman writers was an imitator of some great Grecian model, but are certain that the finest remains in painting, sculpture, and architecture, which still subsist in Italy, were either brought thither from Greece, or were the works of Greek artists, who had left their own ruined and oppressed country, to bask in the warm sun-shine of power and affluence at Rome.

Vitruvius, in his Treatise on Architecture, has inserted a chapter on music, in which he has given the harmonical system of Aristoxenus; but he introduces it with a complaint of the unavoidable obscurity of musical literature, on account of the deficiency of terms in the Latin tongue, to explain his ideas. "The science of music, in itself obscure," says he, "is particularly so to such as understand not the Greek language." This writer, therefore, who seems to have been the first that had treated of music in the Roman language, confesses the necessity he was under of using Greek appellatives, not only for the notes, but for other parts of the art; which shews, if not the low state of music at Rome when he wrote, which was in the Augustan age, at least whence their music came; and *borrowing* implies *inferiority*. Indeed, the writings of Cicero shew that philosophy, and all the arts and sciences, were wholly furnished to the Romans from Greece, even in the most enlightened times.

Music was, however, in great favour at Rome during the latter end of the republic, and the voluptuous times of the emperors; the stage then flourished; the temples were crowded; festivals frequent; and banquets splendid; so that we may suppose it to have been very much used both upon public and private occasions, in so rich, populous, and flourishing a city as Rome, the mistress of the world. But this music must have differed as little from that of the Greeks, as the descriptions of it in Horace and Virgil differ from those to be found in Homer, and the Greek lyric poets.

Notwithstanding the Romans had the Greeks, Etrurians, and Sicilians to imitate in the polite arts, they never advanced so far in them as the modern Italians have done; who, without any foreign help, have greatly surpassed not only their forefathers the ancient Romans, but even the Greeks themselves, in several of the arts, and in no one so much as that of music, in which every people of Europe have, at different times, consented to become their scholars.

From the success which attended the arms of the Romans, and that dominion which they acquired over the greatest part of the known world, it is natural to conclude that they must have carried the military art to a higher degree of perfection than any other nation of that period. It is the discipline of an army that makes the multitude act as one man; it moreover increases the courage of troops, because each individual confides in the steady co-operation of his associates. From the constant practice of athletic exercises, the Romans were inured from infancy to hardiness and fatigue, and bred to that species of life which a soldier leads in the most active campaign.

Among the ancient nations there were usually but two different arrangements of the troops in order of battle. The one the Phalanx, or close arrangement in parallelograms, interfected only by great divisions; the other the Quincunx, consisting of small companies or platoons, disposed in three straight lines, with alternate spaces between them equal to the space occupied by each company. The military tactics of the Romans are supposed to have been at their highest pitch of excellence during the Punic wars. Hannibal was a master in the science, and the Romans understood how to profit from the instructions of an enemy. The art of intrenchment was carried to great perfection by the Romans, particularly by Julius Cæsar. Their intrenchments consisted of a ditch from nine to fifteen feet in depth and width, fenced on the inside by the mound of excavated earth, and on the outside by strong stakes with pointed branches.

In besieging a town, several camps were formed around the place, joined to each other by lines of circumvallation and countervallation. A mound of earth was raised, gradually rising in elevation as it approached the city. The front, where workmen were employed, was defended by a curtain of hides. On this mound the engines of attack were advanced, till they played on the very spot which the besiegers wished to assail. The same machines were used by the besieged for annoying the enemy. When the batteries from the terrace had silenced those on the walls, the battering ram was brought up, and if it once reached the walls, it was generally decisive of the fate of the town. The great object, therefore, of the besieged, was to prevent its approach by every power of annoyance.

The naval military art was utterly unknown among the Romans till the first Punic war. A Carthaginian galley was the first model; and in the space of two months they equipped a fleet of 100 gallies of five banks of oars, and 20 with three banks. In the times of the empire, which we are going, very briefly, to describe, the Romans maintained their different conquests, not by their armies, but by their fleets, which were moored in the large rivers and bays, and

and generally preferved a fixed ftation, as well as the legions.

Rome under the Emperors.—The battle of Actium, as we have already obferved, decided the fate of the commonwealth, and Octavius, now having affumed the name of Auguftus, was mafter of the Roman empire. This emperor new-modelled the ftate, flattered the people, and rendered monarchy fupportable to republicans. Auguftus poffeffed the talent of difcerning what character was beft fitted for gaining the affections of the people he governed, and verfatility of temper and genius to affume it. His virtues, though the refult of policy, not of nature, were certainly favourable to the happinefs, and even the liberties, of his fubjects. The fate of Cæfar might, and probably did, warn him of the infecurity of an ufurped dominion; and, therefore, while he ftudiouffy imitated what was excellent in his predeceffor, he affected a much higher degree of moderation and refpect for the rights of the people. Long peace, in which the temple of Janus was fhut, which had been open nearly two centuries, fince the beginning of the fecond Punic war; an uniform and temperate government, and prevailing luxury, introduced a flow poifon into the vitals of the empire. The national character was changed. The outward form remained; but the animating fpirit and vigour had vanifhed. The Romans thought themfelves free, becaufe they had no longer to fight for their liberty. The fovereign kept up the delufion, by maintaining the ancient forms of the republican conftitution, in the election of magiftrates, &c. though they were nothing more than mere forms. He even pretended to confider his own functions as temporary, exerted for the benefits of the people, and depending upon their will. Five times, in the courfe of his protracted reign, did he fubmit to a fort of election. The emperor repofed the moft unlimited confidence in Mecænas, by whofe counfels all public affairs were conducted, and the moft falutary laws enacted for the remedy of public grievances, and even the correction of the morals of the people. By his influence and wife inftructions, Auguftus affumed thofe virtues to which his heart was a ftranger; and which, in their tendency to the happinefs of his fubjects, were equally effectual as if they had been the genuine fruits of his nature. On the death of Marcellus, the nephew and fon-in-law of the emperor, he beftowed his chief favour on Marcus Agrippa, who married Julia, the widow of Marcellus; and on his deceafe, Julia took Tiberius for her third hufband, who became the emperor's fon-in-law by a double tie, for Auguftus had previouffy married his mother, Livia. On the death of the emperor, in the 14th year of the Chriftian era, and in the 44th of his reign, Tiberius fucceeded to the throne.

The government eftablifhed by Auguftus, founded, as it inquefionably was, on the power of the fword, not on the confent of the fenate and people, degenerated in proportion as the army became corrupted. This prince had refolved to confine the boundaries of the empire to the limits which, he affumed, Nature had pointed out, *viz.* on the weft the Atlantic ocean; the Rhine and Danube on the north; the Euphrates on the eaft; and towards the fouth, the fandy deferts of Arabia and Africa. His immediate fucceffors adopted this refolution. Britain and Dacia were the fole acceffions to the empire during the firft century of the Chriftian era. A military fpirit was, in fome degree, preferved and cherifhed, when almoft every virtue was extinguifhed; but the difcipline of the legions was greatly corrupted by the ambition, or relaxed by the weaknefs, of the emperors, who confided in the army, and particularly in the ftrength and fidelity of the Prætorian guards, which had been formed by Auguftus, and were kept up for the protection of the emperor's perfon. The foldiers were, however, foon roufed to a fenfe of their own power, and of the impotency of the civil authority.

Tiberius, the fecond emperor, was an unfeeling tyrant, and he took for his counfellor Sejanus, prefect of the Prætorian guards, a man ftill more cruel and tyrannical than himfelf. Sejanus conceived the project of placing himfelf on the throne: for the furtherance of his plans, he caufed Drufus, the fon of the emperor, to be poifoned, and removed from the fight of the people the fons of Germanicus, who were the natural heirs to the crown. He even perfuaded Tiberius himfelf, under the pretence of a difcovery of plots for his affaffination, to retire from Rome to the ifle of Capreæ, and devolve the government upon himfelf. He had but one ftep more to the attainment of the object of his ambition: he was on the point of affaffinating his mafter when he was detected, and inftantly executed. Tiberius now became negligent of the cares of government, and the imperial power was difplayed only in fcenes of cruelty and rapine. At length he fell fick, and was ftrangled in his bed by Macro, the præfect of the Prætorian guards, in the 78th year of his age, and the 23d of his reign.

Caligula, the fon of Germanicus, who was Tiberius's nephew, was the third emperor of Rome. The commencement of his reign was fignalized by a few acts of clemency and good policy. But tyrannical and cruel by nature, he fubftituted military execution for legal punifhment. The provinces were loaded with the moft oppreffive taxes, and daily confifcations filled the imperial coffers. He was affaffinated in the 4th year of his reign, and was fucceeded by his uncle

Claudius, the fon of Octavia, the fifter of Auguftus, whofe fhort reign, though he was a man of weak intellects, and of little education, was marked by an enterprife of importance. He undertook the reduction of Britain, and after vifiting the ifland in perfon, left his generals, Plautius and Vefpafian, to profecute a war, which was carried on for feveral years with various fuccefs. The inhabitants of Wales, then denominated the Silures, under their king Caractacus, made a noble refiftance, but were finally defeated, and Caractacus was led captive to Rome. The civil adminiftration of Claudius was weak and contemptible; he was the flave even of his domeftics, and the dupe of his abandoned wives Meffalina and Agrippina. Claudius was put to death in the 15th year of his reign.

Nero, the fcourge of mankind, fucceeded his father Claudius, and for the firft five years he reigned with great applaufe, whence Trajan, faid "cunctos principes longè abeffe a Neronis quinquennio;" but when his character began to unfold itfelf, he was found to be a compound of every thing that was bafe and inhuman. (See his article.) He perifhed in the 30th year of his age, and the 14th of his reign.

The two fucceeding emperors, Galba and Otho, did not reign a year between them; the former was murdered by the foldiers, and the latter died by his own hand.

The reign of Vitellius, the next emperor, was of eight months' duration. He is faid to have propofed Nero for his model, and it was juft that he fhould refemble him in his fate. Vefpafian, who had obtained from Nero the charge of the war againft the Jews, which he had conducted with ability and fuccefs, was proclaimed emperor by his troops in the Eaft, and a great part of Italy fubmitting to his generals, Vitellius capitulated to fave his life; but as foon as Rome was taken, the depofed emperor was feized, maffacred, and his body thrown into the Tiber.

Vefpafian reigned with great popularity for ten years.

the *Music of the Ancients*, and *Musical Instruments* of the Greeks, (see MUSIC, and INSTRUMENT, in *Music*,) those of the Romans are generally included. They, indeed, imitated and adopted many customs, religious rites and ceremonies of the Etrurians; and Plutarch (Vita Romuli) mentions it as a prevailing opinion, that the Greek language, which was spoken by the Romans in the time of Romulus, was not corrupted by Italian words. From these accounts it appears that the Romans had not only vocal and instrumental music as well as other arts and sciences from Greece, but even their alphabet, language, religion, and all the learning of which they were possessed during the time of their kings, and the first ages of their republic, these having been originally Greek, though the Romans had them through Etruscan strainers.

The first Roman triumph, according to Dionysius (lib. ii.), was that of Romulus over the Cæninenses; in which, clad in a purple robe, he was drawn in a chariot by four horses. The rest of the army, both horse and foot, followed, ranged in three several divisions, hymning their gods in songs of their country, and celebrating their general with extemporary verses: this account affords a very venerable origin to the improvisatori of Italy; as the event happened in the fourth year of Rome, 749 years before Christ, and the fourth year of the seventh olympiad.

Indeed the Romans were later in cultivating arts and sciences than any other great and powerful people; and none of them seem to have been the natural growth of the soil, except the military art; all others were brought in by conquest.

During the reign of Augustus, except Vitruvius, it does not appear that the Romans had one architect, sculptor, painter, or musician; those who have been celebrated in the arts at Rome, having been Asiatics, or European Greeks, who came to exercise such arts among the Latins, as the Latins had not among themselves; this custom was continued under the successors of Augustus, and those Romans who were prevented by more important concerns from going into Greece, contrived in a manner to bring Greece to Rome, by receiving into their service the most able professors of Greece and Asia, in all the arts. We find too, not only that each of the best Roman writers was an imitator of some great Grecian model, but are certain that the finest remains in painting, sculpture, and architecture, which still subsist in Italy, were either brought thither from Greece, or were the works of Greek artists, who had left their own ruined and oppressed country, to bask in the warm sun-shine of power and affluence at Rome.

Vitruvius, in his Treatise on Architecture, has inserted a chapter on music, in which he has given the harmonical system of Aristoxenus; but he introduces it with a complaint of the unavoidable obscurity of musical literature, on account of the deficiency of terms in the Latin tongue, to explain his ideas. "The science of music, in itself obscure," says he, "is particularly so to such as understand not the Greek language." This writer, therefore, who seems to have been the first that had treated of music in the Roman language, confesses the necessity he was under of using Greek appellatives, not only for the notes, but for other parts of the art; which shews, if not the low state of music at Rome when he wrote, which was in the Augustan age, at least whence their music came; and *borrowing* implies *inferiority*. Indeed, the writings of Cicero shew that philosophy, and all the arts and sciences, were wholly furnished to the Romans from Greece, even in the most enlightened times.

Music was, however, in great favour at Rome during the latter end of the republic, and the voluptuous times of the emperors; the stage then flourished; the temples were crowded; festivals frequent; and banquets splendid; so that we may suppose it to have been very much used both upon public and private occasions, in so rich, populous, and flourishing a city as Rome, the mistress of the world. But this music must have differed as little from that of the Greeks, as the descriptions of it in Horace and Virgil differ from those to be found in Homer, and the Greek lyric poets.

Notwithstanding the Romans had the Greeks, Etrurians, and Sicilians to imitate in the polite arts, they never advanced so far in them as the modern Italians have done; who, without any foreign help, have greatly surpassed not only their forefathers the ancient Romans, but even the Greeks themselves, in several of the arts, and in no one so much as that of music, in which every people of Europe have, at different times, consented to become their scholars.

From the success which attended the arms of the Romans, and that dominion which they acquired over the greatest part of the known world, it is natural to conclude that they must have carried the military art to a higher degree of perfection than any other nation of that period. It is the discipline of an army that makes the multitude act as one man; it moreover increases the courage of troops, because each individual confides in the steady co-operation of his associates. From the constant practice of athletic exercises, the Romans were inured from infancy to hardiness and fatigue, and bred to that species of life which a soldier leads in the most active campaign.

Among the ancient nations there were usually but two different arrangements of the troops in order of battle. The one the Phalanx, or close arrangement in parallelograms, intersected only by great divisions; the other the Quincunx, consisting of small companies or platoons, disposed in three straight lines, with alternate spaces between them equal to the space occupied by each company. The military tactics of the Romans are supposed to have been at their highest pitch of excellence during the Punic wars. Hannibal was a master in the science, and the Romans understood how to profit from the instructions of an enemy. The art of intrenchment was carried to great perfection by the Romans, particularly by Julius Cæsar. Their intrenchments consisted of a ditch from nine to fifteen feet in depth and width, fenced on the inside by the mound of excavated earth, and on the outside by strong stakes with pointed branches.

In besieging a town, several camps were formed around the place, joined to each other by lines of circumvallation and countervallation. A mound of earth was raised, gradually rising in elevation as it approached the city. The front, where workmen were employed, was defended by a curtain of hides. On this mound the engines of attack were advanced, till they played on the very spot which the besiegers wished to assail. The same machines were used by the besieged for annoying the enemy. When the batteries from the terrace had silenced those on the walls, the battering ram was brought up, and if it once reached the walls, it was generally decisive of the fate of the town. The great object, therefore, of the besieged, was to prevent its approach by every power of annoyance.

The naval military art was utterly unknown among the Romans till the first Punic war. A Carthaginian galley was the first model; and in the space of two months they equipped a fleet of 100 gallies of five banks of oars, and 20 with three banks. In the times of the empire, which we are going, very briefly, to describe, the Romans maintained their different conquests, not by their armies, but by their fleets, which were moored in the large rivers and bays, and

and generally preferved a fixed ftation, as well as the legions.

Rome under the Emperors.—The battle of Actium, as we have already obferved, decided the fate of the commonwealth, and Octavius, now having affumed the name of Auguftus, was mafter of the Roman empire. This emperor new-modelled the ftate, flattered the people, and rendered monarchy fupportable to republicans. Auguftus poffeffed the talent of difcerning what character was beft fitted for gaining the affections of the people he governed, and verfatility of temper and genius to affume it. His virtues, though the refult of policy, not of nature, were certainly favourable to the happinefs, and even the liberties, of his fubjects. The fate of Cæfar might, and probably did, warn him of the infecurity of an ufurped dominion; and, therefore, while he ftudiouffy imitated what was excellent in his predeceffor, he affected a much higher degree of moderation and refpect for the rights of the people. Long peace, in which the temple of Janus was fhut, which had been open nearly two centuries, fince the beginning of the fecond Punic war; an uniform and temperate government, and prevailing luxury, introduced a flow poifon into the vitals of the empire. The national character was changed. The outward form remained; but the animating fpirit and vigour had vanifhed. The Romans thought themfelves free, becaufe they had no longer to fight for their liberty. The fovereign kept up the delufion, by maintaining the ancient forms of the republican conftitution, in the election of magiftrates, &c. though they were nothing more than mere forms. He even pretended to confider his own functions as temporary, exerted for the benefits of the people, and depending upon their will. Five times, in the courfe of his protracted reign, did he fubmit to a fort of election. The emperor repofed the moft unlimited confidence in Mecænas, by whofe counfels all public affairs were conducted, and the moft falutary laws enacted for the remedy of public grievances, and even the correction of the morals of the people. By his influence and wife inftructions, Auguftus affumed thofe virtues to which his heart was a ftranger; and which, in their tendency to the happinefs of his fubjects, were equally effectual as if they had been the genuine fruits of his nature. On the death of Marcellus, the nephew and fon-in-law of the emperor, he beftowed his chief favour on Marcus Agrippa, who married Julia, the widow of Marcellus; and on his deceafe, Julia took Tiberius for her third hufband, who became the emperor's fon-in-law by a double tie, for Auguftus had previouffy married his mother, Livia. On the death of the emperor, in the 14th year of the Chriftian era, and in the 44th of his reign, Tiberius fucceeded to the throne.

The government eftablifhed by Auguftus, founded, as it unquefionably was, on the power of the fword, not on the confent of the fenate and people, degenerated in proportion as the army became corrupted. This prince had refolved to confine the boundaries of the empire to the limits which, he affumed, Nature had pointed out, *viz.* on the weft the Atlantic ocean; the Rhine and Danube on the north; the Euphrates on the eaft; and towards the fouth, the fandy deferts of Arabia and Africa. His immediate fucceffors adopted this refolution. Britain and Dacia were the fole acceffions to the empire during the firft century of the Chriftian era. A military fpirit was, in fome degree, preferved and cherifhed, when almoft every virtue was extinguifhed; but the difcipline of the legions was greatly corrupted by the ambition, or relaxed by the weaknefs, of the emperors, who confided in the army, and particularly in the ftrength and fidelity of the Prætorian guards, which had been formed by Auguftus, and were kept up for the protection of the emperor's perfon. The foldiers were, however, foon roufed to a fenfe of their own power, and of the impotency of the civil authority.

Tiberius, the fecond emperor, was an unfeeling tyrant, and he took for his counfellor Sejanus, prefect of the Prætorian guards, a man ftill more cruel and tyrannical than himfelf. Sejanus conceived the project of placing himfelf on the throne: for the furtherance of his plans, he caufed Drufus, the fon of the emperor, to be poifoned, and removed from the fight of the people the fons of Germanicus, who were the natural heirs to the crown. He even perfuaded Tiberius himfelf, under the pretence of a difcovery of plots for his affaffination, to retire from Rome to the ifle of Capreæ, and devolve the government upon himfelf. He had but one ftep more to the attainment of the object of his ambition: he was on the point of affaffinating his mafter when he was detected, and inftantly executed. Tiberius now became negligent of the cares of government, and the imperial power was difplayed only in fcenes of cruelty and rapine. At length he fell fick, and was ftrangled in his bed by Macro, the præfect of the Prætorian guards, in the 78th year of his age, and the 23d of his reign.

Caligula, the fon of Germanicus, who was Tiberius's nephew, was the third emperor of Rome. The commencement of his reign was fignalized by a few acts of clemency and good policy. But tyrannical and cruel by nature, he fubftituted military execution for legal punifhment. The provinces were loaded with the moft oppreffive taxes, and daily confifcations filled the imperial coffers. He was affaffinated in the 4th year of his reign, and was fucceeded by his uncle

Claudius, the fon of Octavia, the fifter of Auguftus, whofe fhort reign, though he was a man of weak intellects, and of little education, was marked by an enterprife of importance. He undertook the reduction of Britain, and after vifiting the ifland in perfon, left his generals, Plautius and Vefpafian, to profecute a war, which was carried on for feveral years with various fuccefs. The inhabitants of Wales, then denominated the Silures, under their king Caractacus, made a noble refiftance, but were finally defeated, and Caractacus was led captive to Rome. The civil adminiftration of Claudius was weak and contemptible; he was the flave even of his domeftics, and the dupe of his abandoned wives Meffalina and Agrippina. Claudius was put to death in the 15th year of his reign.

Nero, the fcourge of mankind, fucceeded his father Claudius, and for the firft five years he reigned with great applaufe, whence Trajan, faid "cunctos principes longè abeffe a Neronis quinquennio;" but when his character began to unfold itfelf, he was found to be a compound of every thing that was bafe and inhuman. (See his article.) He perifhed in the 30th year of his age, and the 14th of his reign.

The two fucceeding emperors, Galba and Otho, did not reign a year between them; the former was murdered by the foldiers, and the latter died by his own hand.

The reign of Vitellius, the next emperor, was of eight months' duration. He is faid to have propofed Nero for his model, and it was juft that he fhould refemble him in his fate. Vefpafian, who had obtained from Nero the charge of the war againft the Jews, which he had conducted with ability and fuccefs, was proclaimed emperor by his troops in the Eaft, and a great part of Italy fubmitting to his generals, Vitellius capitulated to fave his life; but as foon as Rome was taken, the depofed emperor was feized, maffacred, and his body thrown into the Tiber.

Vefpafian reigned with great popularity for ten years.

He refpected the ancient forms of the conftitution, reftored the fenate to its deliberative rights, and acted by its authority in the adminiftration of all public affairs. Under his reign, and by the arms of his fon Titus, was terminated the war againft the Jews. They had been brought under the yoke of Rome by Pompey, who took Jerufalem. Under Auguftus, they were governed for fome time by Herod as viceroy; but the tyranny of his fon Archelaus was the caufe of his banifhment, and alfo of the reduction of Judæa into the ordinary condition of a Roman province. In the reign of Vefpafian, Jerufalem was befieged, and after a blockade of fix months, taken by ftorm, the temple burnt to afhes, and the city buried in ruins. Vefpafian affociated Titus in the imperial dignity, and foon after died, at the age of 69, in the year 79 of the Chriftian era.

In elective monarchies, the vacancy of the throne is a moment big with danger and mifchief. The Roman emperors, defirous to fpare the legions that interval of fufpence, and the temptation of an irregular choice, invefted their defigned fucceffor with fo large a fhare of prefent power, as fhould enable him, after their deceafe, to affume the remainder, without fuffering, as it were, the empire to perceive the change of maffers. Thus Auguftus, after all his fair profpects had been fnatched from him by untimely deaths, refted his laft hopes on Tiberius, and obtained a law, by which the future prince was invefted with an authority equal to his own over the provinces and the armies. Thus, alfo, Vefpafian fubdued the generous mind of his eldeft fon. Titus was adored by the eaftern legions; his power was dreaded; but as his virtues were clouded by the intemperance of youth, his defigns were liable to be fufpected. Inftead of liftening to fuch unworthy fufpicions, the prudent monarch affociated, as we have feen, Titus to the full powers of the imperial dignity: and the grateful fon ever approved himfelf the humble and faithful minifter of fo indulgent a father.

Vefpafian had embraced every meafure that might confirm his recent and precarious elevation. The military oath, and the fidelity of troops, had been confecrated by the habits of an hundred years to the name and family of the Cæfars; and although that family had been continued only by the fictitious rite of adoption, the Romans ftill revered, in the perfon of Nero, the grandfon of Germanicus, and the lineal fucceffor of Auguftus. It was not without reluctance and remorfe that the Prætorian guards were perfuaded to abandon the caufe of the tyrant. The rapid downfall of Galba, Otho, and Vitellius, taught the armies to confider the emperors as the creatures of their will, and the inftruments of their licence. The birth of Vefpafian was very mean: his own merit had raifed him, in an advanced age, to the empire. "Such a prince," then, fays Gibbon, "confulted his true intereft by the affociation of a fon, whofe more fplendid and amiable character might turn the public attention from the obfcure origin, to the future glories, of the Flavian houfe. Under the mild adminiftration of Titus, the Roman world enjoyed a tranfient felicity. His character was humane, munificent, dignified, and fplendid. In his reign happened that dreadful eruption of Vefuvius, which overwhelmed the cities of Herculaneum and Pompeii; and the public loffes from thefe calamities he repaired by the facrifice of his fortune and revenues. He died in the third year of his reign, and obtained the moft exalted epithet, 'Deliciæ humani generis.'"

Domitian, the brother of Titus, and fufpected of murdering him by poifon, fucceeded to the empire A.D. 81. He was a moft cruel tyrant. A rebellion in Germany gave him an opportunity to fignalize the barbarity of his difpofition; and its confequences were long felt in the fanguinary punifhments inflicted under the pretence of juftice. In this reign, the fucceffes of Agricola in Britain threw a luftre on the Roman arms; nevertheleefs Domitian treated this brave commander with the bafeft ingratitude. The emperor was affaffinated in the fixteenth year of his reign.

It may not be amifs, before we proceed, to notice, in a geographical fenfe, the different divifions of the empire under Auguftus, and which continued during the reigns of the twelve Cæfars, to that of Adrian. When Auguftus made himfelf mafter of the Roman empire, its poffeffions extended almoft to all the then known world. He did not, as we have feen, make any attempts to extend the limits of the empire, but took every means, that his great talents could fuggeft, to preferve his own authority, without rendering the fenate and people his enemies. He appeared to furrender to them their ancient authority and rights, and only to attend to thofe parts of the government which were moft laborious and difficult. He even feemed to divide the provinces of the empire between himfelf and the nation, which provinces he arranged into twenty-fix dioceefes or departments. Of thefe he granted twelve to the fenate and people, referving to himfelf the other fourteen. He had taken care, in this divifion of the empire, that not only the moft confiderable provinces fhould fall to his own fhare, but that they fhould be fo fituated, as to give him a decided preeminence over the others. With refpect to the departments under the controul of the fenate and people, two were governed by proconfuls, and ten by pretors.

I. The two departments governed by proconfuls comprehended Africa, including Africa proper, Numidia, and part of Libya.

II. The ten departments under the government of prætors comprehended that part of Spain denominated Bœtica; Gallia Narbonenfis; Sicily; Sardinia, and Corfica; Illyria, and part of Epirus; Macedonia, and part of Greece; Achaia; Bœotia, Acarnania, and part of Epirus; the ifland of Crete; Cyrenaica, an ancient kingdom of Africa, including the prefent kingdom and defart of Barca and Tripoli; the ifland of Cyprus; Bithynia; Paphlagonia; the countries about the Propontis and Pontus.

III. The fourteen dioceefes or departments under the immediate authority of the emperor were as follow: Hifpania; Lufitania; Celtiberia; Aquitania; the moft important parts of Gallia and Belgica; Nerica, Vindelicia, and Rhætia; Mœfia, comprehending Dardania, Dacia, and Thrace; Dalmatia, and part of Illyria; the Maritime Alps; Cilicia, Ifauria, and Lycaonia; Galatia, Pamphylia, and Pifidia; Syria, Little Armenia, Mefopotamia, and all the eaftern parts of the empire; Egypt, and part of Arabia; Italy, from the ifland of Sicily to the Alps.

Nerva, who fucceeded Domitian, had fcarcely accepted the fovereign power from the murderers of that emperor, before he difcovered that he was too aged and infirm to ftem the torrent of public diforders, which had multiplied to an alarming degree under the long tyranny of his predeceffor. His mild difpofition was highly refpected by the virtuous, but was treated with great contempt by the guilty. Though he had relations of his own, yet he adopted for his fucceffor a ftranger, Trajan, who had commanded with wifdom and fuccefs a powerful army in Lower Germany, and immediately, by a decree of the fenate, declared him his colleague and fucceffor in the empire. Nerva died in fixteen months after his elevation to the throne.

Trajan poffeffed every talent and every virtue that can adorn a fovereign. As a warrior, he raifed the Roman arms to their ancient fplendour, and greatly enlarged the boundaries

boundaries of the empire. He ſubdued the Dacians, conquered the Parthians, and brought under ſubjection Aſſyria, Meſopotamia, and Arabia Felix. Nor was he leſs eminent in promoting the happineſs of his ſubjects, and the internal proſperity of the empire. He was illuſtrious in every connection, and in every ſtation of life, and obtained the epithet *Optimus*. He died after a glorious reign of nineteen years. Of this emperor Gibbon remarks, "It is ſincerely to be lamented, that while we are fatigued with the diſguſtful relation of Nero's crimes and follies, we are reduced to collect the actions of Trajan from the glimmering of an abridgment, or the doubtful light of a panegyric. Above two hundred and fifty years after the death of Trajan, the ſenate, in pouring out the cuſtomary acclamations on the acceſſion of a new emperor, wiſhed that he might ſurpaſs the felicity of Auguſtus and the virtue of Trajan."

Adrian, the nephew of Trajan, was nominated to the throne, in the laſt moments of his predeceſſor, and his title was peaceably acknowledged. Under his reign the empire flouriſhed: he encouraged the arts, reformed the laws, aſſerted ſtrict military diſcipline, and viſited all his provinces in perſon. He adopted a policy very different from that of his predeceſſor, and judging the limits of the empire too extenſive, abandoned all the conqueſts of Trajan, bounding the eaſtern provinces by the Euphrates. To his talents as an able politician, he joined an excellent taſte in the liberal arts. In the laſt year of his life he adopted, and declared for his immediate ſucceſſor, Titus Aurelius Antoninus, and ſubſtituting Annius Verus, the ſon of Ælius Verus, in caſe of the other's death. Adrian died A.D. 138, at the age of 62.

The emperor Adrian ſuppreſſed the departments eſtabliſhed by Auguſtus, and divided the whole empire into eleven parts, as follow.

I. Italy, including two provinces, of which the firſt comprehends all the country from Picenum to Sicily; and the ſecond from Picenum to the Alps, with the two Rhætias.

II. Africa, comprehending the proconſular part of that country; Numidia, and Mauritania.

III. Hiſpania, including Hiſpania Tarraconenſis; Bœtica, and Luſitania.

IV. Gallia, comprehending Gallia Belgica; Gallia Lugdunenſis; Gallia Aquitanica, and Gallia Narbonenſis.

V. Britanny, comprehending the upper and lower countries of that name.

VI. Illyria, containing ſeventeen provinces, *viz.* the two Noricas; the Upper and Lower Pannonia, and their appendages; Dalmatia; Mœſia Prima; the Superior and Inferior Dacia; Macedonia; Theſſaly; Achaia; the two Epiri, and the iſland of Crete.

VII. Egypt, including Egypt Proper; Thebais; Libya, and Pentapolis.

VIII. The eaſtern part of the empire comprehended Paleſtine; Phœnicia; Cœlo-Syria; Syria; the two Cicilias; Iſauria; Meſopotamia; Arabia, and the iſland of Cyprus,

IX. Thrace comprehended Thrace Proper; the Lower Mœſia; Scythia, and the adjoining countries.

X. Pontus included Pontus Proper; Galatia; Bithynia; the two Cappadocias; Paphlagonia, and Armenia.

XI. The Aſiatic diviſion comprehended the proconſular part of Aſia; Pamphylia; the countries about the Helleſpont; Lydia; Piſidia; Lycaonia; the two Phrygias; Lycia; Caria; and ſeveral iſlands, of which Rhodes was the chief.

The Age of the Antonines.—This has by hiſtorians been regarded as an era in the Roman empire. Adrian, ſays the hiſtorian, was reſolved to deſerve the thanks of poſterity, by placing the moſt exalted merit on the Roman throne. His diſcerning eye eaſily diſcovered a ſenator about 50 years of age, blameleſs in all the offices of life; and a youth of about 17, whoſe riper years opened the fair proſpect of every virtue. The elder of theſe, as we have ſeen, was declared the ſon and ſucceſſor of Adrian, on condition that he himſelf ſhould immediately adopt the younger. The two Antonines, for ſo they have been denominated, governed the Roman world 42 years, with the invariable ſpirit of wiſdom and virtue. The former has, on account of his many excellent qualities, been ſurnamed Pius; the latter, Annius Verus, on his acceſſion, aſſumed the name of Marcus Aurelius Antoninus. Titus Antoninus Pius has been denominated a ſecond Numa. The ſame love of juſtice and peace was the diſtinguiſhing characteriſtic of both princes: but the ſituation of the latter opened a much wider field for the exerciſe of thoſe virtues. The wiſdom of the former could benefit but a few villages; but Antoninus diffuſed order and tranquillity over the greateſt part of the earth. "His reign," ſays Gibbon, "is marked by the rare advantage of furniſhing very few materials for hiſtory; which is, indeed, little more than the regiſter of the crimes, follies, and misfortunes of mankind." In private life, he was an amiable as well as a good man; and he enjoyed with moderation the advantages of his good fortune. He died after a reign of 22 years.

The virtue of Marcus Aurelius Antoninns was of a ſeverer and more laborious kind. At the age of twelve he embraced, from a conviction of its utility, the rigid ſyſtem of the Stoics, which taught him to ſubject his body to his mind, his paſſions to his reaſon; to conſider virtue as the only good, and vice as the only evil. His "Meditations," compoſed in the midſt of a camp, are not only extant, but ſtill read with delight and advantage; and he even gave leſſons of philoſophy to the Roman people, as he had before done in ſeveral cities of Greece and Aſia. War he deteſted, as the diſgrace and calamity of human nature; but when the neceſſity of a juſt defence called upon him to take up arms, he readily expoſed his perſon to eight winter campaigns on the frozen banks of the Danube, the ſeverity of which was at laſt fatal to the weakneſs of his conſtitution. Having appeared like a benevolent deity, diffuſing around him peace and happineſs, he died in Pannonia, in the 19th year of his reign, A.D. 180. His memory was revered by a grateful poſterity; and above a century after his death, many perſons preſerved the image of Marcus Antoninus among thoſe of their houſehold gods.

"If a man," ſays the hiſtorian of theſe times, "were called on to fix the period in the hiſtory of the world, during which the condition of the human race was moſt happy and proſperous, he would, without heſitation, name that which elapſed from the death of Domitian to the acceſſion of Commodus. The vaſt extent of the Roman empire was governed by abſolute power, under the guidance of virtue and wiſdom. The armies were reſtrained by the firm and gentle hand of five ſucceſſive emperors, whoſe characters and authority commanded an involuntary reſpect. The forms of the civil adminiſtration were carefully preſerved by Nerva, Trajan, Adrian, and the Antonines, who delighted in the image of liberty, and were pleaſed with conſidering themſelves as accountable miniſters of the laws. Such princes deſerved the honour of reſtoring the republic, had the Romans of their days been capable of enjoying a rational freedom. The labours of theſe monarchs were overpaid by the immenſe reward that inſeparably waited on their ſucceſs; by the honeſt pride of virtue, and by the exquiſite delight

delight of beholding the general happineſs, of which they were the authors."

Commodus ſucceeded to the empire on the death of his father. The meaſures of this reign were as unimportant as the character of the ſovereign was contemptible. Commodus had an averſion from every rational and liberal purſuit, and was in many reſpects very like Nero. To his other crimes, which he had in common with preceding tyrants, may be added, that he entered the liſts as a public gladiator, and actually received a ſtipend for the ſlaughter of his helpleſs antagoniſts. The concubine and ſome of the chief officers of this emperor prevented their own deſtruction, by aſſaſſinating him in the thirteenth year of his reign, A.D. 193.

Publius Helvius Pertinax was the next emperor, a man of mean birth, but who had riſen to eſteem by his virtues and military talents. He diſappointed the army of a promiſed reward for his elevation, and, after a reign of 86 days, was murdered in the imperial palace by the ſame hands which had raiſed him to the throne. The empire was now put up to auction by the Prætorians, and was purchaſed by Didius Julianus; but not paying the ſtipulated price for his elevation, he was depoſed and put to death.

Septimius Severus ſucceeded, whoſe intention was to erect the fabric of abſolute monarchy, and all his inſtitutions operated to that end. He poſſeſſed eminent military talents, and it was his boaſt, that, having received the empire oppreſſed with foreign and domeſtic wars, he left it in profound, univerſal, and honourable peace. He carried with him into Britain his two ſons, Caracalla and Geta; and died at York, in the 66th year of his age, after a reign of eighteen years, A.D. 211. He was ſucceeded by the two ſons juſt named, whoſe former mutual hatred of each other was increaſed by their aſſociation in the empire; and Caracalla, with brutal inhumanity, cauſed his brother to be openly murdered in the arms of his mother. His reign, which was of ſix years' duration, and full of atrocities, was at length terminated by aſſaſſination, A.D. 217.

As it would not be conſiſtent with the limits aſſigned to this article, neither is it at all neceſſary, to advance ſtep by ſtep through the ſucceeding reigns; it will be ſufficient to tranſcribe, with very trifling additions, the names of ſeveral of the emperors who followed Caracalla.

The diſorders in the Roman empire, which began with Commodus, continued nearly a century, till the acceſſion of Diocletian: and this interval was filled by the reigns of Macrinus and Heliogabalus, who were both ſlain by the ſoldiers. Alexander Severus was a juſt prince and a lover of learning; he was ſucceſsful in his war againſt Artaxerxes, the new king of Perſia, and after that, was ſlain by ſome of his ſoldiers in an expedition into Germany.

Maximin, Maximus and Balbinus, Gordian, and Philip the Arabian, with his ſon, in whoſe reign were inſtituted the ſecular games, were all raiſed to the throne by the prætorian bands, and by them killed. Decius, a ſevere perſecutor of the Chriſtians, was drowned while fighting againſt the barbarians. After this Gallus was ſlain by the army, at the end of a reign of two years. The life of Valerianus was devoted to the reformation of the manners of his people; but in a war with Sapor, king of Perſia, he was captured and flead alive. Gallienus, the ſon of Valerianus, was loſt in luxury and debauchery, and ſuffered the empire to be torn from him on all ſides by barbarians and tyrants. Hence the 30 tyrants, as they are called, though hiſtory records the names of 19 only, roſe up againſt him. Among theſe was Zenobia, wife to Odenatus, prince of Palmyra, a woman of martial ſpirit, who ſpread her conquering arms far over the Eaſtern world.

After Gallienus were Claudius II., who died of the plague; Aurelian, who carried Zenobia a captive in triumph, and who was murdered by his ſoldiers: Claudius Tacitus, Probus, and Carus followed in ſucceſſion. Probus was killed by the ſoldiers, and Carus was ſtruck dead with lightning.

Diocletian began his reign A.D. 284, and introduced a new ſyſtem of adminiſtration, dividing the empire into four governments, under as many princes. Maximian ſhared with him the title of Auguſtus, and Galerius and Conſtantius were declared Cæſars, or their ſucceſſors. Each had his ſeparate department or province, all nominally ſupreme, but in reality under the direction of the ſuperior talents and authority of Diocletian. The two emperors, truſting to a continuance of that order in the empire which their vigour had eſtabliſhed, retired from ſovereignty, and left the government in the hands of the Cæſars; but Conſtantius died ſoon after in Britain, and he was ſucceeded by his ſon Conſtantine, who was proclaimed emperor at York, though Galerius, at firſt, refuſed to acknowledge his title. Maximian, however, having once more reſumed the purple, beſtowed on Conſtantine his daughter in marriage, and thus he inveſted him with a double title to the empire. On the death of Maximian and Galerius, Conſtantine had no other competitor than Maxentius, the ſon of Maximian, and the conteſt between them was decided by the ſword. Maxentius fell in battle, and Conſtantine remained ſole maſter of the empire: this was the time in which the croſs is ſaid to have appeared in the heavens, in viſion, to the emperor, with this inſcription, "in hoc ſigno vinces."

Conſtantine made a conſiderable change in the diſtribution of the provinces which had not ſuffered much alteration ſince the arrangement of Adrian. He ſubjected the whole empire to the dominion of four prefects of the palace; of whom one was placed over Gallia, one over Italia, one over Illyria, and the other over the Eaſtern provinces. Theſe prefects had under them *proconſuls* in ſome of the provinces; in others, *magiſtrates*, called *conſuls*, *preſidents*, and *correctors*; and a certain number of provinces over which theſe were placed being united, formed a vicariat. The *prefect of the palace*, under Auguſtus, was a military officer, in the order of knights. Tiberius increaſed the importance of the office; but Antoninus was the firſt who made uſe of that officer to promulgate, in his name, the laws of the empire. Hence the prefect of the palace became chief judge, who had authority over all other tribunals. In him were united the ſeveral offices of conſtable, chancellor, and ſuperintendant of the finances. Conſtantine ſuppreſſed this office, as held by an individual, and created four prefects of the palace, who had under them *vicars*, whoſe power extended over a certain number of countries, forming a dioceſe or department. Theſe officers had the moſt conſiderable influence in their departments, and when they quitted the capital, they left their children with the emperor, as pledges of their fidelity.

Under Auguſtus, and after him, the proconſuls were magiſtrates ſent by the ſenate to correct the exiſting abuſes of the departments: but they had neither the command of troops, nor the adminiſtration of the provinces.

The *conſul*, called alſo rector of the province, had only the name and the enſigns of that office, not the power. Auguſtus governed the departments of the empire, which he had reſerved to himſelf, by means of his prætors and conſuls.

The *correctors* were officers who were charged to reform the abuſes which had crept into the provinces.

The

The *presidents* were cloathed with a much greater power than that possessed by the proconsuls. They were military officers, and had the power of life and death over the army. It was to one of these officers that the provinces of the empire were subjected in each of the great prefectures: thus,

The prefecture of the Gauls, comprehending twenty-nine provinces, was divided into three vicariats, *viz.* Hispania, Gallia, and Britanny.

I. The vicariat of Hispania included seven provinces, of which three were under consuls, and four under presidents.

II. The vicariat of the Gauls included seventeen provinces; six under consuls, and eleven under presidents.

III. The vicariat of Britanny comprised five provinces; two under consuls, and three under presidents.

The prefecture of Italy included likewise twenty-nine provinces, divided into the proconsulship of Africa, and the vicariats of Rome, Italy, Africa, and Illyria. The vicariat of ROME was under consuls, correctors, and presidents; that of ITALY was under consuls and presidents; that of AFRICA was under consuls and presidents; and that of ILLYRIA under one consul, one corrector, and four presidents.

The prefecture of Illyria included eleven provinces; one under the proconsul of Achaia; the vicariat of Macedonia comprehended five provinces, two under consuls, and three under presidents; the vicariat of Dacia was under one consul, and four presidents.

The prefecture of the East included forty-eight provinces; *viz.* three under the proconsul of Asia; fifteen under the count of the East, a companion to the emperor; six under the prefect of Egypt; seven under the vicariat of Asia; eleven under the vicariat of Pontus; and six under the vicariat of Thrace.

We are now arrived to that state of the Roman empire in which it was governed by Christian emperors, and which may be divided into three distinct periods. The *first* will contain the whole time that the Roman world was governed by one emperor only. The *second* commences with the division of the empire, after the death of Theodosius the Great, and goes down to the extinction of the Western empire under Augustulus. The *third* reaches from the fall of the Western empire to the capture of Constantinople, and the destruction of the whole empire.

Of the Christian Roman Emperors before the Division of the Empire.—The administration of Constantine was, in the early part of his reign, mild, equitable, and politic. Though strongly attached to the Christian faith, he made no great innovations on the religion of the state. He introduced order and economy into the civil government, and repressed every species of oppression and corruption. But his natural temper was severe and cruel, and the latter part of his reign was deformed by rancour and a most sanguinary rigour. From this unfavourable change of character he lost the affections of his subjects; and from a feeling, probably of reciprocal disgust, he removed the seat of the Roman empire to Byzantium, where a new city was raised; from his name it was called CONSTANTINOPLE; see the article. The court followed the sovereign: the opulent proprietors were attended by their slaves and retainers. Rome was in a few years depopulated, and the new capital swelled almost at once to an enormous magnitude. In an expedition against the Persians, Constantine died at Nicomedia, in the 30th year of his reign, A.D. 337. During this reign the Goths had made several irruptions on the empire, and though repulsed and weakened, they began gradually to encroach on the provinces.

Before we proceed with the monarchs, we may just notice some particulars relating to the state of the Roman empire at this period; for which we shall be chiefly indebted to Mr. Tytler's Elements, already quoted and referred to.

Instead of the ancient republican distinctions, which were founded chiefly on personal merit, a rigid subordination of rank and office now went through all the orders of the state. The magistrates were divided into three classes, distinguished by the unmeaning titles of, 1, the Illustrious; 2, the Respectable; and 3, the Clarissimi. The epithet of *Illustrious* was conferred on, 1, the consuls and patricians; 2, the prætorian prefects of Rome and Constantinople; 3, the masters-general of the cavalry and infantry; and 4, the seven ministers of the palace.

The consuls were created by the sole authority of the emperor; their dignity was inefficient, and their names served only to give the legal date of the year. The dignity of patrician was not hereditary, but was bestowed as a title of honour by the emperor on his favourites. The prætorian prefects were the civil governors of the four departments of the empire. These were the East, Illyria, Italy, and the Gauls: to them was committed the supreme administration of justice, and of the finances.

The *Respectables* were the proconsuls of Asia, Achaia, and Africa; and the military *comites* and *duces*, generals of the imperial armies. The *Clarissimi* included the inferior governors and magistrates of the provinces, responsible to the prefects and their deputies.

The intercourse between the court and the provinces was maintained by the construction of roads, and the institution of regular posts or couriers; under which denomination were ranked the numberless spies of government, whose duty was to convey all kinds of intelligence to the seat of empire. Taxes were levied by the sole authority of the emperor, and subsidies were exacted from all the cities, under the name of free gifts, on various occasions of public concern, as the accession of an emperor, the birth of a prince, &c.

An impolitic distinction was made between the troops stationed in distant provinces, and those in the heart of the empire. The latter, denominated *Palatines*, enjoyed a higher pay, and more particular favour, and having less employment, spent their time in idleness and luxury; while the former, called *Borderers*, who, in truth, had the care of the empire, and were exposed to perpetual hard service, had, with an inferior reward, the mortification of feeling themselves regarded as of a meaner rank than their fellow-soldiers. Constantine also debased the body of the army by the intermixture of Scythians, Goths, and Germans. This mass of heterogeneous parts, which internally laboured with the seeds of dissolution and corruption, was kept together for some time by the vigorous exercise of despotic authority.

Constantine had divided the empire among five princes, three of them his sons, and two nephews; but Constantius, the youngest of the sons, finally freed himself from all his competitors, and ruled the empire alone. During his reign, the Franks, Saxons, Alemanni, and Sarmatians, laid waste all the fine countries on the banks of the Rhine, and the Persians made the most destructive incursions on the provinces of the East. Constantius wasted his time in theological controversies; but before his death, he appointed his cousin Julian to the dignity of Cæsar. He died A.D. 361.

Julian possessed many heroic qualities, and his mind was formed by nature for the sovereignty of a great people; but having been educated under the philosophers at Athens, he had unfortunately conceived a rooted antipathy to the doctrines of Christianity. The reformation of civil abuses

delight of beholding the general happineſs, of which they were the authors."

Commodus ſucceeded to the empire on the death of his father. The meaſures of this reign were as unimportant as the character of the ſovereign was contemptible. Commodus had an averſion from every rational and liberal purſuit, and was in many reſpects very like Nero. To his other crimes, which he had in common with preceding tyrants, may be added, that he entered the liſts as a public gladiator, and actually received a ſtipend for the ſlaughter of his helpleſs antagoniſts. The concubine and ſome of the chief officers of this emperor prevented their own deſtruction, by aſſaſſinating him in the thirteenth year of his reign, A.D. 193.

Publius Helvius Pertinax was the next emperor, a man of mean birth, but who had riſen to eſteem by his virtues and military talents. He diſappointed the army of a promiſed reward for his elevation, and, after a reign of 86 days, was murdered in the imperial palace by the ſame hands which had raiſed him to the throne. The empire was now put up to auction by the Prætorians, and was purchaſed by Didius Julianus; but not paying the ſtipulated price for his elevation, he was depoſed and put to death.

Septimius Severus ſucceeded, whoſe intention was to erect the fabric of abſolute monarchy, and all his inſtitutions operated to that end. He poſſeſſed eminent military talents, and it was his boaſt, that, having received the empire oppreſſed with foreign and domeſtic wars, he left it in profound, univerſal, and honourable peace. He carried with him into Britain his two ſons, Caracalla and Geta; and died at York, in the 66th year of his age, after a reign of eighteen years, A.D. 211. He was ſucceeded by the two ſons juſt named, whoſe former mutual hatred of each other was increaſed by their aſſociation in the empire; and Caracalla, with brutal inhumanity, cauſed his brother to be openly murdered in the arms of his mother. His reign, which was of ſix years' duration, and full of atrocities, was at length terminated by aſſaſſination, A.D. 217.

As it would not be conſiſtent with the limits aſſigned to this article, neither is it at all neceſſary, to advance ſtep by ſtep through the ſucceeding reigns; it will be ſufficient to tranſcribe, with very trifling additions, the names of ſeveral of the emperors who followed Caracalla.

The diſorders in the Roman empire, which began with Commodus, continued nearly a century, till the acceſſion of Diocletian: and this interval was filled by the reigns of Macrinus and Heliogabalus, who were both ſlain by the ſoldiers. Alexander Severus was a juſt prince and a lover of learning; he was ſucceſsful in his war againſt Artaxerxes, the new king of Perſia, and after that, was ſlain by ſome of his ſoldiers in an expedition into Germany.

Maximin, Maximus and Balbinus, Gordian, and Philip the Arabian, with his ſon, in whoſe reign were inſtituted the ſecular games, were all raiſed to the throne by the prætorian bands, and by them killed. Decius, a ſevere perſecutor of the Chriſtians, was drowned while fighting againſt the barbarians. After this Gallus was ſlain by the army, at the end of a reign of two years. The life of Valerianus was devoted to the reformation of the manners of his people; but in a war with Sapor, king of Perſia, he was captured and flead alive. Gallienus, the ſon of Valerianus, was loſt in luxury and debauchery, and ſuffered the empire to be torn from him on all ſides by barbarians and tyrants. Hence the 30 tyrants, as they are called, though hiſtory records the names of 19 only, roſe up againſt him. Among theſe was Zenobia, wife to Odenatus, prince of Palmyra, a woman of martial ſpirit, who ſpread her conquering arms far over the Eaſtern world.

After Gallienus were Claudius II., who died of the plague; Aurelian, who carried Zenobia a captive in triumph, and who was murdered by his ſoldiers: Claudius Tacitus, Probus, and Carus followed in ſucceſſion. Probus was killed by the ſoldiers, and Carus was ſtruck dead with lightning.

Diocletian began his reign A.D. 284, and introduced a new ſyſtem of adminiſtration, dividing the empire into four governments, under as many princes. Maximian ſhared with him the title of Auguſtus, and Galerius and Conſtantius were declared Cæſars, or their ſucceſſors. Each had his ſeparate department or province, all nominally ſupreme, but in reality under the direction of the ſuperior talents and authority of Diocletian. The two emperors, truſting to a continuance of that order in the empire which their vigour had eſtabliſhed, retired from ſovereignty, and left the government in the hands of the Cæſars; but Conſtantius died ſoon after in Britain, and he was ſucceeded by his ſon Conſtantine, who was proclaimed emperor at York, though Galerius, at firſt, refuſed to acknowledge his title. Maximian, however, having once more reſumed the purple, beſtowed on Conſtantine his daughter in marriage, and thus he inveſted him with a double title to the empire. On the death of Maximian and Galerius, Conſtantine had no other competitor than Maxentius, the ſon of Maximian, and the conteſt between them was decided by the ſword. Maxentius fell in battle, and Conſtantine remained ſole maſter of the empire: this was the time in which the croſs is ſaid to have appeared in the heavens, in viſion, to the emperor, with this inſcription, "in hoc ſigno vinces."

Conſtantine made a conſiderable change in the diſtribution of the provinces which had not ſuffered much alteration ſince the arrangement of Adrian. He ſubjected the whole empire to the dominion of four prefects of the palace; of whom one was placed over Gallia, one over Italia, one over Illyria, and the other over the Eaſtern provinces. Theſe prefects had under them *proconſuls* in ſome of the provinces; in others, *magiſtrates*, called *conſuls*, *preſidents*, and *correctors*; and a certain number of provinces over which theſe were placed being united, formed a vicariat. The *prefect of the palace*, under Auguſtus, was a military officer, in the order of knights. Tiberius increaſed the importance of the office; but Antoninus was the firſt who made uſe of that officer to promulgate, in his name, the laws of the empire. Hence the prefect of the palace became chief judge, who had authority over all other tribunals. In him were united the ſeveral offices of conſtable, chancellor, and ſuperintendant of the finances. Conſtantine ſuppreſſed this office, as held by an individual, and created four prefects of the palace, who had under them *vicars*, whoſe power extended over a certain number of countries, forming a dioceſe or department. Theſe officers had the moſt conſiderable influence in their departments, and when they quitted the capital, they left their children with the emperor, as pledges of their fidelity.

Under Auguſtus, and after him, the proconſuls were magiſtrates ſent by the ſenate to correct the exiſting abuſes of the departments: but they had neither the command of troops, nor the adminiſtration of the provinces.

The *conſul*, called alſo rector of the province, had only the name and the enſigns of that office, not the power. Auguſtus governed the departments of the empire, which he had reſerved to himſelf, by means of his prætors and conſuls.

The *correctors* were officers who were charged to reform the abuſes which had crept into the provinces.

The

The *presidents* were cloathed with a much greater power than that possessed by the proconsuls. They were military officers, and had the power of life and death over the army. It was to one of these officers that the provinces of the empire were subjected in each of the great prefectures: thus,

The prefecture of the Gauls, comprehending twenty-nine provinces, was divided into three vicariats, *viz.* Hispania, Gallia, and Britanny.

I. The vicariat of Hispania included seven provinces, of which three were under consuls, and four under presidents.

II. The vicariat of the Gauls included seventeen provinces; six under consuls, and eleven under presidents.

III. The vicariat of Britanny comprised five provinces; two under consuls, and three under presidents.

The prefecture of Italy included likewise twenty-nine provinces, divided into the proconsulship of Africa, and the vicariats of Rome, Italy, Africa, and Illyria. The vicariat of ROME was under consuls, correctors, and presidents; that of ITALY was under consuls and presidents; that of AFRICA was under consuls and presidents; and that of ILLYRIA under one consul, one corrector, and four presidents.

The prefecture of Illyria included eleven provinces; one under the proconsul of Achaia; the vicariat of Macedonia comprehended five provinces, two under consuls, and three under presidents; the vicariat of Dacia was under one consul, and four presidents.

The prefecture of the East included forty-eight provinces; *viz.* three under the proconsul of Asia; fifteen under the count of the East, a companion to the emperor; six under the prefect of Egypt; seven under the vicariat of Asia; eleven under the vicariat of Pontus; and six under the vicariat of Thrace.

We are now arrived to that state of the Roman empire in which it was governed by Christian emperors, and which may be divided into three distinct periods. The *first* will contain the whole time that the Roman world was governed by one emperor only. The *second* commences with the division of the empire, after the death of Theodosius the Great, and goes down to the extinction of the Western empire under Augustulus. The *third* reaches from the fall of the Western empire to the capture of Constantinople, and the destruction of the whole empire.

Of the Christian Roman Emperors before the Division of the Empire.—The administration of Constantine was, in the early part of his reign, mild, equitable, and politic. Though strongly attached to the Christian faith, he made no great innovations on the religion of the state. He introduced order and economy into the civil government, and repressed every species of oppression and corruption. But his natural temper was severe and cruel, and the latter part of his reign was deformed by rancour and a most sanguinary rigour. From this unfavourable change of character he lost the affections of his subjects; and from a feeling, probably of reciprocal disgust, he removed the seat of the Roman empire to Byzantium, where a new city was raised; from his name it was called CONSTANTINOPLE; see the article. The court followed the sovereign: the opulent proprietors were attended by their slaves and retainers. Rome was in a few years depopulated, and the new capital swelled almost at once to an enormous magnitude. In an expedition against the Persians, Constantine died at Nicomedia, in the 30th year of his reign, A.D. 337. During this reign the Goths had made several irruptions on the empire, and though repulsed and weakened, they began gradually to encroach on the provinces.

Before we proceed with the monarchs, we may just notice some particulars relating to the state of the Roman empire at this period; for which we shall be chiefly indebted to Mr. Tytler's Elements, already quoted and referred to.

Instead of the ancient republican distinctions, which were founded chiefly on personal merit, a rigid subordination of rank and office now went through all the orders of the state. The magistrates were divided into three classes, distinguished by the unmeaning titles of, 1, the Illustrious; 2, the Respectable; and 3, the Clarissimi. The epithet of *Illustrious* was conferred on, 1, the consuls and patricians; 2, the prætorian prefects of Rome and Constantinople; 3, the masters-general of the cavalry and infantry; and 4, the seven ministers of the palace.

The consuls were created by the sole authority of the emperor; their dignity was inefficient, and their names served only to give the legal date of the year. The dignity of patrician was not hereditary, but was bestowed as a title of honour by the emperor on his favourites. The prætorian prefects were the civil governors of the four departments of the empire. These were the East, Illyria, Italy, and the Gauls: to them was committed the supreme administration of justice, and of the finances.

The *Respectables* were the proconsuls of Asia, Achaia, and Africa; and the military *comites* and *duces*, generals of the imperial armies. The *Clarissimi* included the inferior governors and magistrates of the provinces, responsible to the prefects and their deputies.

The intercourse between the court and the provinces was maintained by the construction of roads, and the institution of regular posts or couriers; under which denomination were ranked the numberless spies of government, whose duty was to convey all kinds of intelligence to the seat of empire. Taxes were levied by the sole authority of the emperor, and subsidies were exacted from all the cities, under the name of free gifts, on various occasions of public concern, as the accession of an emperor, the birth of a prince, &c.

An impolitic distinction was made between the troops stationed in distant provinces, and those in the heart of the empire. The latter, denominated *Palatines*, enjoyed a higher pay, and more particular favour, and having less employment, spent their time in idleness and luxury; while the former, called *Borderers*, who, in truth, had the care of the empire, and were exposed to perpetual hard service, had, with an inferior reward, the mortification of feeling themselves regarded as of a meaner rank than their fellow-soldiers. Constantine also debased the body of the army by the intermixture of Scythians, Goths, and Germans. This mass of heterogeneous parts, which internally laboured with the seeds of dissolution and corruption, was kept together for some time by the vigorous exercise of despotic authority.

Constantine had divided the empire among five princes, three of them his sons, and two nephews; but Constantius, the youngest of the sons, finally freed himself from all his competitors, and ruled the empire alone. During his reign, the Franks, Saxons, Alemanni, and Sarmatians, laid waste all the fine countries on the banks of the Rhine, and the Persians made the most destructive incursions on the provinces of the East. Constantius wasted his time in theological controversies; but before his death, he appointed his cousin Julian to the dignity of Cæsar. He died A.D. 361.

Julian possessed many heroic qualities, and his mind was formed by nature for the sovereignty of a great people; but having been educated under the philosophers at Athens, he had unfortunately conceived a rooted antipathy to the doctrines of Christianity. The reformation of civil abuses

formed the firſt object of his attention, after which he endeavoured, but without perſecution, to undermine and extinguiſh the Chriſtian religion. To avenge the injuries which the empire had ſuſtained from the Perſians, Julian marched into the heart of Aſia, and in an engagement, though crowned with victory, he was ſlain at the age of thirty-one, after a reign of three years.

Jovian, a captain of the guards, was choſen to ſucceed Julian, who purchaſed his ſafe retreat by the ignominious ſurrender of five provinces. His reign, of ſeven months only, was mild and equitable, and he reſtored the Chriſtians to all their privileges as ſubjects.

Valentinian was choſen emperor by the army on the death of Jovian, who aſſociated with himſelf in the empire his brother Valens, to whom he gave the dominion of the Eaſtern provinces, reſerving to himſelf the Weſtern. Valentinian favoured the Chriſtian faith, but did not perſecute its adverſaries, which was very unlike the conduct of Valens, who, intemperately ſupporting the Arian doctrine, ſet whole provinces in a flame, and drew upon the empire a ſwarm of invaders, in the diſguiſe of friends and allies, but who, in the end, entirely ſubverted it. Theſe were the Goths, who, migrating from Scandinavia, had, in the ſecond century, ſettled on the banks of the Palus Mæotis, and thence gradually extended their territory. In the reign of Valens they poſſeſſed themſelves of Dacia, and were known by the diſtinct appellation of Oſtrogoths and Viſigoths, or Eaſtern and Weſtern Goths. Valentinian died on an expedition againſt the Alemanni, and was ſucceeded in the empire of the Weſt by Gratian, his eldeſt ſon, a youth of ſixteen years of age. Valens was the ſcourge of his people. The Huns, of Tartar or Siberian origin, now poured down on the provinces both of the Eaſt and Weſt. The Goths fled before them. The Viſigoths were allowed by Valens to ſettle in Thrace; the Oſtrogoths aſked the like liberty, and, being refuſed, forced their way into the ſame province. Valens gave them battle at Adrianople; his army was defeated, and he himſelf ſlain in the engagement. The Goths, unreſiſted, ravaged Achaia and Pannonia, and were ſeveral times within ſight of the walls of Conſtantinople.

Gratian took Theodoſius as his colleague, who, on the early death of his aſſociate, and minority of his ſon Valentinian II., governed with great ability both the Eaſtern and Weſtern empire. Theodoſius obtained the ſurname of Great, and having reigned till A.D. 395, he died, leaving two ſons, Arcadius and Honorius, aſſigning to them ſeparate ſovereignties. Arcadius was proclaimed emperor of the Eaſt, and Honorius emperor of the Weſt. The Eaſtern empire comprehended Aſia Minor, Arabia, Syria, Egypt, Libya, and the ſeveral regions on the Danube. The Weſtern empire included Italy, Spain, France, Britain, Germany, Pannonia, and Africa. The Eaſtern empire ſubſiſted many ages, but the Weſtern ſoon became the prey of barbarians.

It may be obſerved, that the reign of Theodoſius was ſignaliſed by the downfall of Paganiſm, and the full eſtabliſhment of the Chriſtian religion in the Roman empire: for, from the time of Numa to that of Gratian, the Romans preſerved the regular ſucceſſion of the ſeveral ſacerdotal colleges, the pontiffs, augurs, veſtals, flamens, &c. whoſe authority, though weakened in the latter ages, was ſtill protected by the laws. Even the Chriſtian emperors held, like their Pagan predeceſſors, the office of pontifex maximus. Gratian was the firſt who refuſed that ancient dignity as a profanation. In the time of Theodoſius, the cauſe of Chriſtianity and Paganiſm was ſolemnly debated in the Roman ſenate; Chriſtianity was triumphant, and the ſenate iſſued a decree for the abolition of Paganiſm, the deſtruction of which in the capital was ſoon followed by its extinction in the provinces.

Of the Weſtern Empire.—In the reigns of Arcadius and Honorius, the ſons and ſucceſſors of Theodoſius, the barbarian nations eſtabliſhed themſelves in the frontier provinces both of the Eaſt and Weſt. Theodoſius had committed the government to Rufinus and Stilicho during the minority of his ſons: of their fatal diſſentions the enemies of the empire took every advantage. The Huns overſpread Armenia, Cappadocia, and Syria. The Goths, under Alaric, ravaged the borders of Italy, and laid waſte Achaia to the Peloponneſus. Arcadius purchaſed an ignominious peace, by ceding to Alaric the whole of Greece. This prince, now ſtyled king of the Viſigoths, prepared to add Italy to his new dominions. He paſſed the Alps, and was carrying all before him, when he was defeated by Stilicho, then at the head of the armies of Honorius. In the courſe of a few months, a torrent of Goths breaking down upon Germany, forced the nations whom they diſpoſſeſſed, *viz.* the Suevi, Alani, and Vandals, to haſten out of Italy. They joined their arms to thoſe of Alaric, who, being thus ſuddenly reinforced, determined to overwhelm Rome. Stilicho to ward off the threatened danger, promiſed him, if he would retire, 4000 pounds weight of gold, which engagement Honorius would not ratify. Alaric was not to be trifled with, and he took ample revenge by the ſack and plunder of the city. He was anxious to ſpare the lives of the vanquiſhed, and to preſerve the ancient edifice from deſtruction. This event happened in Auguſt 410. Alaric had, as we have ſeen, ravaged Greece, ſome time before; and Arcadius, more wiſe than his brother, was contented to purchaſe his friendſhip, by inveſting him with the maſter-generalſhip of the Eaſtern Illyricum. He died within a week of the capture of Rome, and was ſucceeded by Ataulfus, or Adolphus, to whom Honorius gave his ſiſter Placidia in marriage, and, with her, ceded to his brother-in-law a large portion of Spain. With theſe conceſſions Adolphus was contented, and, having concluded a peace, he retired into Gaul, A.D. 412. A great part of what remained of Spain had before been occupied by the Vandals. Honorius allowed, ſoon after, to the Burgundians a juſt title to their conqueſts in Gaul. Thus the Weſtern empire was by degrees mouldering from under the dominion of its ancient maſters.

In the Eaſt, Arcadius died in 408, leaving that empire to his infant ſon, Theodoſius II., whoſe ſiſter, Pulcheria, ſwayed the ſceptre with prudence and talent during a government of 40 years. Honorius died A.D. 423. The laws of Arcadius and Honorius are, with very few exceptions, remarkable for their wiſdom and equity; a ſingular circumſtance, conſidering the perſonal character of thoſe princes, and evincing at leaſt that they employed able miniſters.

In the reign of Valentinian III., the hordes from the north of Europe again abandoned their own foreſts and mountains, in queſt of new ſettlements. Under the command of Attila (ſee his article), they defeated the Roman armies, A.D. 452, and threatened total deſtruction to the empire. He was for a time ably oppoſed by Ætius, Valentinian's general; the emperor himſelf being ſhut up in Rome by the armies of the barbarian, and at length compelled to purchaſe a peace. On the death of Attila, his dominions were diſmembered by his ſons, whoſe diſſentions gave a temporary relief to the declining empire. Valentinian was put to death by the guards of his general Ætius, A.D. 455. He was ſucceeded by Maximus, who had excited the death of Valentinian, and who now married his widow Eudoxia. Within three months of this event he

was

was deprived of his kingdom by Genferic, king of the Vandals, who was invited by Eudoxia to revenge the murder of her firſt huſband, and deliver her from the power of the tyrant. Maximus fled, but being taken, he was killed, and his body thrown into the Tiber. Genferic carried Eudoxia and her two daughters into Italy, one of whom he married to his ſon Hunneric, the other he ſent back to Conſtantinople, and married the mother himſelf.

After Maximus, we have a ſucceſſion of ſeven or eight princes, but the events of their ſeveral reigns merit no detail. In the reign of Romulus, ſurnamed Auguſtulus, the empire of the Weſt came to a final period. Odoacer, prince of the Heruli, ſubdued Italy, but ſpared the life of Auguſtulus, on the condition of his reſigning the throne. This occurred A.D. 476. Odoacer retained the poſſeſſion of Italy during 14 years. In this period, the eſtates of the Roman ſenators were divided among his countrymen and ſoldiers. At the extinction of the Roman empire in the Weſt, Rome and Italy came into the poſſeſſion of the Oſtrogoths. Africa was ſeized by the Vandals; Pannonia by the Huns; Spain by the Goths, Alans, and Suevi; Gaul by the Franks; and Great Britain by the Saxons. Hence we ſee the origin of thoſe nations, many of which have proved ſo illuſtrious in hiſtory.

We cannot cloſe this portion of the hiſtory, without ſome reflections relating to the riſe and fall of Rome. The foundations of the greatneſs of this vaſt empire have been enumerated as follow. The fidelity of the citizens to each other, and to the ſtate, was confirmed by the habits of education, and the prejudices of religion. Honour, as well as virtue, was the principle of the republic. The ambitious citizens laboured to deſerve the ſolemn glories of a triumph; and the ardour of the Roman youth was kindled into active emulation, as often as they beheld the domeſtic images of their anceſtors. The temperate ſtruggles of the patricians and plebeians had finally eſtabliſhed the firm and equal balance of the conſtitution; which united the popular aſſemblies with the authority and wiſdom of the ſenate, and the executive powers of a regal magiſtrate. When the conſul diſplayed the ſtandard of the republic, each citizen bound himſelf by the obligation of an oath, to draw his ſword in the cauſe of his country, till he had diſcharged the ſacred duty by a military ſervice of ten years. This wiſe inſtitution continually poured into the field the riſing generation of freemen and ſoldiers; and their numbers were reinforced by the warlike and populous ſtates of Italy, who had yielded to the valour, and embraced the alliance of the Romans. From their inſtitutions of peace and war, Polybius had deduced the ſpirit and ſucceſs of a people, incapable of fear, and impatient of repoſe. The ambitious deſign of conqueſt was attempted and achieved, and the perpetual violation of juſtice was maintained by the political virtues of prudence and courage. The arms of the republic, ſometimes vanquiſhed in battle, always victorious in war, advanced with rapid ſteps to the Euphrates, the Danube, the Rhine, and the ocean; "and the images of gold, or ſilver, or braſs, that might ſerve to repreſent the various nations, and their kings, were ſucceſſively broken by the iron monarchy of Rome."

The riſe of a city, which ſwelled to an empire, may deſerve, as a ſingular prodigy, the reflection of a philoſophic mind: but the decline of Rome was from the natural and inevitable effect of immoderate greatneſs. Proſperity ripened the principles of decay; the cauſes of deſtruction multiplied with the extent of conqueſt; and as ſoon as time or accident had removed the artificial ſupports, the ſtupendous fabric yielded to the preſſure of its own weight. "The ſtory of its ruin," ſays Gibbon, "is ſimple and obvious; and inſtead of inquiring why the Roman empire was deſtroyed, we ſhould rather be ſurpriſed that it ſubſiſted ſo long. The victorious legions, who, in diſtant wars, acquired the vices of ſtrangers and mercenaries, firſt oppreſſed the freedom of the republic, and afterwards violated the majeſty of the purple. The emperors, anxious for their perſonal ſafety, and the public peace, were reduced to the baſe expedient of corrupting the diſcipline, which rendered them alike formidable to their ſovereign and to the enemy. The rigour of the military government was relaxed, and finally diſſolved, by the partial inſtitutions of Conſtantine; and the Roman world was overwhelmed by a deluge of barbarians."

The decay of Rome has often been aſcribed to the tranſlation of the ſeat of empire; but the powers of government were divided, rather than removed. The court of Conſtantinople was erected in the Eaſt; while the Weſt was ſtill poſſeſſed by a ſeries of emperors, who held their reſidence in Italy, and claimed an equal inheritance of the legions and provinces. This impaired the ſtrength, and fomented the vices of a double reign; the inſtruments of an oppreſſive and arbitrary ſyſtem were multiplied; and a vain emulation of luxury was introduced and ſupported between the ſucceſſors of Theodoſius. Extreme diſtreſs, which unites the virtue of a free people, embitters the factions of a declining monarchy. The hoſtile favourites of Arcadius and Honorius betrayed the republic to its common enemies; and the Byzantine court beheld with indifference, or pleaſure, the diſgrace of Rome, the misfortunes of Italy, and the loſs of the Weſt. Under the ſucceeding reigns, the alliance of the two empires was reſtored; but the aid of the Oriental Romans was tardy, doubtful, and ineffectual; and the national ſchiſm of the Greeks and Latins was enlarged by the perpetual difference of language and manners, of intereſt, and even of religion. Yet the event juſtified and did credit to the deciſion of Conſtantine. During a long period, as we ſhall ſee, his impregnable city repelled the victorious arms of barbarians, protected the wealth of Aſia, and commanded, both in peace and war, the important ſtreights which connect the Euxine and Mediterranean ſeas. The foundation, therefore, of Conſtantinople ſeems to have more eſſentially contributed to the preſervation of the Eaſt, than to the ruin of the Weſt.

On the decline or ruin of the Roman empire, great ignorance and darkneſs, as to letters and the uſeful arts of life, began to overſhadow the Weſtern world. A barbarous people, untaught in letters, poured themſelves into the Weſtern provinces of the Roman empire, and gave the firſt blow to learning. Academies were ruined, libraries burnt, and the learned compelled to ſhut up their ſchools and books too. Nor were thoſe, who in that age were denominated Chriſtian prieſts, leſs concerned in the deſtruction of letters; for as they had been loaded with contempt and injuries, when Paganiſm prevailed, by the philoſophers, they not only armed themſelves againſt thoſe teachers, but endeavoured to forbid their writings, as containing tenets the moſt dangerous and pernicious to young perſons. Both haſtened the deſtruction of letters: nevertheleſs the age was not deſtitute of learned men, of whom the following have, among others, been enumerated. Thoſe profeſſing Chriſtianity are Sulpicius Severus, Cyril of Alexandria, Socrates, Sozomen, Theodoret, Iſidore, Sidonius Apollinarius; and among the Pagans, Zoſimus and Olympiodorus were of the greateſt note.

For the Roman ſenate, their magiſtracy, conſuls, ſoldiery, tribes, courts, names, weights, meaſures, coins, and other matters relating to the antiquities of that people, their policy, religion, law, cuſtoms, &c. ſee the reſpective articles in this work.

Of the Eaſtern Empire.—The emperors who reigned in the Eaſt, previouſly to the ruin of the Weſtern empire, were Arcadius, Theodoſius II., of whom we have ſpoken, Marcian, who married Pulcheria, the ſiſter of Theodoſius, and Leo the Thracian, who reigned 17 years, and died in 474. He was ſucceeded by his grandſon, Leo, the boy who died in his cradle. His father, Zeno, followed, who, in 475, was driven from the throne by Baſiliſcus, an uſurper; but in the following year he recovered it.

The period in which the emperors reigned ſingly, after the deſtruction of the Weſtern empire, includes almoſt a thouſand years, extending from 476 to the year 1453; in which year Conſtantinople was taken by Mohammed II. We ſhall only notice ſome of the moſt celebrated, beginning with Zeno, who, as we have juſt obſerved, had been, after a ſhort rebellion, reſtored to the throne.

Auguſtulus, at the command of Odoacer, ſignified his reſignation to the ſtill exiſting aſſembly of the Weſtern empire; and that aſſembly, in their laſt act of obedience to the Roman prince, ſtill affected the ſpirit of freedom, and the forms of the conſtitution. An epiſtle was addreſſed to Zeno, in which they ſolemnly diſclaim the neceſſity, or even wiſh, of continuing any longer the imperial ſucceſſion of Italy; ſince, they ſay, that it is their opinion, the majeſty of a ſole monarch is ſufficient to pervade and protect the Eaſt and the Weſt. They, therefore, in their own name, and in the name of the people, conſent that the ſeat of univerſal empire ſhall be transferred from Rome to Conſtantinople: they renounce the right of chooſing their maſter, the only veſtige that yet remained of the authority which had given laws to the world; and they add, that the republic might ſafely be confided in the civil and military virtues of Odoacer, and humbly requeſt that the emperor Zeno would inveſt him with the title of patrician, and the adminiſtration of the dioceſe of Italy. The deputies of the ſenate were received at Conſtantinople with ſome marks of diſpleaſure and indignation; and when they were admitted to the audience of Zeno, he at firſt reproached them with the ill uſage of ſome of their emperors, particularly of Anthemius and Nepos. The firſt, ſaid he, you have murdered, and the ſecond you have expelled; but while he lives, he is your lawful ſovereign. Zeno, notwithſtanding his harangue, very ſoon abandoned the cauſe of his abdicated colleague. His vanity was gratified by the title of ſole emperor, and by the ſtatues erected to his honour in the ſeveral quarters of Rome. He entertained a friendly correſpondence with Odoacer; and he gratefully accepted the imperial enſigns, the ſacred ornaments of the throne and palace, which the barbarian monarch was not unwilling to remove from the ſight of the people. Zeno died in the year 495, and was ſaid to have been entombed while he was in one of his drunken fits, and before he was dead. He was ſucceeded by

Anaſtaſius I. who married Adriadne, Zeno's widow, and by her influence was raiſed to the throne. See ANASTASIUS.

Juſtin, of whom we have, in the alphabetical order, given a full account, followed Anaſtaſius, and after a reign of nine years he died, leaving his power to JUSTINIAN, ſee his article, who deſtroyed the kingdom of the Vandals in Africa by means of his general Beliſarius, and that of the Oſtrogoths by Narſes. He is particularly famous in having built the church of St. Sophia, and in having aboliſhed the conſulſhip, long ſince only a name without power. He died A.D. 565, and was ſucceeded by Juſtin II., who eſtabliſhed the exarchate of Italy, and who died mad in the year 578. He was followed by Tiberius, one of the captains in Juſtin's guards, who died in about four years, having firſt appointed his own great captain Mauritius as a ſucceſſor. Mauritius, and all his family, were murdered by Phocas, who exerciſed the ſame cruelty in his government, as he had in his way to it. He was dethroned by Heraclius in 611, who ſucceeded him. During the reign of Heraclius, the Perſians made very deſtructive ravages in the empire; this was the period, alſo, in which Mohammed, prince of the Arabians, founded the Mohammedan religion and power. This new power quickly weakened the empire, by depriving it of almoſt all its provinces in Aſia and Africa. Heraclius died of a dropſy, after a reign of about 30 years. In the courſe of a few months, Conſtantine, Heracleonas, and Conſtans, all aſcended the throne; the two firſt were cut off in a few months. The latter attempted to fix the ſeat of empire at Rome, but changing his plans, he went to Sicily, where he was killed, leaving three ſons to ſucceed him, who held the government during the remainder of the ſeventh century. In the eighth, we have Leo Iſauricus, or Iconomachus, ſo called from the perſecutions which he inſtituted againſt the worſhippers of images; alſo the empreſs Irene, who reſtored image worſhip, and who cruelly put out the eyes of her own ſon Conſtantine, for preſuming to take the government into his own hands when he was of age.

In the ninth century, the chief among the Eaſtern emperors were Nicephorus, who dethroned Irene, and who acknowledged Charles the Great, king of France, to be the emperor of the Weſt. Alſo, Leo VI., ſurnamed Philoſophus, the author of the conſtitutions that bear his name.

In the tenth century flouriſhed, among many other emperors, Conſtantine IX., ſon of Leo VI., who took poſſeſſion of the kingdom of Naples, after driving out the Saracens; and Romanus, the ſon of Conſtantine IX., who was likewiſe ſucceſsful againſt the Saracens, but he died of debauchery. Nicephorus Phocas, a general of Romanus, married his widow, and aſſumed the government in prejudice to the ſons of his late maſter. Nicephorus conquered the Saracens, and took Antioch; but he loſt Apulia and Calabria, which were taken by Otho the Great, the emperor of Germany. Nicephorus was at length aſſaſſinated by his ſucceſſor, John Zimiſces, who aſſociated with himſelf on the throne Baſilius and Conſtantine, the two ſons of Romanus. Zimiſces was poiſoned by his chamberlain; Baſilius and Conſtantine recovered Apulia and Calabria, and they reigned together fifty years.

In the 12th century, Apulia was loſt by Romanus Argyropulus, and in the ſame period we have Alexius Comnenus, under whom the Cruſades took their riſe; and John Comnenus, the ſon of Alexius, whoſe excellent diſpoſition obtained for him the name of Colojoannes. In his wars with the Turks he was mortally wounded, and was ſucceeded by his ſecond ſon, Manuel Comnenus, who has been characterized for his great perfidy. He has been charged with poiſoning the proviſions which he had engaged to furniſh for the army of the emperor Conrad, and at the ſame time betrayed his deſigns to the Turks, againſt whom he was marching. He was ſucceeded by Alexius II., his ſon, whoſe eyes were torn out, and himſelf depoſed and murdered by his couſin Andronicus, who had previouſly to this aſſaſſinated the empreſs mother. Andronicus ordered a general maſſacre of all the

the Latins at Conſtantinople, and his cruelties not being confined to them, he was at length torn to pieces by his own people. The territories of his ſucceſſor, Iſaac Angelus Comnenus, were ravaged by the emperor Barbaroſſa; the emperor himſelf dethroned, and his eyes put out by his brother Alexius the tyrant, who ſeized on the reins of government, but was himſelf ſoon deteſted, as well on account of his conduct towards Angelus, as for the debaucheries and cruelties of which he was guilty. The cruſaders, wiſhing to free the people from this tyrant, laid ſiege to the city, and took it. Alexius was glad to eſcape with his life, and young Alexius, the ſon of Iſaac, was placed on the throne. This young prince, with the aſſiſtance of the Latins, reſtored his father. His coadjutors, in this act of piety, not receiving the price ſtipulated for their ſervices, plundered Conſtantinople, and ſet it on fire. Upon this the Greeks revolted, and choſe Alexius Ducas for their leader, who having cauſed the young Alexius to be ſtrangled, was himſelf declared emperor. He was, however, depoſed by the Latins, in the year 1204, and this was the commencement of what has been called the

Latin Empire.—Baldwin, earl of Flanders, was the firſt monarch of this dynaſty. This prince was killed in a war with the Bulgarians. About the year 1206, David Comnenus, grandſon of Andronicus, made himſelf maſter of Trebiſond, a city of Aſiatic Turkey, on the Black ſea, which was afterwards conſidered as the capital of the Greek empire, and continued ſo till 1462, when it was taken by Mohammed II., and the reigning emperor, with his family, were carried priſoners to Conſtantinople, where they were moſtly put to death.

Baldwin was ſucceeded, in the Latin empire, by Henry, at the ſame time that Theodore Laſcaris was acknowledged emperor of the Greeks. Theſe two princes made peace. But Henry was afterwards poiſoned at Theſſalonica, and was ſucceeded by Peter de Courtenay, a grandſon of Lewis le Gros, who was hailed emperor while he was at Auxerre, of which he was the count. He was murdered by Theodore Angelus Comnenus, and was ſucceeded, in 1220, by Robert, the ſecond ſon of Peter, the eldeſt having refuſed the crown. This Latin emperor made peace with Theodore Laſcaris, in order that he might revenge the death of his father, by turning his arms againſt Theodore Angelus; but Laſcaris dying, and being ſucceeded, in 1222, by John Ducas, Robert found employment in defending himſelf and his own rights. Under John Ducas the Latin empire was reſtrained within very narrow limits, and on the death of its emperor, Robert, in 1228, Baldwin II. Robert's brother, was raiſed to the throne. Baldwin was but eleven years old when he came to the crown. During his reign the Bulgarians laid ſiege to Conſtantinople, but were obliged, by the efforts of the Genoeſe and Venetians, to raiſe it. Baldwin went into the Weſt to ſeek ſuccours againſt his enemies; in the mean time John Ducas died, and was ſucceeded, in 1255, by Theodore Laſcaris II., whoſe reign was ſhort; and he was ſucceeded, on the Greek throne, by Michael Paleologus in the year 1260, who, in the following year, attacked and took Conſtantinople, and thus put an end to the Latin empire, after it had ſubſiſted about fifty-ſeven years.

New Empire of the Greeks.—Michael Paleologus having obtained the ſovereignty of both empires, endeavoured by all the means in his power to unite the Greek and Latin churches, but without effect. His whole reign, which laſted almoſt twenty-four years, was greatly agitated by diſſentions from within his kingdom, as well as by external enemies. He was ſucceeded by

Andronicus Paleologus in 1283, who, during a long reign of 46 years, conducted himſelf extremely ill, ſuffering himſelf to be led into every fault by ambitious and deſigning perſons; of theſe the chief actors were the clergy, to whom he was ever ſubſervient. During his government the Turks made dreadful ravages on the empire. He was at laſt dethroned by his grandſon,

Andronicus II. who had been aſſociated in the government with the late emperor. In this reign alſo the Turks made great progreſs, notwithſtanding the efforts of Andronicus to oppoſe them. After a reign of about 17 years he was ſucceeded by his ſon,

John Paleologus, who was very young when he came to the throne, and during his minority the government was committed to John Cantacuzenus, who, for ſome time, performed all the duties connected with his high ſtation on principles of wiſdom, united to great moderation. But in 1345 he aſſumed the imperial title in Thrace, and in 1347 took Conſtantinople, compelling the lawful prince, John, who had married his daughter, to retire to Salonica. But the exiled emperor, with the aid of the Genoeſe, obtained his rights, and compelled the uſurper to quit the throne and capital; ſee his article. During the reign of John, the Turks were continually making inroads on the empire, and were often at the very gates of Conſtantinople. The eldeſt ſon of the emperor conſpired againſt his father, but was defeated in his rebellions. During this reign the Genoeſe made themſelves maſters of Leſbos, and Amurath I. took the city of Adrianople. John died in 1391, and was ſucceeded by his ſecond ſon,

Manuel, who, on the death of his father, was at the court of Bajazet: he made his eſcape, and came to Conſtantinople, where he was crowned. He was ſucceſsful in his wars upon the Turks, took Bajazet priſoner, and afterwards defeated the ſon, ſo that the Turks were driven entirely from Conſtantinople. He was embroiled in a conteſt with the ſultan Amurath: this prince laid ſiege to Conſtantinople, on which occaſion cannon were, for the firſt time, employed in the armies of the Eaſt. At length the Turks and the Greeks made peace, and in a very ſhort time after Manuel died, and was ſucceeded by

John II. in the year 1425, who made a moſt diſgraceful peace with Amurath. In a ſhort time he perceived his error, and ſought on all ſides for aſſiſtance. To obtain the requiſite aid from the princes in the Weſt, who had refuſed him ſuccours on account of the ſchiſm of the Greeks, he laboured hard to reunite the two churches. While he was loſing his time at the council of Ferrara, the Turks were making great progreſs. After this, Amurath was defeated by the celebrated Huniades, king of Hungary. At length John made peace with Amurath, and ended his days in peace. His brother,

Conſtantine Dragaſes, ſucceeded him in 1448, and upon the death of ſultan Amurath, the empire of the Turks fell to Mohammed II. With this high-minded prince Conſtantine had the temerity to embroil himſelf, of which he had ample occaſion to repent, for Mohammed laid ſiege to Conſtantinople, which he took, after the moſt extraordinary efforts of courage, as well on the part of the beſieged, as on that of the beſiegers. This event took place on the 29th of May, 1453. Conſtantine, not being able to ſave his capital, refuſed to ſurvive its hard fate, and was killed in attempting to defend it. Mohammed did every thing in his power to ſtop the carnage, and afterwards cauſed the city to be the capital of his empire. Such was the end of the Greek empire, which had ſucceeded to the Latin empire.

Thus have we traced the progreſs of the Eaſtern empire, till it no longer exiſted; yet for ſome ages, as we have ſeen, it not only firmly but proudly lifted up its head, conſcious of its vaſt ſuperiority over the other exiſting governments of the world, particularly in the reign of Juſtinian, who overturned the Vandals in Africa, and the Goths in Italy; but in proceſs of time, as has been ſhewn, it declined in its power, and was diſmembered of its parts one after another. As in almoſt all other caſes, the miſconduct of the emperors not only haſtened the ruin of the empire, but was the primary and leading cauſe of it. The Bulgarians claimed and obtained a part of the empire; as did the Saracens, who poſſeſſed themſelves of Syria, Paleſtine, Egypt, Cilicia, and all the adjacent regions; and after that, overruning the reſt of the Roman world, laid ſiege to Conſtantinople. Theſe were the followers of the prophet Mohammed, who, believing the whole world was deſtined for them as an inheritance, attacked the neighbouring nations with a fury, that, in many caſes, was abſolutely irreſiſtible. It was in this ſtate of things, when the empire could ſcarcely defend itſelf againſt theſe Saracens, that Conſtantinople, as we have ſeen, was taken by Baldwin, earl of Flanders. It was at this period that another emperor took his ſtation at Trebiſond, that city and the regions round it being torn from the reſt of the Roman empire. At laſt the Turks totally deſtroyed that empire. They firſt, in the reign of Heraclius, paſſing through the Caſpian ſtraits, wandered over divers countries in the Eaſt, embraced the Mohammedan religion, and were divided into ſeveral principalities. But the other tribes becoming extinct, the poſterity of Othoman alone took the lead, and ever ſince the Turkiſh ſovereigns have aſſumed the name and title of Othomans, or Ottomans. Theſe, having ſubdued the greateſt part of the provinces which had been poſſeſſed by the Saracens, ſwallowed up the reſt of the Roman empire. Conſtantinople, ſince its capture in 1453, has been the ſeat of the Turkiſh emperors; of courſe it claims no longer our notice in this article.

Affairs of Rome after the Ruin of the Weſtern Empire.—We have already obſerved, that Italy was ſubdued by the Heruli, whoſe prince, Odoacer, out of contempt to Rome, fixed his ſeat at Ravenna. Theſe Heruli were, however, ſoon driven out of Italy by the Oſtrogoths, whoſe king, Theodoric, erected a new kingdom in Italy, and choſe Verona to be the royal ſeat for him and his poſterity. This kingdom laſted from the year 493 to 553; but in 541 Totila ſucceeded to the throne of the Goths, who in the courſe of his reign captured the city of Rome, and abandoned it to his ſoldiers, intending in the end to have razed it to the ground, but was prevented from executing his plan by Beliſarius. Teia, the ſucceſſor of Totila, and the laſt king of the Oſtrogoths, was defeated and ſlain by Narſes, who ſucceeded Beliſarius as general of the armies of Juſtinian. By this general the kingdom of the Goths in Italy was totally deſtroyed. Soon after the Longobards erected another kingdom in Italy, and claimed, under their king Alboin, that part of Italy which is ſtill called Lombardy. Their royal ſeat was Ticinum or Pavia, and their kingdom flouriſhed from 568 to 774, when Charlemagne having taken their capital, carried their laſt prince, Deſiderius, with his family, into France. While the Lombards ruled in Italy, the other parts of that country were in ſubjection to exarchs or prefects, who were uſually ſent by the emperor to Conſtantinople. Theſe, in ſome meaſure, reſiſting the Lombards, defended the remains of the empire there, and fixed their ſeat at Ravenna. This exarchate laſted 185 years, *viz.* from 568 to 752, in which year Aiſtulphus, king of the Lombards, took Ravenna by force. The kingdom of the Lombards being extinct, all Italy, which had been comprehended under the exarchate and kingdom of the Lombards, fell to the kings of France. Charlemagne was firſt proclaimed patrician, and ſoon after emperor, of the Roman people. As the people were prompted to this act by the biſhop of Rome, Charles gave a large part of the exarchate and other lands to the biſhops of Rome, who became the temporal as well as the ſpiritual fathers of the people. They contrived at this period a peculiar kind of dominion, which received great ſtrength and advantage from the general ignorance that then prevailed in the Weſt. The biſhops of Rome claimed to be the vicars of Chriſt, and ſucceſſors to Peter, chief of the apoſtles, and had therefore a right to preſcribe laws to all the Chriſtian world. Formerly, on account of the pre-eminence of the city of Rome, only the biſhops of that city claimed a ſuperiority in matters of religion. But when they ſaw that the biſhops of Conſtantinople aſſumed to themſelves, becauſe the ſeat of empire had been transferred to that city, the title of oecumenical or univerſal patriarchs, then the biſhops of Rome pretended they had a right to the primacy as ſucceſſors to the apoſtle Peter; and at length they were not ſatisfied with their ſupremacy in matters of religion, but arrogated to themſelves the power of diſpoſſeſſing princes of their kingdoms. Gregory VII. laid the foundation of this claim, a man, whoſe ambition, it has been well ſaid, was ſcarcely to be ſatisfied by the poſſeſſion of a world. The other biſhops were not all equal in power, but he who dwelt in the metropolis took the lead of the other biſhops in that province. At firſt he was called metropolitan, and in the eighth century he took the name of archbiſhop. The moſt eminent of theſe metropolitans were thoſe of Rome, Conſtantinople, Antioch, and Alexandria, becauſe theſe were the principal cities of the Roman empire. And next to theſe, on account of the ſuppoſed ſanctity of his city, was the biſhop of Jeruſalem. The others vigorouſly defended their privileges againſt the biſhop of Rome, and the controverſies that aroſe thereupon, gave occaſion at length to the ſchiſm between the Greek and Roman churches, to which we have had occaſion to refer.

The ſee of Rome maintained its authority without much interruption till the 14th century, when it began to totter, on account of the ſchiſms that aroſe among the Roman pontiffs, which laſted nearly half a century, there being two popes at a time, the one at Rome, the other at Avignon. But this ſchiſm being terminated the popes recovered their former ſtrength. It was about this ſame period that Nicholas Gabrini di Rienzi, (ſee GABRINI,) without rank, without money, without friends, alliances or military force, led on by ambition, and ſupported by his eloquence alone, obtained for a ſhort time the ſovereignty of Rome; and though he could not, as he propoſed, make her the miſtreſs of the world, he, however, protected ſome, and awed other ſovereigns, and was admitted an arbiter of kingdoms.

In the fifteenth century the pontiff's authority was again ſhaken, as well by diſputes between the emperor and the popes, three of whom were depoſed by the council of Conſtans, two others by the council of Piſa, and one by the council of Baſil, as by the intrepidity of a ſecond Gabrini, in the character of Stephen Porcaro, of whom, his name having eſcaped us in the alphabetical order, we ſhall ſay a few words. He was of noble birth; his reputation was ſpotleſs; his tongue was armed with eloquence; his mind was enlightened with learning; and he aſpired to free his country and immortalize his name by the glory of his deeds.

deeds. "The dominion of priests," says Gibbon, "is most odious to a liberal spirit." Petrarch was now the oracle of the Italians, and as often as Porcaro revolved the ode, which describes the patriot and hero of Rome, he applied to himself the visions of the prophetic bard. His first trial of the people's feelings was at the funeral of Eugenius IV. In an elaborate speech he called the Romans to liberty and arms. For this act he had, by the existing laws of the state, forfeited his life; but the benevolence of the new pontiff, who viewed his character with pity and esteem, attempted by an honourable office to convert the patriot into a friend. He was again guilty of the same offence, and was a second time pardoned. The humane pontiff now removed him from the scene of temptation to Bologna, with a liberal allowance for his support, and the easy obligation of presenting himself each day before the governor of the city. But he formed a party at Rome, and a new conspiracy was excited. His nephew, a daring youth, assembled a band of volunteers, and on the appointed evening a feast was prepared at his house for the friends of the republic. Their leader, who had escaped from Bologna, appeared among them in a robe of purple and gold: his voice, his countenance, his gestures, bespoke the man who had devoted his life to the glorious cause. In a studied oration, he expatiated on the motives and the means of their enterprize; the name and liberties of Rome; the sloth and pride of their ecclesiastical tyrant; the active or passive consent of their fellow citizens; three hundred soldiers and four hundred exiles, long exercised in arms or in brooding over their wrongs; the licence of revenge to edge their swords, and a million of ducats to reward their victory. "It would be easy," he said, "on the next day, the festival of Epiphany, to seize the pope and the cardinals before the doors, or at the altar, of St. Peter; to lead them in chains under the walls of St. Angelo; to extort, by the threat of instant death, a surrender of the castle; to ascend the vacant Capitol; to ring the alarm-bell, and to restore in a popular assembly the ancient republic of Rome. While he was triumphing in his own mind, he was already betrayed. The senate, with a strong guard, invested the house; the nephew of Porcaro cut his way through the crowd, but the unfortunate Stephen was drawn from a chest, lamenting that his enemies had anticipated by three hours the execution of his design. After such manifest and repeated guilt, the pope, though still inclined rather to pity than punishment, could say nothing in his favour. Porcaro, and nine of his accomplices, were hanged; and amidst the fears and invectives of the papal court, the Romans pitied, and almost applauded, these martyrs of their country. "But," says the eloquent historian of the Decline and Fall of the Roman Empire, "their applause was mute, their pity ineffectual, their liberty for ever extinct; and, if they have since risen in a vacancy of the throne or a scarcity of bread, such accidental tumults may be found in the bosom of the most abject servitude." Of the struggles of the people of Rome we have, therefore, nothing more to record.

But the independence of the nobles, which was fomented by discord, survived the freedom of the commons, which must be founded in union. Rapine and oppression were long maintained by the barons of Rome; their houses were a fortress and a sanctuary: and the criminals whom they protected from the law, repaid the hospitality with the service of their swords and daggers. The private interests of the pontiffs, or their nephews, sometimes involved them in these domestic feuds. Under the reign of Sixtus IV. Rome was distracted by the battles and sieges of the rival houses; after the conflagration of his palace, the prothonotary Colonna was tortured and beheaded; and Savelli, his captive friend, was murdered on the spot, for refusing to join in the acclamations of the victorious Ursini. But the popes no longer trembled on their throne: they had strength to command, if they had resolution to claim, the obedience of their subjects; and the strangers who observed these partial disorders, admired the easy taxes and wise administration of the ecclesiastical state.

The spiritual thunders of the Vatican depend on the force of opinion; and if that opinion be supplanted by reason or passion, the sound may idly waste itself in the air, and the helpless priest will be exposed to the brutal violence of a noble or plebeian adversary. But after their return from Avignon, the keys of St. Peter were guarded by the sword of St. Paul. Rome was commanded by an impregnable citadel; the use of cannon is a powerful engine against popular seditions; a regular force of cavalry and infantry was enlisted under the banners of the pope; his ample revenues supplied the resources of the war; and, from the extent of his domain, he could bring down upon a rebellious city an army of hostile neighbours and loyal subjects. Since the union of the duchies of Ferraro and Urbino, the ecclesiastical power extends from the Mediterranean to the Adriatic, and from the confines of Naples to the banks of the Po; and as early as the sixteenth century, the greater part of that spacious and fruitful country acknowledged the lawful claims and temporary sovereignty of the Roman pontiffs. For the successive changes that have occurred in Italy from that time to the year 1811, we refer our readers to the article ITALY, in the New Cyclopædia; and we shall, probably, by the time we come to the article STATE, *Holy Roman*, be able to give a farther account of the subject, to the general peace, we earnestly hope, of 1815.

In the mean time, we shall lay before our readers an account of Rome as it appeared in the fifteenth century to an accurate and feeling mind, and then conclude the article with some account of the present state of the city.

View of Rome in the Fifteenth Century.—In the last days of pope Eugenius IV. two of his attendants, the learned Poggio and a friend, ascended the Capitoline; reposed themselves among the ruins of columns and temples; and from that commanding spot, they viewed the wide and various prospect of desolation. The place and the object gave ample scope for moralizing on the vicissitudes of fortune, which spares neither man nor the proudest of his works, which buries empires and cities in a common grave; and it would naturally be inferred, that in proportion to her former greatness, the fall of Rome was the more awful and deplorable. The description of Poggio, who was one of the first that raised his eyes from the monuments of legendary, to those of classic superstition, is as follows:

1. Besides a bridge, an arch, a sepulchre, and the pyramid of Cestius, he could discern, of the age of the republic, a double row of vaults in the salt-office of the Capitol, which were inscribed with the name and munificence of Catullus. 2. Eleven temples were visible in some degree, from the perfect form of the Pantheon, to the three arches, and a marble column of the temple of Peace, which Vespasian erected after the civil wars of the Jewish triumph. 3. Of the number, which he rashly defines, of seven thermæ or public baths, none were sufficiently entire to represent the use and distribution of the several parts; but those of Diocletian and Antoninus Caracalla still retained the titles of the founders, and astonished the curious spectator, who, in observing their solidity and extent, the variety of marbles, the size and multitude of the columns, compared the labour and expence with the use and importance. Of the baths of

of Conſtantine, of Alexander, of Domitian, or rather of Titus, ſome veſtige might yet be found. 4. The triumphal arches of Titus, Severus, and Conſtantine, were entire, both the ſtructure and the inſcriptions; a falling fragment was honoured with the name of Trajan; and two arches then extant, in the Flaminian way, have been aſcribed to the baſer memory of Fauſtina and Gallienus. 5. After the wonder of the Coliſeum, Poggius might have overlooked a ſmall amphitheatre of brick, moſt probably for the uſe of the Prætorian camp: the theatres of Marcellus and Pompey were occupied in a great meaſure by public and private buildings; and in the circus Agonalis and Maximus, little more than the ſituation and the form could be inveſtigated. 6. The columns of Trajan and Antonine were ſtill erect; but the Egyptian obeliſks were broken, or buried. A profile of gods and heroes, the workmanſhip of art, was reduced to one equeſtrian figure of gilt braſs, and to five marble ſtatues, of which the moſt conſpicuous were the two horſes of Phidias and Praxiteles. 7. The two mauſoleums or ſepulchres of Auguſtus and Adrian could not totally be loſt; but the former was only viſible as a mound of earth; and the latter, the caſtle of St. Angelo, had acquired the name and appearance of a modern fortreſs. With the addition of ſome ſeparate and nameleſs columns, ſuch were the remains of the ancient city: for the marks of a more recent ſtructure might be detected in the walls, which formed a circumference of ten miles, included three hundred and ſeventy-nine turrets, and opened into the country by thirteen gates.

Of the Government of Rome under the Popes.—For this part of our article we ſhall be chiefly indebted to the juſtly denominated "Claſſical Tour through Italy," by the Rev. I. C. Euſtace, whoſe partiality for whatever is papal, may render him, perhaps, ſomewhat partial as an hiſtorian. In ſpeaking of this government, as it exiſted previouſly to the ravages of the French at the cloſe of the laſt century, he ſays, though deſpotic above all controul, it is exerciſed by the pontiff with mildneſs, and ſubmitted to by the people with reſpect. The ſacred character of the biſhop influences both the ſovereign and the ſubject. The government is elective; promotion depends in a great degree upon talents and virtues; and, conſequently, there is a ſtimulus to exertion and a ſcope for honourable ambition. As for the origin of the temporal ſovereignty of the popes, it may be moſt honourably and firmly eſtabliſhed on the conſent of the people. After the expulſion of the Goths, when the arms of the Eaſtern emperors had re-conquered, but were incapable of protecting Italy; when the incurſions and menaces of the Lombards kept the city in conſtant alarm, and peſtilence and famine had preyed upon it; the Romans naturally turned their eyes to their biſhops, and found in them the ſupport which they had vainly ſolicited from their ſovereigns. The pontiffs had till that period been as eminent for their virtues as for their ſtation, and when forced by public diſtreſs to take a conſiderable ſhare in the adminiſtration of the ſtate, they diſplayed a prudence equal to their ſanctity, and a benevolence as extenſive as the poſſeſſions of the Roman church. "We ſee them," ſays Mr. Euſtace, "in the ſeventh, eighth, and ninth centuries, protecting Rome on one ſide againſt the attacks of the Lombards, and ſecuring it on the other from the rapacity and treachery of the exarchs, repairing its walls, feeding its inhabitants, engaging diſtant princes in its intereſts, and finally reſtoring the majeſty of its name in the new empire. Rome, indeed, ſeems to owe her exiſtence to her pontiffs; and had not the chair of St. Peter replaced the throne of the Cæſars, and the ſeat of empire become the ſanctuary of religion, Rome would probably have ſunk into a heap of uninhabited ruins, and left to poſterity nothing more than the *whiſtling of a mighty name.*"

From the re-eſtabliſhment of the Weſtern empire to the tenth century, the popes employed their influence in oppoſing the growing power of the Saracens, and in protecting the coaſts of Italy, and the capital itſelf, againſt the predatory incurſions of thoſe barbarians. Shortly after commenced their conteſts with the German Cæſars: but however much the popes may be cenſured, as eccleſiaſtics, in thoſe deſtructive quarrels; as princes and as Romans they may claim indulgence, as they ſtruggled againſt foreign influence, and finally ſucceeded in freeing Italy from the yoke of a German, a barbarian, and an abſentee ruler. The diſputes of the popes with the barons and the Roman people were founded on the juſt oppoſition of a firm government, to the arrogance and tyranny of an ariſtocratic body on the one ſide, and to the licentiouſneſs of a turbulent populace on the other. But Rome has juſt cauſe to deplore and condemn the folly and the perverſity of her paſtors, when they forſook her venerable walls, and ſubmitted to voluntary exile, alternately the inſtruments and victims of French intrigue and ambition. Of all the diſaſters that befel Rome in the long ſeries of her eventful hiſtory, this, perhaps, was the moſt pernicious both in its immediate effects and diſtant conſequences, and to it may be aſcribed the degradation of the nobleſt monuments, the depopulation of the capital and its neighbourhood, and the evils that anarchy and tyranny never fail to bring in their train. Theſe evils continued to operate long after their efficient cauſes had ceaſed to exiſt, and the popes, during many ages after their re-eſtabliſhment in Rome, had to ſtruggle with the reſtleſs and unbridled paſſions excited by the guilt or the folly of their abſentee predeceſſors. Sixtus Quintus ſucceeded in breaking the ſpirit of the barons, and having brought the people to ſubmiſſion, he reſtored order, peace, and induſtry, to the Roman ſtates.

From this period Rome rapidly increaſed in proſperity, riches, and population, and became the ſeat of the arts and ſciences, the centre of political negociation, and not unfrequently of courtly intrigue. Moſt of the ſucceeding popes took an active part in the public tranſactions of the times, ſometimes as mediators, but too frequently as parties concerned, with a view to national intereſts, or to family aggrandizement. Their conduct, in this reſpect, though little conformable to the principles of their profeſſion, was advantageous to their territories, as it brought wealth to the inhabitants, and reflected luſtre on a city, at the ſame time the metropolis of the Chriſtian world, and the capital of an extenſive and flouriſhing country.

The reformation produced at the time little or no diminution of the temporal greatneſs and conſideration of the popes: ſo little indeed, that in the century following that event, Rome ſeems to have enjoyed a ſplendour and proſperity not witneſſed within her walls ſince the fall of the empire. Hence it has been obſerved, "that if Pyrrhus's ambaſſador could with propriety call the Roman ſenate in his time a congreſs of kings, a ſimilar appellation might with equal veracity be applied to the modern ſenate of Rome, the college of cardinals, during the ſeventeenth century. That aſſembly was, ſtrictly ſpeaking, compoſed of princes, the ſons, nephews, brothers, or uncles of the firſt ſovereigns in Europe; men who not unfrequently, as ſtateſmen and miniſters, had held the reins of empire at home, or as ambaſſadors, repreſented their royal relatives abroad. They either generally reſided or frequently aſſembled at Rome, not only to diſcharge their duties about the perſon of the pontiff,

tiff, but to ſupport the intereſts of their reſpective courts; and in order to attain this object the more effectually, they diſplayed a ſplendour and a magnificence nearly royal. The officers of their houſehold were often nobles of high rank; their ſecretaries and chaplains were men of talents and buſineſs; a long train of guards, ſervants, and retainers, attended their perſons when they appeared in public, and the blaze of the purple, in itſelf ſo dazzling, was heightened by all the adventitious circumſtances of birth, power, and opulence. The union of ſo many illuſtrious perſonages, vyeing with each other in talents and magnificence, gave Rome the appearance of an univerſal court, where all the ſovereigns of Europe were aſſembled to diſcuſs the general intereſts of Chriſtendom, and to diſplay their rival glories in peace and ſecurity."

From this epoch the character of the pontiffs became more epiſcopal and pacific, and they have chiefly been occupied with the government of the Catholic church over which they preſide, and with the civil adminiſtration of their own territories, which, as we have ſeen, are ſufficiently extenſive to engroſs their utmoſt attention. The arts and ſciences have at all times, but particularly in the latter centuries, met with ſpecial encouragement from the popes; and Rome, enlivened by their conſtant preſence, embelliſhed by their munificence, and fed by the produce of ſeveral extenſive, populous, and well-cultivated provinces, had gradually reſumed her robes of glory, and began to promiſe herſelf once more the return of her former dignity and proſperity. "She had," ſays Mr. Euſtace, "been great even in her fall, and venerable in her diſaſters. She had ceaſed to be the miſtreſs of the world in arms, but ſhe ſtill remained the miſtreſs of the world in arts; ſhe was no longer the capital, but ſhe was the metropolis of Europe; not the reſidence of the firſt ſovereign, but the ſee of the firſt paſtor. She had not been ſubjected to ſlavery as Athens; ſhe had not been reduced to a heap of ruins, as Babylon. She ſtill reigned widowed, but independent; and ſtill claimed and enjoyed the veneration of kings and of nations. Without fleets or armies ſhe repoſed in fearleſs tranquillity: public reverence, more mighty than military power, covered her head with an inviſible ægis, guarded her frontiers, and ſecured her repoſe. Even the nations which had forſaken her communion, and in days of irritation had defied the thunders of her fulminating pontiffs, now looked towards her with reſpect, and beheld with affection and reverence the benevolence, the ſanctity, and the humility of her paſtors. Such was the ſtate of Rome during the eighteenth century; a ſtate happy in the enjoyment of peace, plenty, and increaſing improvement, and big with the hopes of future and accumulating proſperity. The French invaſion cloſed the ſcene. See ITALY.

Of the Preſent State of Rome.—The modern city poſſeſſes many features of ancient Rome. The ſame roads lead to her gates—the ſame aqueducts pour the ſame ſtreams into her fountains—the ſame great churches that received the maſters of the world under the emperors, are ſtill open to their deſcendants—the ſame venerable walls that incloſed ſo many temples and palaces in the reign of Aurelian, ſtill exiſt. Modern Rome lies extended principally on the plain, and is ſcattered thinly over the hills, bordered by villas, gardens, and vineyards. Its population is ſuppoſed to amount to 200,000 ſouls. The ſtreets are well built and paved, narrower, in general, than thoſe in London, and wider than thoſe in Paris: the houſes being low, the ſtreets are light and airy: they are many of them very long and ſtraight, and not unfrequently terminated by an obeliſk, a fountain, or a church. The houſes are of ſtone, but plaſtered or ſtuccoed, as at Vienna, Berlin, &c. This city contains 46 ſquares, 5 monumental pillars, 10 obeliſks, 13 fountains, 22 mauſoleums, 150 palaces, and 346 churches.

Of the ſquares, the moſt remarkable is the Piazza Navona, which gradually roſe on the ruins of the Circus Agonalis. It is adorned by the handſome church of St. Agnes, and refreſhed by three fountains decorated with ſtatues. One of theſe fountains is an object of great admiration, and is thus deſcribed. Four figures, repreſenting four rivers, recline on a craggy rock: on its top ſtands an Egyptian obeliſk; from its hollow ſides ruſhes a perpetual ſtream. Theſe three fountains are ſo managed during the heats of Auguſt, as to inundate the whole ſquare on Saturdays and Sundays, and afford a very refreſhing exhibition to the Roman gentry, who parade along in their carriages, and to the common people, who always collect in crowds to behold the enlivening ſcene. Modern Rome is ten miles in circumference, but this extent comprehends gardens and uninhabited places, and it is defended by the caſtle of St. Angelo. In the Rione di Monte is the church of St. Giovanni in Laterano, dedicated to St. John in the ſeventh century, and raiſed on the ruins of a palace built by Conſtantine, in the year 324. Near this church is the baptiſtery of Conſtantine, celebrated for its ornaments, its antiquities, paintings, columns, and ſtatues. Before the church is an obeliſk, conſtructed at Thebes, in Upper Egypt, and brought down the Nile to Alexandria, from whence, by order of Conſtantius, it was conveyed to Rome. The church of St. Stephen, found alſo in this part of Rome, called the *round*, from its form, is an ancient temple of Faunus; it is ſupported by ſixty pillars of granite or marble of the iſland of Paros. The church of the holy croſs of Jeruſalem was built by Conſtantine, and is celebrated for its relics, its columns, and its paintings. The ruins of a temple, dedicated to Venus and Cupid: the monaſtery of St. Euſebius, built on the ruins of the baths and palace of Gordianus: Trajan's pillar, one of the moſt beautiful monuments of ancient Rome: the remains of the baths of Titus, of temples dedicated to Concord, to Peace, to Jupiter Tonans, to Jupiter Stator, with many other churches, palaces, and monuments of antiquity, are to be found in this quarter of Rome.

In the Rione di Trevi is found the church of the Twelve Apoſtles, firſt built in the reign of Conſtantine, and rebuilt by Clement XI. This ward likewiſe contains a church, dedicated to our Lady of Loretto, adorned with Corinthian pillars and the moſt beautiful ſtatues; the church of St. Mary in Trivio, built or repaired by Beliſarius; the churches of St. Vincent, of Anaſtaſius, and many ſuperb palaces. The Rione di Colonna contains, beſides churches, the Piazza di Colonna, of which the buildings are handſome: in this ſquare is a fountain, and a marble column of Antoninus, conſtructed in the time of Commodus, and all of marble: in this ward is the great hall of Juſtice; the houſe of the miſſionaries, whither all eccleſiaſtics of Rome retire for ten days before they receive holy orders, with ſeveral palaces and monuments of antiquity. The Rione di Campo di Marzo contains the ancient Campus Martius; in this are found ſeveral beautiful churches and magnificent palaces; among other buildings is the Clementine college, founded by pope Clement VIII. The Rione di Ponte takes its name from the bridge of St. Angelo; in it are found a college for one hundred ſtudents, Hungarians and Germans. The Rione della Regola, near the Tiber, contains the Farneſe palace, in which is ſeen the celebrated coloſſal ſtatue of Hercules, and many others: this palace was built by Michael Angelo, with the ſtone taken from Veſpaſian's amphitheatre;

theatre; the gallery was painted by Hannibal Caracci; and the Monte della Pieta, eſtabliſhed in the year 1539, for the purpoſe of lending money on pledges without intereſt. The Rione di St. Euſtachio contains the beautiful church of St. Charles aux Catinari, in which, among many others, is a beautiful picture repreſenting the death of St. Anne; the church of St. Andre de la Valle, which contains ſome excellent paintings; the college de Sapienza is, perhaps, the moſt celebrated in the univerſe; this magnificent building was begun under Leo X. from the deſign of Michael Angelo; the palace of Juſtiniani, adorned with a great number of bas reliefs, and antique ſtatues; many of them found on the ſpot on which were the baths of Nero, and the palace is now erected: the Theatre d'Argentina, and many other palaces, antiquities, and churches. The Rione della Pigna contains the Piazza della Rotondo, in which is a beautiful fountain of white marble, ornamented with an obeliſk and dolphins, which ſpout out the water. The Roman college is a vaſt and ſuperb edifice, built in the time of Gregory XIV. for the ſtudy of the languages and ſciences; here is kept the muſæum of father Kircher, and the library is well furniſhed: the church of St. Maria della Sopra Minerva, ſo called from a temple of Minerva which anciently ſtood there. The ward of the Rione di Campitelli, or Du Capitole, contains the Capitolinus mountain, the Palatine, and part of mount Cœlius; the church of St. Mary in Campitelli, rebuilt in the year 1656, by the people of Rome. Here are found many beautiful ſtatues and pictures, by the moſt celebrated maſters; the Tarpeian rock, now called Monte Caprino; the remains of the temple of Jupiter Tonans; and the church of St. Peter in Carcere; part of the priſon conſtructed by Ancus Martius; the ruins of a temple of Concord; the church of our Lady of Conſolation; the church of St. Sebaſtian, built in the ancient Hippodrome. In this ward is found likewiſe the Coliſeum, a ſuperb building, conſtructed at the command of Veſpaſian, by the Jews brought from Jeruſalem, and deſtined for the combats of gladiators and public ſpectacles. In the Rione di St. Angelo is the church of St. Angelo, which gives name to the ward, was built in the eighth century; near it is the theatre of Marcellus, built by Auguſtus, and capable of holding 30,000 ſpectators; the palace of Savelli, and the palace of Mattei, celebrated for the pictures and ſtatues which they contain; and many others. The ward of the Rione di Ripa, on the ſide of the river, includes the Aventine mountain, and the iſland of St. Bartholomew, inhabited at the time of the expulſion of the Tarquins, and then called Tiberina and Lycania; the church of St. Bartholomew was founded on the ruins of an ancient temple of Eſculapius. This iſland is joined to the reſt of the city by two bridges. The church of St. Nicholas in Carcere is built near the common priſon; St. George in Valebro; the arches of Septimius Severus and Janus; St. Mary in Coſmedin, built by the earlieſt Chriſtians, on the ruins of a temple of Modeſty; St. Paul without the walls is a patriarchal church, and, next to St. Peter, one of the largeſt in Rome, built by Conſtantine; the immenſe ruins of the baths of Caracalla, in which it is ſaid 3000 perſons might bathe at one time; the grand circus; the tomb of Ceſtius; the catacombs or vaults dug in the ſtone or ſolid earth, and uſed for depoſiting of the dead in this ward. The Rione di Tranſtevere is on the other ſide of the Tiber, and includes the mountain Janiculus; in the church of St. Peter in Montorio is the celebrated picture of the Transfiguration, by Raphael, by ſome thought to be the moſt perfect painting that exiſts; the baths of Severus; the Naumachium of Auguſtus; and the temple of Fortune. The Rione di Borgo, or Rione del Vatican; this, too, is beyond the Tiber, and is joined to the reſt of the city by means of the bridge of St. Angelo, anciently Pons Œlius; in it is the caſtle of St. Angelo, anciently called Moles Adriani, from its founder; it is circular, and exceedingly ſtrong: here the papal crown is kept, and priſoners of ſtate are confined; it communicates with the Vatican by a long covered gallery. The church of St. Peter is the chêf-d'œuvre of Italy, the largeſt and moſt beautiful church in the world. It was projected by Nicholas V.; Julius II. laid the firſt ſtone in the year 1506; but the whole building was not finiſhed till the next century: it is ſaid to cover 20 acres, and to have coſt upwards of one million ſterling. The original artiſt was Bramante, but the greater part was from the plan of Michael Angelo, who raiſed the cupola; Maderni finiſhed it in the year 1621. The pavilion of the great altar of this church, and the four wreathed pillars of Corinthian braſs which ſupport it, were formed out of the ſpoils of the Pantheon. The Pantheon, originally dedicated to the honour of all the gods, is now a Chriſtian temple, and is ſtill the moſt perfect of the Roman temples that now remain, and notwithſtanding the depredations it has ſuſtained from Goths, Vandals, and Popes, is ſtill a beautiful monument of Roman taſte.

The pope has three fine palaces, of which the principal is the VATICAN, which ſee. The library of this palace is the largeſt and moſt complete in the world, rich, eſpecially in manuſcripts, in all languages, and all ages. In Rome, the lover of the fine arts will, after all the depredations of the French, meet with innumerable paintings by the moſt celebrated maſters in the world, and with the fineſt works of ſculpture. Beſides the univerſity, which conſiſts of ſeveral noble colleges, there are numerous academies and literary ſocieties.

The relative ſituation of Rome, with regard to other European capitals, is as follows: it is 380 miles from Vienna, 560 from Paris, 740 from Amſterdam, 810 from London, and 900 from Madrid. It ſtands within 10 miles of the Tuſcan ſea. Univerſal Hiſtory. Holberg's Introduction. Tytler's Elements of General Hiſtory. Playfair's Chronology. Gibbon's Hiſtory of the Riſe, &c. Encyclopédie Méthodique. Euſtace's Claſſical Tour, 2d edition.

ROME, *Citizen of*, at firſt, was only a citizen of Rome: at length, the right of citizenſhip was given to other cities and people, both in Italy and the provinces. It was thus St. Paul was a Roman citizen, Acts, xvi. 21. 37, 38. xxii. 25, 26, 27. xxiii. 26; the city of Tarſus, in Cilicia, a native of which he was, having the right of Roman citizens. See MUNICIPAL *Cities*, and PAUL.

ROME DE L'ISLE, JOHN BAPTIST LOUIS, in *Biography*, was born, in 1736, at Gray, in Franche-Comtè. He applied himſelf, from a very early period, with earneſtneſs to the ſtudy of natural hiſtory and mineralogy; and by his diſcoveries and writings he acquired a conſiderable reputation. In 1766 he publiſhed "A Letter to M. Bertrand on Freſh-Water Polypes." He drew up deſcriptive catalogues of many rich collections of minerals and madrepores, of which the moſt diſtinguiſhed was that of Davila, in 3 vols. 8vo. 1767. In 1779 and 1781 he publiſhed a work, entitled "L'Action de Feu central banni de la Surface du Globe, et le Soleil retabli dans ſes Droits." In 1783 he publiſhed that work by which he is beſt known, entitled "Chriſtallographie ou Deſcription des Formes propres à tous les Corps du Regne minerale," 4 vols. In this elaborate performance, the author gives a deſcription of the forms proper to every ſubſtance of the mineral kingdom, in a ſaline, ſtony, and metallic combination; with figures of all the known cryſtals, arranged according to the number and diſpoſition

position of their angles. He asserts, which is generally admitted, that every species in the mineral kingdom always takes a polyhedral form, which is regular, constant, and peculiar to itself. Besides the works already mentioned, he published "Caractères extérieurs des Mineraux," 8vo. 1784; and "Metrologie ou Tables pour servir a l'Intelligence des Poids et des Mésures des Anciens d'àpres leur Rapport avec les Poids et les Mésures de la France," 8vo. 1789. This philosopher died at Paris, in 1790.

Romé, in *Geography*, a town of Brasil, in the government of Goyas; 85 miles E. of Villa Boa.

Rome, a post-town of America, in the county of Oneida, and state of New York, situated on the Mohawk river; 8 miles W. of Whitestown. This town was taken from Stauban, and incorporated in 1796. N. lat. 43° 12′. W. long. 75° 30′.

Rome *du Tarn, St.*, a town of France, in the department of the Aveiron, on the Tarn; 4 miles N. of St. Afrique.

Rome *Scot.* } See Peter-*Pence.*
Rome *Peny.* }

ROMELIA, in *Geography*. See Romania.

ROMELSO, a cluster of small islands on the west side of the gulf of Bothnia. N. lat. 64° 55′. E. long. 21°.

ROMENAY, a town of France, in the department of the Saone and Loire; 15 miles N.N.E. of Macon.

ROMENO, a town of the county of Tyrol; 13 miles S.W. of Bolzano.

ROMERSBERG, a mountain of Bavaria, in the principality of Aichstatt; 5 miles W. of Aichstatt.

ROMERSGEHAG, a town of Germany, in the bishopric of Fulda; 14 miles S. of Fulda.

ROMERSTADT, or Romarow, a town of Moravia, in the circle of Olmutz, near which are some iron mines; 20 miles E.N.E. of Olmutz. N. lat. 49° 50′. E. long. 17° 9′.

ROMESCAMPS, a town of France, in the department of the Oise; 6 miles N.W. of Grand Villiers.

ROMETTA, a town of Sicily, in the valley of Demona; 5 miles N.W. of Messina.

ROMFORD, a market-town and parish in the liberty of Havering-atté-Bower, county of Essex, England, is situated at the distance of 17 miles S.W. from the county town of Chelmsford, and 12 miles E.N.E. from London. This town is supposed by Stukeley to occupy the scite of the Roman station Durolitum. The same author conjectures that its present name is a contraction for Romanford; and in this opinion he is supported by Mr. Lethieullier. Lysons, however, derives it from the Saxon words *Rom* and *Ford*, which signify the Broad-Ford, in allusion to an ancient passage through a rivulet which flows past the western extremity of the town. Romford is first mentioned in record in the Red Book of the Exchequer; where it is said that, in 1166, Roger Bigod, duke of Norfolk, held "the wood of Romford by serjeancy, and payment of five shillings a-year." It is next noticed in 1277, at which time the manor formed part of the possessions of Adam de Cretinge. It afterwards passed to Thomas de Brotherton, earl of Norfolk, from whom it descended by marriage to the Mowbrays, dukes of Norfolk; but on the death of John, the fourth duke, without male issue, in 1477, it became vested in James, lord Berkeley. Since that period it has belonged to different families, and is now the property of a gentleman named Newman.

Romford is governed by a bailiff and wardens, who, though forming no corporation, are empowered by letters patent to hold a weekly court, for the trial of all causes, whether civil or criminal, high treason not excepted. In ecclesiastical jurisdiction, however, it is subordinate to Hornchurch, except so far as concerns the maintenance of the poor; in which particular it was recognised as a separate parish, in the year 1786. The privilege of holding a weekly market was first granted to the inhabitants by king Henry III.; but at present here are three: one on Monday, for the sale of calves; another on Tuesday, for hogs; and a third on Wednesday, for corn and cattle. There is likewise an annual fair on the 24th of June. The church or chapel of Romford is an ancient structure, and was probably erected about the commencement of the 15th century, when the inhabitants obtained a bull from the pope, authorising them to consecrate a cemetery adjoining the town, for the burial of their dead, who had, previously to that time, been carried to Hornchurch burying-ground. In this chapel were, in Catholic times, a guild and a chantry; the former of which was valued at 4*l.* 10*s.* 2*d.*, and the latter at 13*l.* annual revenue, at the era of the dissolution. The principal monuments here are those of sir George Hervey, knight, lieutenant of the Tower, who died in 1605, and his lady, both of whom are represented kneeling; and of sir Anthony Cook of Gidea-Hall, and his lady, whose effigies are exhibited in similar positions. On the latter tomb are several inscriptions in Latin, said to have been written by the daughters of the deceased, who were the most learned females of the age. Not far from the church is a charity-school for forty boys, and another for twenty girls, which were founded and endowed in 1728; and at a short distance from the western end of the town are barracks for the accommodation of a regiment of cavalry, erected in 1795. According to the population census of 1811, the parish of Romford, including the Town ward, Collier-row ward, Harold's-wood ward, and Noah-hill ward, contains 620 houses, and 3244 inhabitants.

The district called Havering-atté ward, which comprehends the three adjacent parishes of Hornchurch, Romford, and Havering, anciently constituted part of the demesnes of Saxon kings; and even to this day it possesses peculiar privileges, both as prescriptive rights, and by charter, granted by Henry IV., and since confirmed by several of his successors. Near the village of Havering-atté-Bower was formerly a palace, which tradition ascribes to king Edward the Confessor, and which subsequently became the occasional residence of more than one monarch of the Norman line. The situation of this palace is very fine, and commands extensive views over parts of Essex, Hertfordshire, Kent, Middlesex, and Surrey, as well as of the river Thames. The surrounding park, now the property of the crown, but let on lease, exceeds a thousand acres in extent. To the westward of this park, about two miles, lies Hainault-Forest, in which is a very remarkable tree, called Fairlop-oak, which Gilpin informs us, in his "Remarks on Forest Scenery," is traced by tradition "half way up the Christian era." It is generally said to be the largest tree in this kingdom, measuring 36 feet in girt near the base or root, and spreading its branches over a circumference of 300 feet. At Hempstead, in Essex, is a tree of much larger dimensions. Round the Fairlop-oak, on the first Friday in July, is held an annual fair, which appears to have originated from a gentleman, named Day, who commenced the practice of dining with his friends annually under its shade.

About a mile to the eastward of Romford is Gidea-Hall, an ancient seat of the Cook family; and near it stands Hare-Hall, a mansion formerly belonging to John Arnold Wallenger, esq. The house was built under the direction of Mr. Payne, in 1769, and is constructed of Portland stone;

ſtone; it conſiſts of a centre, with two wings, connected by colonnades. A ſmall villa in this neighbourhood, at Hare-ſtreet, is the reſidence of Humphrey Repton, eſq., diſtinguiſhed for his taſte and talents as a landſcape-gardener. He is alſo author of two or three elegant volumes on pictureſque ſcenery, and the principles of taſte, as diſplayed in the embelliſhment of parks and gentlemen's manſions. His ſon, John Adey Repton, is alſo juſtly celebrated for his intimate knowledge of the principles and hiſtory of the ancient architecture of England. Four miles to the eaſtward is the village of Brentwood, or Burnt-wood, which was anciently a market-town; but this privilege is now loſt. Its former importance, however, may be conjectured from the fact of the county aſſizes having been held here for many years. The remains of the town-hall and priſon are ſtill diſcernible in the main ſtreet, which ſtretches itſelf along the Harwich road, and abounds with inns and public houſes for the accommodation of travellers. Here is a grammar-ſchool, founded in 1537 by ſir Anthony Brown. Camden ſuppoſed the Roman ſtation of Cæſaromagus to have been ſituated at or near Brentwood; but this opinion is not ſupported by any facts, or even probability.

Five miles weſtward from Romford is Wanſtead-Houſe, the ſeat of William Pole Tilney Long Welleſley, eſq., M.P., who acquired it by marriage with Miſs Tilney Long, eldeſt daughter and co-heireſs of the late ſir James Tilney Long. It is a very ſpacious and magnificent building, meaſuring 260 feet in front, and nearly 80 feet in depth. In the centre of the principal front is a grand portico, ſupported on ſix Corinthian columns, and having on each ſide a flight of ſteps, and in the tympanum the arms of the Tilney family, finely ſculptured. The houſe is divided into two ſtories, the uppermoſt of which contains the ball-room and principal apartments. Several of the rooms contain a collection of fine paintings by eminent artiſts. The gardens and pleaſure-grounds were laid out by Richard Child, previouſly to the erection of the houſe; but latterly great alterations and improvements have been made in the former, under the direction of Mr. Repton, who has very properly revived part of an old and almoſt exploded faſhion, in decorating the lawn immediately adjoining the houſe with flowers, beautiful ſhrubs, &c. to regale and "delight the ſenſes of ſeeing and ſmelling." At the ſplendid manſion of Longleat, Wiltſhire, this has been adopted on a large ſcale, and with ſingular beauty. (See WARMINSTER.) Oppoſite the back front is an eaſy aſcent, through an agreeable viſta, to the river Roding, which is formed into canals, and has near it a curious grotto, conſtructed by the ſecond earl Tilney, at an expence of 2000*l.*, excluſive of its coſtly materials. Within the park, on its ſouthern ſide, a teſſellated Roman pavement was diſcovered in the year 1735. It was about 20 feet long, and was conjectured by Mr. Lethieullier to have been the pavement of a banquetting-room. In the centre was the figure of a man, and around him a great variety of ornaments. The Hiſtory and Antiquities of the County of Eſſex, by Philip Morant, M.A., 2 vols. folio, Lond. 1767. Lyſons's Environs of London, 4to. 1796. Beauties of England and Wales, vol. v. by John Britton and E. W. Brayley, 8vo. Lond. 1803.

ROMHILD, a town of Germany, in the county of Henneberg; eight miles S.E. of Meinungen. N. lat. 50° 26′. E. long. 10° 42′.

ROMI, a town of Aſiatic Turkey, in the province of Diarbekir; 45 miles S. of Kerkiſieh.

ROMIEU, M. of Montpellier, in *Biography*, publiſhed in 1743 and 1751, what he called "A New Diſcovery of the grave Harmonics," meaning the third ſound, reſulting from the coincident vibrations of two acute ſimultaneous ſounds; a phenomenon which Tartini had diſcovered in 1714, and upon which he afterwards built his ſyſtem, or "Trattato di Muſica," publiſhed in 1754.

This diſcovery of Tartini excited the envy, not only of Romieu, but of d'Alembert, Serre of Geneva, the abbé Rouſſier, Laborde, &c. The firſt attempt was to rob him of the honour of the *diſcovery*, and then to depreciate his explanations, and the *conſequences* which he derived from the phenomenon. But it appears to us, on the moſt careful and minute enquiry, that they have egregiouſly failed in both. With reſpect to his *diſcovery*, Tartini himſelf, and his zealous diſciple count Taxis, of Venice, have clearly authenticated his title to it. (Riſpoſta di Tartini alla critica del di lui Tratt. di Muſ. Ven. 1767—et Riſpoſta di un Anonimo al Sig^r. Rouſſeau circa al ſuo ſentimento in propoſito d'ahcune propoſ. del Giuſ. Tartini, Ven. 1769.)

And the long extracts given from Romieu's laboured memoir on the ſubject of his diſcovery of the *terzo ſuono*, by Laborde, in his "Eſſai ſur la Muſique," have ſo much puzzled the cauſe, that he may be truly ſaid to "explain the thing till all men doubt it," &c.

Tartini himſelf, by his notation of each *third ſound*, produced, as is ſuppoſed, by the coincident vibrations of any two ſimultaneous intervals, is clear and evident. Stillingfleet's commentary of Tartini's "Trattato di Muſica," and Rouſſeau's analyſis of his ſyſtem, do juſtice to his ingenuity and profound harmonical knowledge, without concealing his defects.

Perhaps we have no right to imagine ourſelves unprejudiced in this diſcuſſion; having been ſo long accuſtomed to regard Tartini as a great practical muſician, and an exquiſite compoſer, we may have been inſenſibly inclined to reſpect his theory, and, indeed, whatever he has produced; for what more can ſcience do for any muſician in the practice of his art, than it has done for Tartini? Has it taught his mathematical opponents, of the old French ſchool, to compoſe elegant, graceful, ſpirited, or fanciful muſic? or even informed them in what good muſic conſiſts? See TARTINI and TERZO SUONO.

ROMIEU, *La*, in *Geography*, a town of France, in the department of the Gers; five miles E. of Condom.

ROMILLY, a town of France, in the department of the Aube, and chief place of a canton, in the diſtrict of Nogent ſur Seine; nine miles E.N.E. of it. The place contains 2175, and the canton 6888 inhabitants, on a territory of 267½ kiliometres, in 15 communes.

ROMISHORN, a town of Switzerland, in the canton of Zurich; nine miles E.S.E. of Conſtance.

ROMKALA, a town of Aſiatic Turkey, in the government of Maraſch, on the right bank of the Euphrates, where the river Simeren joins it. This town has a caſtle, much ruined, which was the work of the Greek emperors, and which is ſituated at the N. end of a chain of mountains over the river. It ſtands on a path, ſeparated from the mountains, to the ſouth, by a deep foſſée cut in the rock, and originally intended, as it is ſaid, to be made ſo deep that it might be ſupplied with water by the river Simeren, and thus the place be inſulated. On the W. ſide is the aſcent, having four terraces cut in the rock, and ſituated above one another, each having a gate-way, and connected by ſteps. In the caſtle are two churches; 50 miles N. of Aleppo. N. lat. 36° 35′. E. long. 37° 45′.

ROMKERA, a town of Hindooſtan, in Viſiapour; 28 miles N.E. of Poonah.

ROMKINT,

ROMKINT, a town of Asia, in the country of Karasim; 230 miles N.W. of Samarcand.

ROMMEN, a town of Prussia, in the palatinate of Culm; eight miles S.E. of Lautenburg.

ROMMENDAL, a town of Norway; 24 miles N. of Berga.

ROMNA, a town of Russia, in the government of Tchernigov; 88 miles N.E. of Tchernigov. N. lat. 50° 36′. E. long. 33° 24′.

ROMNEY, George, in *Biography*, was born at Dalton, in Lancashire, in December 1734. His father was a native of the same place, where, upon a small patrimonial estate, he followed the threefold occupation of merchant, builder, and farmer; but as his family was large, the joint profits of his triple concerns barely afforded the means for its maintenance. At the age of 12, George was taken from the village school, where he had imbibed the rudiments of learning, and engaged by his father to superintend the workmen. He employed his leisure hours in carving, and being fond of music, made a violin for himself, which he preserved till his death.

He was first tempted to draw, from seeing some ordinary prints in a periodical magazine, which he imitated with considerable success; and his first attempt at drawing a portrait was from memory, when endeavouring to describe the features of a stranger whom he had seen at church. When he was about 15, his mind was led astray from the occupations in which his father had engaged him, by the society and conversation of a peculiar, but ingenious man, named Wilkinson, who resided at Dalton. He was afterwards placed under the care of a Mr. Wright, a cabinet-maker at Lancaster; but he, soon perceiving the turn of Romney's mind for drawing, advised his father to leave him at liberty to indulge his propensity, and become a painter. At the same time he recommended an artist of the name of Steele, as a preceptor for the youth; and with him he continued to study and practise for a short time only, in which, however, he acquired, to a certain extent, the knowledge and use of the materials of the art.

When he left Steele, and had begun to practise portrait painting as a means of subsistence, he became anxious to visit, and tempt his fate in the metropolis. He laboured therefore very hard, painting portraits at low prices, and occasionally producing pictures of historical subjects, which he disposed of by way of raffle at Lancaster. By these means he acquired a sum of nearly a hundred guineas; of which taking thirty pounds to pay his travelling expences, and leaving the remainder with his wife, he set out to put his long intended project into execution, in the year 1762.

He first resided in the city, where he painted portraits at five guineas a head, and acquired considerable practice through the friendly assistance of Mr. Braithwaite, then of the post-office. In 1764 he visited France, in company with Mr. Greene, of Gray's Inn. There he was introduced to Vernet, and, by his friendly assistance, obtained admittance to the gallery of the duke of Orleans, the Luxembourg, and other repositories of art. On his return, he took up a residence in Gray's Inn, to be near his travelling companion; and, by a picture of judge Yates, obtained favour among gentlemen of the robe, and afterwards produced many excellent pictures of persons eminent in that profession. In 1765 he obtained a prize from the Society for the Encouragement of Arts and Sciences, for an historical picture, the subject of which was the death of king Edmund. In 1768 he quitted Gray's Inn, and went to live in Great Newport-street, where he continued to advance in reputation and practice; exhibiting with the incorporated society of artists in Pall Mall, and in Spring Gardens.

Though thus rapidly gaining public respect as an artist, Romney was himself so conscious of his want of style, and the necessity of cultivating his taste by seeing the great models of antiquity, that he nobly resolved upon relinquishing, for a time, the pecuniary advantages his talents acquired him, (which now amounted to 1200*l.* a-year,) and visit Italy, where alone he could, at that time, attain the object of his desire. He accordingly arranged a plan of travel with Mr. Ozias Humphrey, a miniature painter of celebrity, and on the 20th March 1773, they set forward on their journey, through France, to Rome. There, and at other places, where the best works of art were to be found, he remained two years; leading a life reclose and studious, and making some few copies.

On his return, in July 1775, he took the house in Cavendish-square, where he resided till he retired, in 1798, from public practice, to live at Hampstead, in a house he had built; and where he hoped to recruit a weakened constitution by tranquil enjoyment, and the beneficial effects of purer air. During the preceding 20 years, Romney had enjoyed uninterrupted success in the practice of his profession, to which he was so ardently attached, that his whole delight was in it. His talents, in return, were highly esteemed, and encouraged by an immense influx of employment. He, in measure, divided the attention of the town with Reynolds, and indeed by numbers was preferred before him; but he wanted the suavity of mind and manners which his accomplished rival enjoyed. Timid and reserved, and, at the same time, ardent and enterprising, his imagination was tremblingly alive to those irritating circumstances, by which vulgarity and ignorance constantly wound the mind of the portrait painter, and subject him to mortification and disgust. The slightest appearance of coldness in a friend, or of hostility in a critic, was often sufficient to obstruct the exertions of his faculties. This timidity and reserve were the reasons that, amidst the immense crowd of persons to whom, of course, by his professional practice, he was known, there were few with whom he lived in friendly intercourse. His mind dwelt constantly on the art he delighted and excelled in, and among those only who sympathized with his peculiarities, was he happy to associate.

Romney was subject to occasional depression of spirits, which the kind attentions of his friend Hayley, and the invigorating air of the Sussex Downs, among which that friend resided, and where our painter usually spent his summer months, often partially removed. On the approach of age, he was less able to cope effectually with attacks of that nature, and they gained strength upon him to an alarming degree. In 1797 he felt a slight paralytic stroke, which affected his eye and his hand, and prevented him from continuing his professional labours. He then retired, as we have said, to Hampstead, but finding his health still decline, he, in 1799, revisited his native country; and at Kendal received from a wife, whom, though deserted for so long a space of time, he had supported, and protected from poverty, a kind and affectionate attention till his death, (which occurred in Nov. 1802,) having unhappily survived the loss of that faculty which is the distinguishing glory of man, and relapsed to the helpless state of infancy.

Of Romney, as an artist, it is by no means easy to appreciate the just character. That he possessed genius and talents in an eminent degree, no one can deny. The learned editor of Pilkington's Dictionary has said, "that he was made for the times, and the times for him." It had perhaps been more just to have observed, that Romney was made for bet-

ter times than those in which he lived. His perception of art was far purer than most of his contemporaries, at least in this country, were capable of enjoying; and it must be remembered, that no one ever set forth in the career of an artist under greater disadvantages than he did. The taste he imbibed for simplicity and grandeur, on seeing, at an advanced period of his life, the works of the ancient artists, prove what might have been fairly expected of him, had he happily been born under more favourable circumstances; and early initiated, under good instructors, in the mysteries of the art he cultivated with so much success without those aids. Till the time he was twenty-two he had seen no better painting than the sign of a public house, in the place where he was born; but to his active, enterprising spirit, all nature was a school; and at an age when others are employed in laying by stores of ideas from books, and thence forming regulations to guide their future progress in art, he was industriously observing and reflecting upon the grand scenery around him, and the various characters of the objects among which he lived. Thus, the little learning he had imbibed from the few literary works he had seen was called into immediate action, and his progress in real knowledge became equal to what is usually obtained in the ordinary way, with greater assistance from books and masters.

The pursuit of painting, however, requires a knowledge of certain rules in the arrangement of lines; of the beauty and power of contrast in light and shade, and in form and colour; as well as of the speediest and most efficient modes of execution. This science, being the result of repeated observations upon the principles by which Nature produces her most agreeable and sublime effects, is most readily obtained, by a careful inspection of good works of art wherein it is exemplified. Such advantage was not Romney's. He had to separate for himself the partial, from the general effects of nature; and the inequality with which he, in this point, met the rivalry of more fortunate artists, is too evident in most of his productions. Frequently, his chiaroscuro is ill conducted, and his harmony of forms and colours imperfect; even in pictures produced when enjoying the height of his intellectual power, and at the happiest period of his executive skill: at the same time they exhibit great fertility of invention, with sweetness and delicacy of sentiment.

He was happily endowed with an inquisitive mind, that delighted in science, and pursued it warmly, with the best means he had: and he possessed a versatility of genius, which is exemplified by the variety of subjects he chose for representation. Both the comic and serious impressions of the mind had charms for him. Early in life he painted two pictures from Tristram Shandy; one, of the arrival of Dr. Slop at Shandy-hall, after the unlucky catastrophe he met with on the road; which afforded scope for sentimental comic humour; the other from the affecting story of the death of Le Fevre: both of them were highly approved for truth and propriety of feeling and expression, though differing so widely in their effects upon the mind. His journey to Italy expanded his view of art: new scenes, and new sources of information, were presented to him, of which he did not neglect to avail himself. The works of fancy he produced after his return home exemplify the use he made of the two years he spent among the unrivalled productions of art he there met with. The purity and perfection of ancient sculpture appear to have made the deepest impression upon his mind: and he afterwards assiduously cherished the taste he then imbibed, by procuring a collection of casts from the best models of ancient statues, groups, basso-relievos, &c. which he would sit by the hour to contemplate; examining their appearances under all changes of sun-shine, and common day-light; and with lamps, prepared on purpose, he would try their effects in various modes of illumination, with rapturous delight. Hence, grandeur and simplicity became the principal objects of his ambition; he perceived these qualities distinctly, and employed them judiciously; even whilst imitating nature in his most usual occupation,—portrait painting. To present his figure, or tell his story, with simple undisturbed effect, rejecting all unnecessary minutiæ, was the point he aimed at and obtained.

On his return from the continent, his zeal for historical painting revived, or rather became strengthened. In several epistles to Mr. Hayley, he laments his confinement to portraits: in one he says, "this cursed portrait painting, how I am shackled with it! I am determined to live frugally, and cut it short as soon as I can." In another, he mentions his "wish to be retired, in order to compose with more effect and propriety." And whenever he returned to London from Eastham, the hospitable retreat of his admiring correspondent and friend, whose playfulness of fancy was a constant and useful stimulus to Romney's dejected and desponding mind, he felt it a weight of drudgery again to fall into the trammels of portraiture: yet from the enjoyment he by nature found in the practice of his profession, a short time inured him afresh to it, and still he felt pleasure in tracing the features of each new face that presented itself; till again his exhausted frame required the exhilaration of retirement, and the refreshment afforded by pure uncontaminated air, free from the gross vapours that hover in the region of a great and populous city. It is not a little surprising, that amidst his continual labours in that branch of the art he more immediately professed, he should have found time to produce so great a number of fancy pictures as he left behind him. He also frequently spent his evenings in making large cartoons in charcoal, of subjects which suited his fancy;—generally of a sublime cast. Amongst these, was one of the dream of Attossa, from the Persian of Æschylus, which was conducted with the taste and feeling of the ancient Greek artists.

He was in general fortunate in the choice of his historical subjects; and certainly, in this respect, had far the advantage of his great rival, sir Joshua Reynolds: and no less so in the power of expression, which he scarcely ever failed to obtain: whilst the latter, in his historical pictures, has rarely been so happy. Reynolds gave beauty and grace to his figures: Romney imparted soul. The former delights the eye with the harmony and richness of colour, and beauty of effect; the latter thrills and gratifies the heart with truth and force of expression, in action and countenance; wrought with more simplicity, but with less art. His picture of Ophelia seated upon a branch of a tree, the breaking of which threatens her destruction in the stream below, whilst the melancholy distraction visible in her lovely face accounts for her apparent insensibility to danger, is a sufficient proof of this assertion. His composition also of "Titania and her Indian Votaress," in the possession of Mr. Beckford; "Titania, Puck, and the Changeling," at sir John Leicester's, and others of his works of the like playful and interesting kind, might be brought forward to support it. In portraiture, however, the justly exalted president of the Royal Academy stood alone, and Romney was not able to cope with him. In the composition of his figures, our artist exhibited the taste he had acquired by the study of the antique; and he admirably varied the characters of his heads. The arrangement of drapery which he adopted, partook largely of the same style; and being well understood, was painted with great dexterity;

dexterity; though it muſt be confeſſed, that in form, it was not unfrequently better adapted to ſculpture than to painting. His ſtyle of colouring was ſimple and broad. In that of his fleſh he was very ſucceſsful; exhibiting a great variety of complexion, with much warmth and richneſs. It was not always, however, that his pictures were compl... in the general tone; but crude diſcordant colours were ſometimes introduced in the back-grounds, which not being blended or broken into uniſon with the hue of the principal figures, interrupted the harmony of the whole. The executive part of his works was free, learned, and preciſe, without being trifling or minute, poſſeſſing great ſimplicity, and exhibiting a purity of feeling conſonant with the ſtyle of his compoſitions. He aimed at the beſt of all principles in the imitation of nature, *viz.* to generalize its effects; he even carried it ſo far as to ſubject himſelf to the charge of negligence in the completion of his forms: but the truth of his imitation is ſufficiently perfect to ſatisfy the minds of thoſe who regard nature ſyſtematically, and not individually, or too minutely. In a word, every lover of art who knows how to appreciate truly what is moſt valuable in painting, will hold the name of Romney in increaſing eſtimation, the more frequently and impartially he examines his productions.

Romney, *New*, in *Geography*, one of the Cinque-ports, locally ſituated, partly within the liberty of Romney Marſh, partly within the level of Walland Marſh, and partly in the lower half hundred of St. Martin's Pountney, lathe of Shepway, county of Kent, England. It is diſtant 37 miles S.E. from Maidſtone, and 71 miles S.E. by E. from London. This town is deſcribed as having riſen from the ruins of Old Romney, at leaſt a century previous to the Norman conqueſt. Subſequent to that event, it was beſtowed by king William I. on Odo, biſhop of Baieux, and earl of Kent, and was declared to be privileged as one of the Cinque-ports, having Old Romney, Lydd, Dengemarſh, and Oſwardeſtone, and part of Promhill pariſh, annexed to it as members, which were to ſend out jointly five veſſels of war, with twenty-one men and one boy to each of them. At this period, and for many years afterwards, New Romney was a very flouriſhing place. It was divided into twelve wards, and contained within its liberty five pariſh churches, a priory, and an hoſpital for the ſick. In the reign of Edward I., however, a great part of it was deſtroyed by a dreadful tempeſt and convulſion of nature, which likewiſe choaked up its haven, and thereby prevented its revival as a commercial and ſhipping town. When Henry VIII. aſcended the throne, the ſea had retired from it nearly two miles, and all its churches were demoliſhed, except that of St. Nicholas, which is ſtill ſtanding. Henry therefore united the whole liberty into one pariſh, as it continues at the preſent day.

In very early times the Cinque-ports were enfranchiſed with various privileges and cuſtoms, though of what antiquity they are, or when ſo enfranchiſed, has not been determined with any certainty; they are held therefore to enjoy their privileges by preſcription, though theſe were confirmed by Magna Charta, and ſince by a charter of king Edward I. New Romney, as one of theſe ports, is conſequently a corporation by preſcription; but in Edward III.'s time it was incorporated by charter, firſt by the ſtyle of "barons of the town and port of New Romney," and afterwards by that of "jurats and commonaltie of the town and port of New Romney." Queen Elizabeth again incorporated this town, and under her charter the corporation now conſiſts of a mayor, twelve jurats, a chamberlain, recorder, town-clerk, and twenty-ſix common council-men. The mayor, who is coroner by virtue of his office, is choſen on Lady-day, yearly; and together with the jurats, who are the excluſive juſtices within the liberty, hold a court of general ſeſſions of the peace and gaol delivery, and alſo a court of record. Romney returns two members to parliament, who are uſually ſtyled barons, and are elected by the mayor, jurats, and freemen. The firſt return mentioned on record, is in the forty-ſecond year of Edward III. ſoon after its ſeparate incorporation.

The town of Romney ſtands on elevated ground in the centre of a marſhy country. It conſiſts principally of one broad well-paved ſtreet, interſected by a ſecond, in which the hall or brotherhood houſe is ſituated, where the mayors, jurats, and commons of the Cinque-ports, and of the two ancient towns of Rye and Winchelſea, uſually keep their court, called the brotherhood; but as it is too ſmall for the purpoſe, the court called the Gueſtling, or Geſling, is held in the church. The market-houſe ſtands in the main ſtreet, and is a modern ſtructure. The day on which the market is held is Saturday, weekly; beſides which there is an annual fair on the 22d of Auguſt. The church of St. Nicholas is an ancient ſtructure, and conſiſts of three aiſles and three chancels, with a ſquare tower at its weſtern extremity. The columns ſeparating the aiſles are maſſive, and ſupport circular arches with zigzag and billeted mouldings. The weſt door-way under the tower is likewiſe formed by a circular arch, ſimilarly ornamented. Within this edifice is a great variety of monumental erections, chiefly in memory of perſons who have been mayors and jurats of the town. Anciently the church of New Romney belonged to the abbot and convent of Pontiniac, in France, who had a cell or priory here, which was ſuppreſſed by king Henry V. Here was alſo an hoſpital for lepers, founded and endowed by Adam de Cherryng in the time of king Henry II. There was likewiſe a houſe called St. John's houſe in this town previous to the reign of Edward IV. The only charitable inſtitution now in the pariſh is an hoſpital and ſchool-houſe for the reſidence of a ſchoolmaſter and four poor perſons. According to the population cenſus of 1811, New Romney pariſh contained 159 houſes, and 841 inhabitants.

Old Romney is ſituated two miles to the weſtward of New Romney, of which it is a member. This place is ſaid to have been anciently of much importance, and to have conſtituted one of the original Cinque-ports. Here, in the times of the Romans and of the Saxons, was a commodious haven for ſhipping, but the ſea deſerting it occaſioned the decay of the town. Somner conjectures, that the Portus Lemanis of Antoninus was ſituated either at Old or at New Romney; but this opinion is contradicted by later antiquaries, who fix that ſtation near Stutfal caſtle, at the baſe of Limne hill. Old Romney now conſiſts only of about twenty houſes, with a church, which is an ancient building in the maſſive circular ſtyle. In the north chancel is a very old tomb, with a vault underneath, but there is no inſcription to identify its poſſeſſor. The font is rudely ſculptured, and is ſupported on four ſtone pillars.

Romney Marſh is an extenſive level of the richeſt paſture land in England, ſituated between the upland hills and the ſea-ſhore. This diſtrict meaſures about ten miles in length and five in breadth. It comprehends four diviſions, all under different juriſdictions and conſtitutions, *viz.* Romney Marſh, ſtrictly ſo called; Walland Marſh; Dengemarſh, with Southbrooks; and Guildford Marſh, part of which is within Suſſex. Vaſt flocks of ſheep and herds of black cattle are paſtured here. The bullocks of this Marſh are reckoned the largeſt in England, and the ſheep equal to thoſe of Leiceſterſhire and Lincolnſhire. So careful

were

were our ancient monarchs of this fertile diſtrict, that they granted to the inhabitants various important privileges. Edward IV. incorporated the towns of Lydd and Romney, with nineteen pariſhes, by the title of the bailiff, twenty-four jurats, and the commonalty of Romney Marſh; but the inhabitants exerciſed many privileges for ſeveral centuries anterior to that era. Under the above charter the bailiff, jurats, and commonalty, are empowered to hold a court every three weeks, and to decide on all pleas of action real and perſonal, civil and criminal. They are likewiſe empowered to chooſe four juſtices of the peace of their own, yearly, beſides the bailiff, who poſſeſſes ſimilar authority *ex officio*. They have nothing, however, to do with the ſuperintendence or management of the embankments and drainage, which by ancient cuſtom is veſted in the lords of twenty-three neighbouring manors, who appoint a bailiff as chief ſuperviſor of the works, who is commonly, though not always, the ſame perſon with the bailiff under king Edward's charter. The courts are held in a new hall, in Dimchurch; and at a general one holden on Whit-Thurſday, all ſcots and levies, which on an average of years amount to two ſhillings annually, are paid. Romney Marſh is protected from encroachments of the ſea by a wall of great ſtrength, called Dimchurch wall, which extends ſomewhat more than three miles in length. This wall forms the only highway for carriages along its whole extent, on the road between Hithe and Romney. It meaſures from twelve to twenty feet in height above the level of the Marſh; and from fifteen to thirty feet in breadth at its ſummit. "The drainage," ſays Marſhall, in his Rural Economy of the Southern Counties, "is effected by arched ſluices paſſing under the bank; each having two pair of flood-gates, one on the outſide, the other on the inſide, to provide againſt accidents to the outer pair. Theſe gates permit the interior waters to paſs off when the tide is low; and prevent thoſe of the ſea from entering at high tide." The Hiſtory and Topographical Survey of the County of Kent, by Edward Haſted, eſq. F.R.S. and S.A. 8vo. edit. Canterbury, vol. viii. A New Topographical, Hiſtorical, and Commercial Survey of the Cities, &c. of Kent, by Charles Seymour, 8vo. Canterbury, 1776. Beauties of England and Wales, vol. viii. by E. W. Brayley, 1807.

Romney, a poſt-town of America, the capital of Hampſhire county, in Virginia, ſituated on the W. bank of the S.W. branch of the river Patowmac; 50 miles W. by N. from Wincheſter. It contains about 30 houſes, a brick court-houſe, and a ſtone gaol.

ROMONT, a town of Switzerland, in the canton of Friburg, and capital of an extenſive bailiwick, which was formerly a county; nine miles N.W. of Friburg.

ROMOPOCK, a town, or rather village, of Bergen county, in New Jerſey, on a river of the ſame name, 15 or 20 miles N. of Patterſon.

ROMORANTIN, a town of France, and principal place of a diſtrict, in the department of the Loire and Cher; ſeven miles S.S.E. of Blois. The town contains 5730, and the canton 10,276 inhabitants, on a territory of 330 kiliometres, in 10 communes. Its manufactures conſiſt of fine cloths and ſerges. N. lat. 47° 22′. E. long. 1° 49′.

ROMORSWALDE, a town of Pruſſia, in the province of Ermeland; five miles N.N.W. of Heilſberg.

ROMPEE, or Rompu, in *Heraldry*, is applied to ordinaries that are repreſented as broken; and to chevrons whoſe upper points are cut off. He beareth a chevron rompee, between three mullets, argent, by the name of Sault.

ROMPION, or Rampion, in *Botany*. See Campanula *Rapunculus*.

ROMPNEY, in *Geography*. See Remney.

ROMPONESCO, a town of Italy, on the Po; 20 miles S. of Mantua.

ROMRA, a town on the W. coaſt of the iſland of Lombock. S. lat. 8° 15′. E. long. 115° 54′.

ROMROD, or Rumroth, a town, with a caſtle, of Weſtphalia, in the principality of Heſſe; 16 miles E. of Marburg.

ROMSDAL, a town of Norway, and capital of a diſtrict or provoſtſhip, in the dioceſe of Drontheim; 100 miles S.S.W. of Drontheim. N. lat. 62° 28′. E. long. 7° 54′.

Romsdal *Bay*, a bay or river of the North ſea, on the coaſt of Norway, 20 miles long, with ſeveral branches. N. lat. 62° 40′. E. long. 7° 45′.

ROMSEY, or Rumsey, a market-town and pariſh in the lower half hundred of King's Sombourne, Andover diviſion of the county of Southampton, England, is ſeated in a flat diſtrict, watered by the river Teſt, or Anton, at the diſtance of 8 miles S.W. from the town of Southampton, and 73 miles S.W. by W. from London. The town is of conſiderable antiquity, and probably derived its origin, as it certainly did its early importance, from an abbey founded here by Edward the Elder, and afterwards filled with Benedictine nuns by his ſucceſſor, king Edgar. The firſt abbeſs of this monaſtery was Elfleda, the daughter of a Saxon nobleman, named Ethelwold, who had greatly contributed to its original eſtabliſhment, and whom ſome authors, therefore, deſignate as its founder. This lady was afterwards canonized, and conſtituted one of the patron ſaints of the abbey. She was ſucceeded in her office by ſeveral females of royal birth, and diſtinguiſhed for the ſanctity of their lives. In the year 992, Romſey and its monaſtery were plundered by the Danes; but the nuns and moſt of their valuables had been previouſly removed to Wincheſter, by order of the abbeſs Elwina. The buildings were ſoon reſtored, and the nuns replaced. In 1085, Chriſtina, couſin to king Edward the Confeſſor, took the veil here, and was ſubſequently entruſted with the education of Matilda, daughter of Malcolm, king of Scotland, afterwards conſort to Henry I. Mary, daughter to king Stephen, likewiſe became a nun in this abbey; but afterwards renounced the veil, and married Matthew, younger ſon of Theodoric, earl of Flanders; an event which called forth all the thunders of the Vatican againſt herſelf and her huſband. The benefactors to this monaſtery were numerous; and previouſly to the diſſolution, its revenues were eſtimated, according to Dugdale, at the annual value of 339*l.* 10*s.* 10¼*d.*; but Speed ſtates their amount at 528*l.* 8*s.* 10¼*d.* Of the buildings which belonged to it ſcarcely a veſtige remains, except the church, which is ſtill uſed for divine ſervice.

Romſey is governed by a corporation, conſiſting of a mayor, recorder, ſix aldermen, and twelve burgeſſes, beſides inferior officers. The petty ſeſſions for Romſey diviſion of the hundred are held here. The market-day is Saturday, weekly; and there are fairs on Eaſter Monday, every Tueſday fortnight after 31ſt July until Chriſtmas, 26th Auguſt, and 8th November. Formerly this town poſſeſſed a conſiderable woollen trade, but that is now greatly diminiſhed, and is in part ſupplied by paper-works, and a ſacking manufactory. The chief public buildings here are the audit-houſe, which is a large ſquare building, ſtanding on piers, near the centre of the town; a town-hall; the pariſh church; and a large meeting-houſe for Preſbyterians, built about ten years ago. The church, which alone deſerves

ſerves particular notice, was formerly annexed to the abbey. The whole preſents a ſeries of intereſting ſtudies and details to the architectural antiquary. It conſiſts of a nave, with aiſles, a north and ſouth tranſept, a choir, or chancel, with aiſles, three ſmall chapels or oratorios at the eaſt end, where is alſo an aiſle, two ſmall ſemicircular chapels at the angles of the tranſepts with the choir, and a low tower riſing on four lofty arches, at the interſection of the tranſepts with the nave and choir. The eaſtern part of the church is certainly the moſt ancient, and is ſaid by Dr. Latham to have been erected anterior to the Norman conqueſt. At the weſt end are ſome arches of a later age, probably about the era of king Stephen. In the ſouth tranſept is an ancient ſtatue of a female, probably one of the nuns. Near the ſouth door is a crucifixion in bold baſſo relievo, cloſe to which is a ſquare niche, or cupboard, in the wall. At the eaſt end of the north and ſouth aiſles of this church are two pillars, the ſculptures on the capitals of which form the ſubject of ſome papers in the 14th and 15th volumes of the "Archæologia." That in the north aiſle exhibits four human figures, beſides two birds, a horſe, and ſeveral mutilated bodies, &c.; the whole repreſenting a field of battle. Two of the human figures are crowned, and one of them holds the other by the beard. Both have ſwords in their right hands, and ſeem in the act of ſtriking with them; but each is reſtrained by a winged figure ſeizing his ſword. To the right, at bottom, is a horſe ſaddled; and in each corner, above, a bird of prey, loaded with mangled limbs, many of which are likewiſe diſperſed in various places. The oppoſite pillar to this repreſents a more peaceable ſcene. In the centre ſtands a crowned perſonage in a looſe robe. On the left is another crowned man, ſitting bare-legged, and ſupporting one ſide of an angular label, the other ſide of which is held by a winged figure; and on the right is a ſimilar label, held by two ſitting figures habited in mantles. The legend on the firſt label is "Robert me-fec';" and that on the ſecond, "Robert tute conſule + D.S." Dr. Latham makes the former refer to the battle and conſequent peace between king Alfred and Guthrum, the Daniſh chief, who oppoſed him; and the latter to the foundation of the monaſtery. The figures of the two kings he ſuppoſes to repreſent Edward and Edgar; and the legend to mark the name of the conſularius, or maſter maſon of the buildings. Other capitals in this church are alſo ornamented with ſculptured figures, &c. (See Carter's "Ancient Sculpture and Painting," folio.) Some ancient tomb-ſtones commemorate the names of abbeſſes buried beneath; and there is alſo a flat ſtone in remembrance of the celebrated ſir William Petty, author of "A Treatiſe on Taxes and Contributions," "A Survey of Ireland," and ſeveral other works, who died in 1687. He was the ſon of a clothier at Romſey, and anceſtor to the preſent marquis of Landſdown. Another eminent native of this town was Mr. Giles Jacob, author of Jacob's Law Dictionary, and of a work, entitled "Lives and Characters of Engliſh Dramatic Poets." According to the parliamentary returns of 1811, Romſey pariſh, including Romſey Infra et Extra, contained 933 houſes, and 4297 inhabitants.

About half a mile to the ſouth-weſt of Romſey is Broadlands, the ſeat of lord viſcount Palmerſton, whoſe father, the late lord, purchaſed it from the family of St. Barbe, which had poſſeſſed it for more than two centuries. The houſe is embelliſhed with a fine collection of paintings, by the moſt eminent maſters. Paultons, a ſeat of lord viſcount Mendip, is ſituated about three miles to the ſouth-eaſt. The houſe is not remarkable, but the grounds, which extend five miles in circumference, diſplay the taſte and ſkill of the celebrated Brown. Near this manſion is Tatchbury Mount, which tradition reports to have been the ſcite of a royal hunting ſeat; but it appears more probable that it has been an ancient military ſtation. The vallations are ſtill clearly diſcernible on the declivity of the hill. Beauties of England and Wales, vol. vi. 8vo., by John Britton and E. W. Brayley. Archæologia, vols. xiv. xv.

ROMSOE, a ſmall iſland of Denmark, in the Great Belt, near the coaſt of Funen. N. lat. 55° 30′. E. long. 10° 48′.

ROMULEA, in *Botany*, a name given by Maratti, in honour of the founder of Rome, to the Linnæan *Ixia Bulbocodium;* which Mr. Ker, in ſeparating with other ſpecies, from *Ixia*, has thought proper to call *Trichonema;* nor ſhall we, by any means, contend for the above, though the original appellation of this genus. See TRICHONEMA.

ROMULUS, in *Biography*, founder and firſt king of Rome. See ROME.

ROMULUS, in *Geography*, a military townſhip in the ſtate of New York, in Cayoga county, between Seneca and Cayoga lakes. Its northern part is croſſed by the road to the ferry at Cayoga lake. The townſhip was incorporated in 1794, and comprehends, within its juriſdiction, the townſhips of Janus and Galen, and that part of the lands reſerved to the Cayoga nation of Indians, W. of Cayoga lake. Its number of inhabitants is 1025.

ROMUNDA, a mountain of Carinthia; 6 miles S. of Mautten.

RON, a ſmall rocky iſland of Denmark, in the Little Belt. N. lat. 55° 7′. E. long. 9° 55′.

RON, *Lynder*, a cluſter of ſmall iſlands in the Categat; 12 miles S. from the iſland of Leſoe.

RONA, one of the weſtern iſlands of Scotland, is ſituated about ſixteen leagues N.W. from the Butt of Lewis, and is ſuppoſed to lie fartheſt to the N.W. of any land in Europe. It is about a mile in length, and half a mile in breadth; and is included in the pariſh of Barvas, in the iſle of Lewis. In this iſland is an ancient chapel, which is fenced round with a ſtone wall, and is kept clean and in good repair by the inhabitants. On the altar lies a large plank of wood about ten feet long, having as many holes in it, each pegged with a ſtone, to which the natives aſcribe many virtues, particularly the promotion of ſpeedy delivery to a woman in travail. The products of Rona are a few cows and ſheep, and a ſmall quantity of barley and oats. The cuſtom of walking round a perſon ſunways, to whom it is intended to expreſs high eſteem, is yet practiſed by the natives of Rona, all of whom are employed as ſervants by the tackſman of the iſland, which was let on leaſe about fifteen years ago for the annual rent of four pounds. A Deſcription of the Weſtern Iſlands of Scotland, by M. Martin, 1716, 8vo. Carliſle's Topographical Dictionary of Scotland, 4to. 1813. The Statiſtical Account of Scotland, &c. by ſir John Sinclair, bart. vol. xix. Edin. 8vo. 1797.

RONABEA, in *Botany*, an unexplained name, Aubl. Guian. v. 1. 154. t. 59. Juſſ. 205. Lamarck Illuſtr. t. 166. This ſuppoſed genus appears, as Juſſieu points out, ſo very near PÆDERIA, ſee that article, that we cannot conſider them as diſtinct. Still, without examination of ſpecimens, we durſt not poſitively treat of it under that head. Aublet deſcribes two ſpecies, *R. latifolia* and *erecta;* ſhrubby plants of Guiana, of no remarkable properties, the firſt with a twining *ſtem*, the other erect. The *flowers* are ſmall and axillary.

RONALDSAY, NORTH, in *Geography*, the moſt northerly of the Orkney iſlands, Scotland, is ſo called to diſtinguiſh it from South Ronaldſay, the ſubject of the next article, to which, however, it bears no ſort of reſemblance.

It is ſeparated from the iſle of Sanday by a rapid and dangerous frith, two miles in breadth, and contains an area of four ſquare miles in extent, which ſupports about 500 inhabitants. The whole iſland is flat, and little raiſed above the level of the ocean, which rendered it peculiarly dangerous to navigators, previous to the erection of a lighthouſe on its north-eaſtern extremity. It is nevertheleſs dry and healthy, and produces both corn and graſs of excellent quality, and ſufficient to ſupply the home conſumption. The inhabitants are ſober, honeſt, and induſtrious, beyond the generality of the Orkney iſlanders. In winter, their chief occupation is the care of their cattle and crops, and fiſhing, when the weather will permit their venturing to ſea. In ſpring they are employed on the land, as in other places; and when ſummer arrives, almoſt every individual is actively engaged in the manufacture of kelp, of which they make about 120 tons every year. Near the centre of the iſland is a ſingle ſtone monument, ten feet high, and four broad, round which it is cuſtomary for the inhabitants to aſſemble annually, on the firſt day of January, to uſher in the new year with the ſong and the dance. Tumuli are numerous, one of which, on being opened, "was found to contain a building of nine feet in diameter, circular on the outſide, and ſquare and hollow within, in the bottom of which was a well, and in the upper part the ſkeleton of a man in nearly an upright attitude." Hiſtory of the Orkney Iſlands, by the Rev. Dr. Barry; ſecond edition, by the Rev. James Headrick, 4to. Lond. 1808.

Ronaldsay, *South*, one of the Orkney iſlands, Scotland, is ſituated to the ſouthward of the Mainland of Orkney, at the diſtance of ſeven miles from Duncanſby Head, in Caithneſs. In ſuperficial extent it contains about eighteen ſquare miles; and its inhabitants amounted to 1631 in the year 1811. The greater part of this iſland is very well cultivated; and is equally fit for corn and paſture. Of the former, a larger quantity is raiſed than can be conſumed at home, and hence a conſiderable exportation takes place to the Mainland. The bowels of the earth contain lead ore, of which a very promiſing vein has been diſcovered at Grimneſs Head, and another at Widewall. The ſhores abound with kelp, which is a ſource of great wealth to the inhabitants; and the ſea affords fiſh in vaſt numbers, and of the beſt quality. An Engliſh company employs about twenty veſſels in carrying cod-fiſh and lobſters to the London market. This iſland is excellently furniſhed with harbours: for, beſides ſeveral places where ſhips may anchor for a time, it has the ſafe and commodious road of St. Margaret's Hope on the north, and the bay of Widewall on the ſouth. Here are alſo ſome intereſting objects of antiquity. On the ſummit of a hill, near Stow's Head, are the remains of a monument compoſed of three upright ſtones, placed in a triangular form, but only one of them is now ſtanding. Another ſtone monument is ſituated in the beautiful vale of Paplay. It conſiſts of a ſingle block of ſtone, ſixteen feet high, and deſtitute of all marks of human art, by which to diſcriminate its uſe. Similar ſtones of ſmaller dimenſions may be ſeen in other parts of the iſland, which likewiſe affords a number of tumuli, and ſeveral of thoſe buildings uſually called Picts-houſes; alſo the ruins of ſome Catholic chapels and chantries. Hiſtory of the Orkney Iſlands.

RONAY, one of the weſtern iſles of Scotland, is ſituated between the Mainland and the Iſle of Skye. It is about four miles in length, and two in breadth; and has a more level ſurface, and greater fertility of ſoil, than moſt iſlands of the Hebrides; but its cultivation is much neglected. On the weſtern ſide of the iſland is an excellent harbour for ſhipping; and round the coaſt the ſea has hollowed out ſeveral caves, ſome of which afford fine ſpecimens of ſtalactites. Carliſle's Topographical Dictionary of Scotland, 4to. 1813. Sinclair's Statiſtical Account of Scotland, vol. xvi. 8vo.

RONCA *de Scaglia*, a town of Italy, in the department of the Panaro; 20 miles S. of Modena.

RONCADOR, an iſland in the Caribbean ſea. N. lat. 13° 45′. W. long. 79° 30′.

Roncador, or *Rum Key*, one of the ſmaller Bahama iſlands. N. lat. 23° 26′. W. long. 75° 3′.

RONCAGLIA, Francesco, in *Biography*, an Italian opera ſinger, with a ſoprano voice, who arrived in England in 1777 as firſt man in our lyric theatre, when Sacchini was here, and the Danzi, afterwards madame Le Brun, was firſt woman.

Roncaglia had a beautiful face, and elegant figure; a ſweet-toned voice; a chaſte and well-diſciplined ſtyle of ſinging; hazarded nothing, and was always in tune. The beſt part of his voice, which was a ſoprano, was from D to A; he ſometimes went to C, but not eaſily. Both his voice and ſhake were feeble; and of the three great requiſites of a complete ſtage ſinger, pathos, grace, and execution, which the Italians call *cantabile*, *grazioſa*, and *bravura*, he was in perfect poſſeſſion of only the ſecond. As his voice, though of an exquiſite quality, was by no means powerful, and little more than a *voce di camera* (more ſuited to a room than a ſpacious theatre), his ſinging at concerts, when confined to the *grazioſa* ſtyle, left nothing for an audience to wiſh. He was of the Bologna ſchool, formed by Piſtocco and Bernacchi, and reminded his hearers of one of their beſt ſcholars, Guarducci.

Roncaglia remained here two ſeaſons, and was ſucceeded by Pacchierotti.

Roncaglia, in *Geography*, a town of Italy, in the duchy of Piacenza; 8 miles E. of Piacenza.—Alſo, a town of the county of Tyrol; 14 miles N.E. of Trent.

RONCARUOLO, a town in the duchy of Piacenza; 4 miles E.N.E. of Piacenza.

RONCAU, a town of the iſland of Dominica.

RONCEVALLOS, a town of Spain, in Navarre, ſituated in a valley of the ſame name, between Pamplona and St. Jean Pie de Porte. This valley has been celebrated in romance for the defeat of the emperor Charlemagne, and the death of Roland; 14 miles N.N.E. of Pamplona.

RONCHAMPS, a town of France, in the department of the Upper Saone; 5 miles E. of Eure.

RONCHAUX, a town of France, in the department of the Doubs; 3 miles S. of Quingey.

RONCIGLIONE, a town of Italy, and capital of a county, to which it gives name, in the Patrimonio; 10 miles S. of Viterbo. N. lat. 42°. E. long. 12° 8′.

RONCINA, a town of Auſtria, in the county of Goritz; 5 miles N. of Goritz.

RONCO, a town of the Ligurian republic; 15 miles N. of Genoa.

RONCOFERRATO, a town of Italy, in the department of the Mincio; 7 miles E. of Mantua.

RONCOFREDDO, a town of Italy, in the department of the Rubicon; 9 miles W. of Rimini.

RONDA, a town of Spain, in the province of Grenada, ſituated on a fertile ſpot, which ſupplies Cadiz with all kinds of fruit and vegetables. The ſoil, which is of a reddiſh colour, abounds with pebbles, and reſiſts the action of fire; and it is therefore uſed in furnaces for fuſing iron. The adjacent country is famous among other curioſities for that ſpecies of Viverra, called Genette (ſee Viverra); and alſo for wild bulls, wolves, and other ferocious animals: its rocks ſerve alſo as a retreat for eagles, oſpreys, and kites; 35 miles W. of Malaga. N. lat. 36° 45′. W. long. 5° 15′.

RONDE,

RONDE, or RHONDS, a ſmall iſland of the Weſt Indies, near the north coaſt of the iſland of Grenada. It has about 500 acres of excellent land, employed in paſturage, and the cultivation of cotton.

RONDE *Haye, La*, a town of France, in the department of the Channel; 6 miles N. of Coutances.

RONDE, Fr., in *Muſic*, a ſemibreve. See TIME-TABLE, and *Muſical* CHARACTERS.

RONDE *de Table*, Fr. a kind of *chanſon à boire*, or drinking ſong, with a *refrain*, or burden to it, and generally mixed with ſentiments of gallantry, compoſed of different ſtanzas, which are ſung by turns at table, and in which all the gueſts join chorus in the refrain.

RONDEAU, Fr., an air of two or more ſtrains, always returning to, and finiſhing with the firſt. In order to do this in an artful, pleaſing manner, the modulation ſhould paſs into ſome key relative to that of the firſt ſtrain.

Rouſſeau has very juſtly cenſured the writing and ſetting vocal rondeaus, in which the thought is begun in one ſtrain, and continued or ended in another; or begins with a ſimile, of which the application is made in the ſecond ſtrain.

The term *rondeau*, derived from *rondel*, is of great antiquity in France. In old Engliſh it was called a *roundelay*.

But Rouſſeau, after pointing out poetical and muſical defects in the compoſition of rondeaux, indicates the means of avoiding both. "Whenever a ſentiment, expreſſed in the firſt ſtrain, ſuggeſts a reflexion which confirms and enforces it in the ſecond; whenever a deſcription of the ſinger's ſtate of mind is the ſubject of the firſt ſtrain, and illuſtrates a ſimile in the ſecond; whenever an affirmation in the firſt ſtrain, contains its proof and confirmation in the ſecond; every time, in ſhort, that the firſt ſtrain contains a propoſition to perform ſome action, and a reaſon for it is given in the ſecond; in theſe, and ſimilar caſes, a rondeau will be always well placed."

RONDEL, in *Fortification*, a round tower, ſometimes erected at the foot of a baſtion.

RONDELETIA, in *Botany*, was ſo named by Plumier, in memory of William Rondelet, a phyſician of Montpellier, who died chancellor of that univerſity in 1566, aged fifty-nine. He is moſt celebrated for his work on Fiſhes; but his ſtudies were much directed to Botany, ſo far as concerned the Materia Medica; and he is ſaid to have deeply inveſtigated the writings of Dioſcorides.—Plum. Gen. 15. t. 12. Linn. Gen. 90. Schreb. 120. Willd. Sp. Pl. v. 1. 930. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 366. Swartz Obſ. 66. t. 10. f. 2. Juſſ. 201. Lamarck Illuſtr. t. 162. (Lightfootia; Schreb. 122.)—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Stellatæ*, Linn. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth of one leaf, ſuperior, in five deep, acute, permanent ſegments. *Cor.* of one petal, funnel-ſhaped; tube cylindrical, longer than the calyx, very ſlightly inflated at the ſummit; limb flat, ſomewhat reflexed, in five deep roundiſh ſegments. Nectary a crenate ring in the orifice. *Stam.* Filaments five, awl-ſhaped, inſerted into the middle of the tube; anthers ſimple. *Piſt.* Germen roundiſh, inferior; ſtyle thread-ſhaped, as long as the corolla; ſtigma cloven. *Peric.* Capſule roundiſh, crowned with the calyx, of two cells. *Seeds* two or more in each cell, rarely ſolitary.

Eſſ. Ch. Corolla funnel-ſhaped, nectariferous at the mouth. Capſule of two cells, with ſeveral ſeeds, roundiſh, inferior, crowned with the calyx.

A genus of Weſt Indian, ſimple and entire-leaved, ſhrubs, to which the diſcoveries of Swartz have added ſeveral ſpecies. Three only are mentioned in the Hortus Kewenſis, nor are any of them in general cultivation; though ſome poſſeſs fragrance as well as elegance. Two have four-cleft tetrandrous flowers. Juſſieu terms the fruit a berry, which ſeems incorrect. *Rondeletia aſiatica*, Linn. Sp. Pl. 244, is perhaps an *Ixora*, or *Pavetta*.

1. R. *americana*. Corymboſe Rondeletia. Linn. Sp. Pl. 243. Willd. n. 1. Ait. n. 1. (R. arboreſcens, tini facie; Plum. Ic. 237. t. 242. f. 1.)—Leaves elliptic-lanceolate, acute. Panicles repeatedly forked, on long ſtalks, riſing above the ſtem.—Native of the Weſt Indies. Cultivated by Miller, before the year 1752. Mr. Aiton ſays it flowers in the ſtove in Auguſt. We have ſeen no ſpecimen, neither had Linnæus. His deſcription is taken from Plumier's figure, as follows. "A *ſhrub*, with oppoſite, ſeſſile, lanceolate *leaves*. *Common flower-ſtalks* ſolitary, very long, naked, forming at the top a forked *corymbus*, in each of whoſe ſubdiviſions is a ſeſſile *flower*, with a two-leaved *involucrum*;" more properly a pair of *bracteas*. The *flowers* are very numerous, about an inch long. *Leaves* not quite ſeſſile, ſomewhat deflexed, entire, two or three inches long, and one or one and a half broad.

2. R. *odorata*. Fragrant Rondeletia. Jacq. Amer. 59. t. 42. Linn. Sp. Pl. 1671. Willd. n. 2. Swartz Obſ. 67. (R. obovata, by an error of tranſcription; Linn. Syſt. Nat. ed. 12. v. 2. 163.)—Leaves ovate, bluntiſh, rough; ſomewhat heart-ſhaped at the baſe; on ſhort ſtalks. Flower-ſtalks cymoſe, three-cleft, terminal. Native of the Weſt Indies, but rare. *Swartz*. Jacquin found it in rocky places, near the ſea, at the Havannah, bearing flowers, as well as ripe ſeeds, in January. The habit of this *ſhrub* is inelegant and ſtraggling; its height ſix feet; the young *ſhoots* villous. *Flowers* in terminal tufts, each tuft about two inches broad; their ſmell very ſweet, reſembling violets. The *corolla* has often ſix ſegments, though the *ſtamens* are never more than five; its colour is vermilion, with an orange nectariferous ring.

3. R. *hirta*. Hairy Rondeletia. Ait. Hort. Kew. ed. 1. v. 1. 227. ed. 2. n. 3. Willd. n. 13. Swartz Ind. Occ. v. 1. 373.—Leaves oblong, pointed, hairy, rigid; ribbed beneath. Flower-ſtalks axillary, three-forked, erect.—Native of Jamaica, from whence it was imported about the year 1776, by John Blackburne, eſq. of Orford, Lancaſhire. It blooms in the ſtove in ſummer. This is ſaid in Hort. Kew. to be very nearly akin to *R. odorata*, differing merely in its axillary *inflorescence*; larger, more acute, *leaves*, not rough on their upper ſurface, nor ſcarcely heart-ſhaped at the baſe; and longer *footſtalks*. The tube of the *corolla* is but twice the length of the *calyx*. *Style* prominent beyond the mouth. *Stigmas* erect, converging. *Corolla* reddiſh-yellow. Swartz ſays there are only two *ſeeds* perfected, of a hemiſpherical figure, and that the *footſtalks* are ſhort and hairy. His deſcription agrees in other reſpects with Mr. Aiton's.

4. R. *lævigata*. Smooth-leaved Rondeletia. Ait. n. 2. —Leaves ſtalked, elliptical, acute, very ſmooth, except the rib underneath. Stipulas elliptical, membranous, ſmooth. Panicles three-forked, axillary, ſomewhat hairy.—Native of the Weſt Indies, flowering in our ſtoves in ſpring or ſummer. It was introduced, in 1790, by Mr. William Anderſon. The *ſtem* is ſhrubby, ſpreading, with forked round *branches*, ſlightly hairy when young. *Leaves* two or three inches long, acute at each end, rather fleſhy; very ſmooth above; paler beneath, with a reddiſh, ſometimes hairy, rib and veins. *Stipulas* very large, elliptical, obtuſe, reddiſh. *Flowers* reddiſh, ſmall, their tube ſcarcely longer than the limb. Baſe of the *calyx* clothed with long hairs.

5. R. *trifoliata*. Three-leaved Rondeletia. Linn. Sp. Pl.

Pl. 1671. Willd. n. 3. (R. trifolia; Jacq. Amer. 60. t. 43. "R. arborescens, tini facie; Ehret Pict. t. 15.")—Leaves on long hairy stalks, whorled, lanceolate, acute; somewhat downy beneath. Stipulas pointed. Panicles axillary, compound, hairy.—Native of Jamaica, flowering in February.—An upright *tree*, twelve feet high. Young *branches* obtusely triangular, hairy. *Leaves* three in a whorl, lanceolate, acute, entire, three inches long; smooth above; slightly downy beneath; with hairy *footstalks*. *Stipulas* roundish, pointed, ternate, alternate with the leaves. *Clusters* axillary, one inch and a half or more in length, hairy, unequal, branched. *Flowers* inodorous, small, reddish, sessile or stalked. *Fruit* not examined. *Jacquin.*—On comparing Browne's specimen of his *Petesia*, t. 2. f. 3, with Jacquin's plate and description of this *Rondeletia*, we are persuaded they must be the same thing. Consequently the *Ixora americana* of Linnæus, an ambiguous and obscure plant, ought to be expunged, and referred hither. (See Ixora, n. 11.) Swartz quotes this synonym of Browne for his *racemosa*, (see the following); but a comparison of specimens shews them to be distinct, though very nearly akin.

6. R. *racemosa*. Smooth Racemose Rondeletia. Swartz Ind. Occ. v. 1. 360. Willd. n. 7, excluding Browne's synonym.—Leaves on long smooth stalks, ovato-lanceolate, pointed, smooth on both sides. Stipulas abrupt, pointed. Clusters axillary, three-forked, spreading, smooth.—Native of uncultivated hills in Jamaica. Like the last in habit, but the *leaves* are opposite, more coriaceous, and quite smooth, as well as the *footstalks* and *flower-stalks*. The *stipulas* are fringed, like the *bracteas* and *calyx*. *Corolla* externally finely downy, as in Browne's specimen just alluded to under *R. trifoliata*.

7. R. *virgata*. Long-branched Rondeletia. Swartz Ind. Occ. 354. Willd. n. 4.—"Leaves heart-shaped, roundish. Branches spreading, thread-shaped. Flower-stalks three-cleft. Flowers three together, crowded. Stamens four."—Gathered by Swartz in bushy places, near the sea, in the northern part of Hispaniola, flowering and fruiting in December.—A *shrub* about six feet high, with very long, spreading, alternate, rough-barked twigs. *Leaves* half an inch long, on short *stalks*, somewhat reflexed, very smooth. *Stipulas* minute, acute. *Flower-stalks* axillary and terminal, opposite, elongated and erect, resembling branches, and often bearing a pair or two of leaves, three-cleft; the terminal ones leafless, and bearing but three flowers. *Flowers* terminal, brownish-purple, silky at the outside; four-cleft, with four very short *stamens*. *Seeds* several, minute, compressed.

8. R. *pilosa*. Hoary Rondeletia. Swartz Ind. Occ. v. 1. 356. Willd. n. 5. (R. triflora; Vahl. Symb. v. 3. 34. t. 54.)—Leaves ovato-lanceolate, hairy on both sides. Flower-stalks axillary, shorter than the leaves, three-flowered. Stamens four.—Native of the West India islands, of Santa Cruz, and Montserrat. A *shrub*, whose young *branches*, *leaves*, *stalks*, *calyx*, and outside of the *corolla*, are clothed with fine, soft, hoary pubescence. *Leaves* on still more hairy *footstalks*, elliptic-lanceolate, with a small acute point, two or three inches long, ribbed; paler, or glaucous, beneath. *Flower-stalks* opposite, axillary, rather shorter than the leaves, hairy, each bearing three *flowers*, of which the middlemost has the shortest partial stalk. *Bracteas*, and segments of the *calyx*, long, awl-shaped. *Corolla* four-cleft; somewhat downy within, but most without. We have no account of the colour, as Swartz seems not to have gathered this species himself. The dried *flowers* are brown, with some indication of a tawny hue.

9. R. *thyrsoidea*. Tufted Rondeletia. Swartz Ind. Occ. v. 1. 358. Willd. n. 6.—Leaves oblong, acute, membranous; downy beneath. Stipulas ovate, acute, smooth. Clusters axillary, dense, many-flowered.—Native of dry barren hills, in the western part of Jamaica, flowering in May. A smooth, branching *shrub*, six feet high, with long, spreading, bluntly quadrangular twigs. *Leaves* three inches long, acute at each end, ribbed, veiny; smooth above. *Footstalks* an inch long, striated. *Stipulas* close-pressed, broad, ovate, acute, smooth, rigid. *Clusters* dense, oblong, shorter than the leaves, on smooth stalks, their branches opposite, crossing each other, subdivided; the last usually three-flowered. *Flowers* small, yellowish-white, or rusty-coloured, highly fragrant at night. *Bracteas* minute, awl-shaped. *Calyx* very minute, five-toothed. *Corolla* five-cleft, with five *stamens*. *Seeds* two in each cell, rounded, somewhat angular, striated.

10. R. *laurifolia*. Laurel-leaved Rondeletia. Swartz Ind. Occ. v. 1. 363. Willd. n. 8, excluding Browne's synonym.—"Leaves lanceolate-oblong, acute, smooth on both sides. Stipulas deltoid. Clusters axillary, compound, erect. Tube of the corolla very short."—Grows in bushy places in Jamaica.—*Branches* round, smooth. *Leaves* laurel-like, three or four inches long, ribbed, veiny; paler beneath. *Footstalks* an inch long, smooth, flat on the upper side. *Stipulas* broad, combined, deltoid, pointed, spreading, rigid, downy at the edge. *Clusters* often as long as the leaves, compound, their ultimate divisions mostly three-flowered. *Bracteas* very minute. *Flowers* small, brownish-yellow, five-cleft. *Seeds* in an early state numerous, membranous, but two only arrive at maturity, which are hemispherical.—We cannot but dissent from our learned friend professor Swartz, in his citation of Browne's t. 2. f. 2, and consequent remarks. That plate certainly represents the *Petesia stipularis* of Linnæus, which was described from Browne's own specimen, and the *leaves* are, on both sides, finely downy, though no such character is expressed in the engraving. The *inflorescence* is thyrsoid, and not half so long as the leaves. See the next species.

11. R. *tomentosa*. Downy-leaved Rondeletia. Swartz Ind. Occ. v. 1. 365. Willd. n. 9. (Petesia stipularis; Linn. Sp. Pl. 160. P. fruticosa, foliis ovatis oppositis, &c.; Browne Jam. 143. t. 2. f. 2.)—Leaves elliptic-lanceolate, pointed, downy. Flower-stalks three-forked, axillary, much shorter than the leaves.—Native of stony hills in Jamaica, near the shady road called Sixteen-mile walk, not far from Spanish-town. *Swartz.* A specimen from the author shews this to be precisely the above plant of Linnæus and Browne, as Swartz suspected. We refer the reader to Petesia for its description, and for remarks on the uncertainty of that genus, which perhaps must hereafter be sunk in *Rondeletia*.

12. R. *umbellulata*. Umbellate Rondeletia. Swartz Ind. Occ. v. 1. 367. Willd. n. 10.—Leaves elliptic-lanceolate, acute, somewhat hairy. Stipulas ovate, pointed, membranous, hairy. Flower-stalks axillary, three-forked. Flowers somewhat umbellate.—Native of rocky banks of rivers in Jamaica, flowering in April. *Swartz.* That author suspects his plant may be the same with Browne's third *Petesia*, which we have adopted by the name of *villosa*, n. 4. This may possibly be the case; but having no specimen of what Browne intended, we cannot determine the point. Swartz's plant, communicated by himself, is a branching upright shrub, two feet or more in height; the *branches* smooth, somewhat compressed; hairy and leafy at the summit. *Leaves* about three inches long, clothed with short scattered hairs, and supported by hairy *stalks*, half

an

an inch in length. *Stipulas* large, concave, moſt hairy within, with a taper reflexed point. *Flower-ſtalks* not half the length of the leaves. *Flowers* collected into a ſort of round head. *Bracteas*, and ſegments of the *calyx*, lanceolate, hairy. *Corolla* larger than in ſome of the foregoing, brownish-yellow. Two *ſeeds* are perfected in each cell.

13. R. *incana*. Silvery-cupped Rondeletia. Swartz Ind. Occ. v. 1. 369. Willd. n. 11.—Leaves ovato-lanceolate; rough and hoary beneath. Stalks axillary, ſimple, three-flowered. Segments of the calyx ovate, ſilky on both ſides.—Found by profeſſor Swartz, from whom we have a ſpecimen, on calcareous rocky mountains of Jamaica, but rarely. A *ſhrub*, two or three feet high, with round, rigid, rough *branches*. *Leaves* about the extremities of the branches, three inches long, ſomewhat coriaceous; ſmooth and ſhining above; paliſh and hairy or downy beneath, with a prominent hairy rib and veins. *Footſtalks* ſtout, ſilky, three-quarters of an inch long. *Stipulas* very ſhort, fringed. *Flower-ſtalks* axillary, oppoſite, twice the length of the footſtalks, ſilky, each bearing three large, nearly ſeſſile, *flowers*, whoſe globular *germen*, and large ovate ſegments of the *calyx*, are entirely clothed with long, denſe, ſilky hairs; as are alſo the lanceolate *bracteas*.

14. R. *hirſuta*. Rough Rondeletia. Swartz Ind. Occ. v. 1. 371. Willd. n. 12.—"Leaves oblong, acute, hairy. Stalks axillary, three-forked, lax. Flowers hairy."—Native of buſhy hills, in the ſouth part of Jamaica, bloſſoming in January. A *ſhrub* ſix feet high, with a ſmooth *ſtem*, and rough, lax, ſlightly compreſſed *branches*. *Leaves* on ſhort, hairy, reddiſh ſtalks, oblong, broadiſh in the middle, ribbed, veiny, hairy on both ſides, pale beneath. *Stipulas* broad, ovato-lanceolate, long and hairy. *Flower-ſtalks* oppoſite, ſlender, about the length of the leaves, twice three-cleft, lax, hairy. *Flowers* ſtalked, yellowiſh, externally hairy. *Bracteas* minute, linear, acute, hairy. Differs from *hirta*, n. 3, in having leſs rigid *leaves*, with lax, not ſtiff, *branches* and *flower-ſtalks*. *Swartz*. We have ſeen no authentic ſpecimen; for one marked *hirſuta*, by the younger Linnæus in his herbarium, ſeems rather to be Swartz's *hirta*. The deſcriptions of theſe two ſpecies are not at all well contraſted.

The diviſion of this genus into two ſections, by the number of the ſeeds, is better omitted, as it ſeparates ſpecies moſt nearly akin, and is beſides very uncertain. All have the rudiments of ſeveral ſeeds in each cell of the germen, though a greater or leſs number is perfected in ſome than in others, or rather perhaps, according to circumſtances, in the ſame.

Rondeletia, in *Gardening*, contains plants of the woody, exotic, ſtove kind, of which the ſpecies cultivated is the American rondeletia (R. americana).

Method of Culture.—This plant may be increaſed by ſowing the ſeeds on a moderate hot-bed in the early ſpring, and when the plants have attained a little growth they ſhould be removed into ſeparate pots, being plunged in the bark-bed of the ſtove, where they are to remain and be managed as other tender exotic plants of a ſimilar kind. They afford variety in ſtove collections.

RONDENCHE, in *Geography*, a town of Ruſſia, in the government of Riga; 28 miles S.W. of Narva.

RONDERO Bay, a bay on the N.E. coaſt of Antigua. N. lat. 17° 15′. W. long. 61° 26′.

RONDINE, in *Ichthyology*, a name by which ſome authors have called the *milvus*, or flying-fiſh.

Rondine *Peſce*, a name by which ſome have called the *hirundo piſcis*, or ſwallow-fiſh, called by others *mugil alatus*.

RONE, in *Geography*, a ſmall iſland near the W. coaſt of Scotland. N. lat. 58° 26′. W. long. 4° 55′.

RONEBY, a town of Sweden, in the province of Blekingen; 10 miles W. of Carlſcrona.

RONES, a cape on the W. coaſt of the iſland of Jerſey; 6 miles N.N.W. of St. Helice.

RONGOS, or Pongos, trumpets, or rather French horns, of the kingdom of Loango, in Africa. Theſe inſtruments are made of ivory, and reſemble hunting-horns of the ancients: their wideſt diameter at the mouth is an inch and a half, or two inches; they are of various kinds, and probably ſerve for treble and baſe to each other. It is pretended, that many rongos united produce a very *harmonious* effect. (Supplement to the folio Encyclopédie.) The editor of the article forgot that, out of Europe, treble and baſe performing together, except in octaves, is unknown, and that harmonious effects can be no otherwiſe produced.

RONNE, in *Geography*, a river of France, which riſes about a league N. of Leuze, and runs into the Scheldt, between Tournay and Oudenarde.

Ronne, or *Ronde*, a ſea-port town of Denmark, in the iſland of Bornholm, the reſidence of the governor. The harbour is not deep, but well fortified.

RONNEBURG, a town of Saxony, in the principality of Altenburg; 12 miles S.W. of Altenburg. N. lat. 50° 48′. E. long. 12° 5′.

RONNEBY. See Rotneby.

RONNEN, a ſmall iſland of Denmark, near the N.W. coaſt of the iſland of Laland. N. lat. 56° 5′. E. long. 11° 15′.

RONNSKAR, a ſmall iſland on the W. ſide of the gulf of Bothnia. N. lat. 65° 3′. E. long. 18° 24′.—Alſo, a ſmall iſland on the E. ſide of the ſame gulf. N. lat. 63° 29′. E. long. 22° 2′.

RONO, a ſmall iſland on the W. ſide of the gulf of Bothnia. N. lat. 63° 5′. E. long. 18° 24′.

RONOBO, a river of the iſland of Celebes, which runs into Sewa bay, N. lat. 1° 33′. E. long. 120° 46′.

RONOUMENA, a river of Madagaſcar, which runs into the ſea at Port St. James.

RONSARD, Peter de, in *Biography*, a French poet of conſiderable celebrity, was born in the year 1524, of a noble family, in the Vendomois. He was educated at the college of Navarre in Paris; but he quitted his ſtudies at an early age, and entered into the ſervice of the duke of Orleans. From the ſervice of this prince he was transferred to that of James V. of Scotland, who had married Magdalen of France. With this ſovereign he paſſed two years, partly in Scotland, and partly in England; and then returning to France, was again taken into the employment of the duke of Orleans. He accompanied Lazare du Baif to the diet of Spire, who inſpired him with ſuch a taſte for the belles lettres, that he applied himſelf with aſſiduity to the Greek language. He at length entirely devoted himſelf to poetry, by which he obtained the title of the prince of the poets of his time. He obtained the firſt prize at the floral games of Touloufe, and the ordinary recompence being thought unequal to his merit, he was preſented by the city with a Minerva of maſſy ſilver. He was patronized by five ſucceſſive kings of France, eſpecially Charles IX., who maintained a poetical correſpondence with him. Mary, queen of Scots, who greatly eſteemed him, made him a rich preſent. He had ſome benefices conferred upon him, though he was not in prieſt's orders; and he diſplayed great zeal in oppoſing thoſe of the reformed religion, againſt whom he fought, in 1562, at the head of the Vendomois. Like many religious zealots, he made his faith ſtand in-

ſtead of morals, being deeply addicted to licentious pleaſures, by which he brought on a premature old age. In the latter years of his life he was a penitent, and felt deep contrition for the licentiouſneſs of his muſe at an earlier period, and reſolved for the future to confine himſelf to ſacred ſubjects. He died in 1585, at the age of 61, and his memory was honoured by eulogies from many of the literary characters of the time. The compoſitions of Ronſard were odes, eclogues, epigrams, ſonnets, hymns, and a poem, entitled "La Franciade." Ronſard had a very bad taſte, which rendered him pedantic, and often obſcure; but he poſſeſſed many excellent qualities as a poet, having warmth of temper, a vivid imagination, and great quickneſs of invention. Very few of his works remain; but three of the beſt have frequently been reprinted, *viz.* "La Promeſſe," "Hymne à l'Eternité," and "Les Quatre Saiſons de l'Année."

Ronſard was praiſed by all the poets of his time, and ſtill merits a part of their encomiums. Scaliger dedicated to him a work, as the firſt poet in France. He was handſome in perſon, well made, loved muſic paſſionately, ſung agreeably, and was very liberal. He had a public and magnificent funeral; the ſervice was ſet in florid or figurative counterpoint, animated by all kinds of inſtruments: it was ſung by the children of the chapel-royal by order of the king, who regretted extremely the death of ſo eminent a perſonage, the ornament of his kingdom. After his interment, Duperon pronounced his funeral oration. All that were great and illuſtrious at court and in the city attended; and the crowd was ſo great, that cardinal Bourbon, and many other princes and nobles, were obliged to return without being able to gain admiſſion into the chapel of the college of Boncourt at Paris.

RONSBERG, in *Geography*, a town of Bohemia, in the circle of Pilſen; 8 miles W. of Teinitz.

RONSDORF, or Rheinsdorf, a town of the duchy of Berg; 12 miles S.S.E. of Duſſeldorf.

RONSE. See Renay.

RONSEL, a town of Germany, in the county of Mentz; 7 miles S.W. of Lunſchede.

RONSENAC, a town of France, in the department of the Charente; 18 miles E. of Angouleſme.

ROO, in *Agriculture*, a provincial term ſignifying rough or coarſe, in the way of paſtures, or the crops on other ſorts of land.

ROOAC, in *Rural Economy*, a provincial word uſed to ſignify a fog or miſt. See Roak.

ROOAH, in *Geography*. See Rewah.

ROOAHOAGA. See Riou's *Iſland*.

ROOD, a quantity of land, equal to the fourth part of an acre; and containing 40 ſquare perches, or poles.

This is the ſtatute rood by which land is uſually at preſent meaſured; but there are local meaſures in many diſtricts, in which both the rood and acre are conſiderably larger. See Measures.

In Scotland, the rood contains 40 ſquare falls. See Fall.

ROODAUN, in *Geography*, a town of Hindooſtan, in Oude; 22 miles N.W. of Allahabad.

ROODE, or Waveren, an extenſive tranſmontane diviſion of the diſtrict of Stellenboſch and Drakenſtein, in Southern Africa, in the Cape diſtrict, lying behind the mountains of Drakenſtein, and producing abundance of grain, pulſe, fruits, and wine. The paſs of Roode Sand is the only waggon-road in this diviſion, and is diſtant from Cape town about 70 miles. In this diviſion there is a ſmall neat church, and a very comfortable parſonage-houſe, with extenſive vineyards, orchards, garden, and arable land; and contiguous to the church is a row of houſes, the number of which has lately increaſed.

ROODLOFT, the gallery over the entrance into the choir, in our ancient cathedral and abbey churches; in the front of which, looking towards the weſt window, a large rood, or crucifix, was uſually placed.

ROOE, Little, in *Geography*, a ſmall iſland among the Shetlands. N. lat. 60° 43′. W. long. 1° 35′.

ROOF, in *Architecture*, is that part of a building generally conſiſting of two ſloping ſides, which protects its contents or inhabitants from inclement ſeaſons or weather.

The ſlope of the roof muſt be directed by the nature of the climate. The ancient Egyptians, Babylonians, Perſians, as well as other Eaſtern nations, made their roofs quite flat. The Greeks, it would appear, were the firſt people who made roofs with a declination each way from the middle to the edges; and this was very gentle, the height from the ridge to the level of the walls not exceeding one-ninth or one-eighth part of the ſpan, as may be ſeen by many ancient temples now remaining. But in northern climates, ſubject to rain and ſnow, the height of the ridge muſt be very conſiderable. In moſt old buildings in Britain, the equilateral triangle ſeems to have been conſidered as the ſtandard, both in private and public edifices; and this pitch ſeems to have continued for ſeveral centuries, until the extinction of Gothic architecture. At the commencement of this period, the ridge was made ſomewhat lower, and the rafters were three-fourths of the breadth of the building. This was called the true pitch, and ſubſequently the ſquare ſeems to have been conſidered as the true pitch. The heights of roofs were gradually depreſſed from the ſquare to one-third of the width, and from that to a fourth, which now ſeems to be a very general ſtandard. They have even been executed much lower. There are ſome advantages in high pitched roofs: they diſcharge the rain with greater rapidity, the ſnow continues to lie a much ſhorter time on the ſurface, and they are leſs liable to be ſtripped by heavy winds. Low roofs require large ſlates, and the utmoſt care in execution; but they have this advantage, that they are much cheaper, ſince they require ſhorter timbers, and of a much ſmaller ſcantling. The roof is one of the principal ties to a building, when executed with judgment: it binds the exterior walls to the interior, and to the partitions, which act like ſtrong counterforts againſt them.

Roofs are of various forms, which depend on the nature of the plan, the law of the horizontal and vertical ſections. The moſt ſimple form of a roof is that which has only one row of timbers, arranged in an inclined plane, which throws the rain entirely to one ſide. This form is called a ſhed-roof, or lean-too. But the moſt elegant roof for a rectangular building is that which conſiſts of two rectangular planes, of equal breadth, equally inclined to, and terminating in a line parallel to, the horizon; and conſequently the form of the roof is that of a triangular priſm, each ſide being equally inclined to the plane of the wall-head. This form of roof is ſometimes called a pent-roof.

When the form of the plan is that of a trapezium, and the wall-heads properly levelled, the roof cannot be executed on planes, ſo as to terminate in a level ridge. In this caſe, the ſides, inſtead of being planes, are made to wind, in order to have the ſummit parallel to the horizon; but the moſt eligible method is to make the ſides of the roof rectangular planes, incloſing a level ſpace, or flat, in the form of a triangle or trapezium, at the ſummit of the roof.

Roofs, which are flat on the top, are ſaid to be truncated.

Truncated roofs are chiefly employed in order to diminish the height, so as not to predominate over that of the walls.

When all the four sides of the roof are formed by inclined planes, the roof is said to be hiped, and is, therefore, called a hiped roof: the inclined ridges, which spring from the angles of the walls, are called the hips. Roofs of this description are frequently truncated; and when the plan of the walls is in the form of a trapezium, the truncation of the roof becomes necessary.

Roofs which stand upon circular bases, and which have all their horizontal sections circular, and the centres of the circles in a straight line drawn from the centre of the base perpendicular to the horizon, are called revolved roofs.

When the plan of the roof is a regular polygon, or a circle, or an ellipse, and the horizontal sections are all similar to the base, and a vertical section a portion of any curve convex on the outside, the roof is called a dome.

In order to save the expence of lead in rectangular roofs, instead of the flat, a valley is sometimes used, which makes the vertical section in the form of the letter M, or rather an inverted W; and thus it is that this form of roof has obtained the name of an M roof.

Before we proceed to the construction of roofing, it will be necessary to shew upon what principles a body or piece of timber may be supported in various positions.

Theory and Practice of Roofs.

PROP. I.

If a heavy body A B C D (*Plate* XLII. *fig.* 3. *Architecture,*) be suspended by any two inclined strings, D E and C F, in a vertical plane, a right line drawn through the intersection, perpendicular to the horizon, will pass through the centre of gravity of the body.

It is shewn by the writers on mechanics, that if any three forces act upon a point, or a body, their directions will tend to the same point, or be parallel to each other. It is well known that every body acts with its full force in one point only, *viz.* in its centre of gravity, and in a direction perpendicular to the horizon: therefore, if a body is sustained at E and F, it will revolve round these points, until the line G H, passing through the intersection, H, of the two strings, D E and C F, and the centre of gravity G, become perpendicular to the horizon.

Cor. 1.—Hence if any body be supported by two strings, it may also be supported by two planes perpendicular to these strings, provided that the two points of the body supported are in the direction of the strings; for every body, acting upon a plane, acts in a line perpendicular to that plane.

Cor. 2.—Hence, also, a body may be supported by two props in any two directions that may be supported by strings, provided that the surface of the body, at the points of contact, or the ends of the props, be planes at right angles to the strings.

Cor. 3.—Hence all the properties that have been demonstrated of three forces acting upon a body, supposed void of weight, will equally flow from a heavy body supported by two strings, by substituting the weight of the body for the middle force; and hence, if the direction of any force supporting a heavy body be given, the other may easily be found.

PROP. II.

Given the position in which a body should be placed, and the position of a plane supporting the body at one end, to find the position of another plane to support it at another given point, and to find the pressure on the planes, the weight of the body being given.

Through the centre of gravity of the body draw a vertical line, and through any point on which the body rests on the given plane draw a line perpendicular to that plane, meeting the vertical line; from the intersection draw a line to the other point which is to be supported; from that point draw a plane at right angles to this line, which will be the direction of the plane required. And to find the intensity of the forces, take any distance on the vertical line to represent the weight of the beam from the intersection; then on that line, as a diagonal, complete a parallelogram, whose sides are in the directions of the lines, perpendicular to the supporting planes; and the side of the parallelogram, perpendicular to either plane, will represent the force on that plane.

Example 1. *Plate* XLII. *fig.* 2.

Let the body A B C D lie upon the top of the wall K C, at C, so as to touch the lower edge, B C, of the body, at that point C; it is required to find the direction of a plane that will support the lower end at B, and to find the pressure of the body on the wall and on the plane.

Through the centre of gravity, G, of the body draw the vertical line G F; draw C F perpendicular to C B, join F B, and draw B I perpendicular to F B, and B I is the direction of the plane required. On the vertical line G F, make F M to represent the weight of the body, and complete the parallelogram L M N F; then F N represents the force on the wall-head, in the direction F C; and F L the force acting perpendicular to the plane, or in the direction B F. But if the vertical and horizontal thrusts on the wall at C are required, draw N P perpendicular to F G, meeting it in P; then the force F N is resolved into two forces, F P and P N. P N represents the horizontal part of the force, *viz.* that which pushes the wall in a direction parallel to the horizon; and F P the other part, which tends to press it downwards in a direction perpendicular to the horizon.

Example 2. *Fig.* 1.

Let the sloping body, A B C D, be supported by a wall at its lower end, D, which coincides with the surface of the body, and let G be the centre of gravity; it is required to cut a notch out of the body, at the upper end C, so that it may rest upon the top of a wall, which is made to fit the notch, and to find the pressure on the walls.

Draw the vertical line G E, from D draw D E perpendicular to D C, join E C, and make C F at right angles to it; then the notch, H C F, being cut, the body, A B C D, will be at rest. Then to find the pressure on the walls, complete the parallelogram E I K L, having a given angle D E C, and its diagonal on the given line E G. Then if K E represent the weight of the body, I E will represent the pressure in the direction D E, upon the wall at D, and L D the pressure in the direction C E. The horizontal and perpendicular pressures upon each wall may be found, as in the preceding example, by resolving each of the forces, I E and L E, into two; one of which is perpendicular to the horizon, and the other parallel to it.

Scholium.—It must be observed in this example, that the notch, which is cut out at C, will remove the centre of gravity nearer to the lower end D, and consequently alter the slope C F; but as this can only be in a very small degree, the equilibrium will hardly be affected by it, when the notch is very small.

Example

Example 3. *Fig.* 6.

Let one of the corners of a ſloping body, A B C D, reſt upon the top of a wall at D, which is quite level; it is required to find the poſition of a notch, cut out of the upper end C, ſo that the body may reſt upon a wall made to fit the notch.

Let the ſmall part, F C H, be ſo cut, that C H may be parallel to the horizon, then the body will be ſupported by the two walls at C and D. For draw D I, G K, and C L, perpendicular to the horizon, then theſe lines being produced, they may be ſuppoſed to meet at an infinite diſtance. To find the preſſure on the walls: join D C, and produce the vertical line K G to meet it in E; then if G be ſuppoſed to be the weight of the body, the preſſure on D will be $\frac{EC \times G}{DC}$, and the preſſure on C, $\frac{DE \times G}{DC}$.

Example 4. *Fig.* 5.

Let the body A B C D lie with its upper end againſt the vertical face of a wall at C; it is required to find the poſition of a plane ſupporting the lower end D, ſo that the body may be at reſt.

Draw the vertical line G E, and C E, perpendicular to the face of the wall C L; join E D, and draw D F perpendicular to E D, then D F is the poſition of the plane required. Complete the parallelogram E H I K; then the preſſure on D, and on C, and the weight of the body, are to one another as E H, E K, E I.

Example 5. *Fig.* 4.

To ſupport a body A B C D by two props at two given points, E and I, the direction of one of the props, E F, being given.

Draw the vertical line G K, produce F E to K, and draw K I H; and I H is the prop required. On the vertical line G K, take K M to repreſent the weight of the body; and on K M, as a diagonal, deſcribe the parallelogram K L M N; then K L is the compreſſion of the prop E F, and K N the compreſſion of the prop I H.

In order to be underſtood by the reader, it will be neceſſary to explain ſuch terms as are uſed in the ſubſequent part of the article, by way of definitions.

Wall-plates are pieces of timber laid on the wall, in order to diſtribute the preſſure of the roof equally, and to bind the walls together. Theſe are ſometimes called raiſing-plates.

Truſſes are ſtrong frames of carpentry, generally of a triangular form, ſupporting the covering. They are diſpoſed at equal diſtances, and are uſed when the expanſion of the walls is too great to admit of common rafters alone, which would be in danger of being bent or broken by the weight of the covering, for the want of ſome intermediate ſupport. They are variouſly conſtructed, according to the width of the building, the contour of the roof, and the circumſtances of walling below, &c.

Tie is any piece of timber connected at its extremities to two others, acted upon by oppoſite preſſures, which have a tendency from each other; or to extend the tie, as rope or chain.

Straining-piece is any piece of timber, connected at its extremities to two others, acted upon by oppoſite preſſures, which have a tendency towards each other.

Hence a tie acts contrary to a ſtraining-piece. A chain, rope, or ſmall bar of iron, may be uſed for the former; but the latter muſt always be inflexible, being in a ſtate of compreſſion.

Principal rafters are two pieces of timber in the ſides of a truſs, ſupporting a grated frame of timber-work over them, on which the ſlating or covering reſts.

Purlins are horizontal pieces of timber, fixed upon the principal rafters.

Tie-beam is a horizontal piece of timber, connected to two oppoſite principal rafters; it anſwers a twofold purpoſe, *viz.* that of preventing the walls from being puſhed outwards by the weight of the covering, and of ſupporting the ceiling of the rooms below.—N.B. The tie-beam, when placed above the bottom of the rafters, is called a collar-beam.

Common rafters are pieces of timber of a ſmall ſection, placed equidiſtantly upon the purlins, and parallel to the principal rafters: they ſupport the boarding to which the ſlating is fixed.

Pole-plates are pieces of timber reſting on the ends of the tie-beams, and ſupporting the lower ends of the common rafters.

King-poſt is an upright piece of timber in the middle of a truſs, framed at the upper end into the principal rafters, and at the lower end into the tie-beam: this prevents the tie-beam from ſinking in the middle.

Queen-poſts, two upright pieces of timber framed below into the tie-beam, and above into the principal rafters, placed equidiſtantly from the middle of the truſs, or its extremities.

Strutts are oblique ſtraining-pieces, framed below into the king-poſts or queen-poſts, and above into the principal rafters, which are ſupported by them; or ſometimes they have their upper ends framed into beams, which are too long to ſupport themſelves without bending.—N.B. Strutts are often called braces.

Puncheons are ſhort tranſverſe pieces of timber, fixed between two others for ſupporting them equally, ſo that when any force is on the one, the other reſiſts that force equally, and if one break, the other will alſo break. Theſe are ſometimes called ſtuds.

Straining-beam is a piece of timber placed between two queen-poſts at their upper ends, in order to withſtand the thruſt of the principal rafters.

Straining-ſill is a piece of timber placed at the bottom of two queen-poſts, upon the tie-beam, in order to withſtand the force of the braces, which are acted upon by the weight of the covering.

Camber-beams are horizontal pieces of timber, made on the upper edge ſloping from the middle towards each end, in an obtuſe angle, for diſcharging the water. They are placed above the ſtraining-beam in a truncated roof, for fixing the boarding on which the load is laid; their ends run three or four inches above the ſloping plane of the common rafters, in order to form a roll for fixing the lead.

Auxiliary rafters are pieces of timber framed in the ſame vertical plane with the principal rafters, under and parallel to them, for giving additional ſupport, when the extent of the building requires their introduction. Theſe are ſometimes called principal braces, and ſometimes cuſhion rafters.

Joggles are the joints at the meeting of ſtrutts with king-poſts, queen-poſts, or principal rafters; or, at the meeting of principal rafters with king and queen-poſts: the beſt form is that which is at right angles to the ſtrutts.

Cocking, or *cogging*, is the particular manner of fixing the tie-beams to the wall-plates: one method is by dovetailing, and the other is by notching the under ſide of the tie-beam,

and cutting the wall-plate in a reverse form to fit it. This method is far preferable to the other, as it is not liable to be drawn, which the other is very subject to, when the timber shrinks.

Ridge-tree is a piece of timber fixed in the vertex of a roof, where the common rafters meet on each side of it; the upper edge of it is higher than the rafters, for the purpose of fixing the lead which goes over it to cover the ends of the slates in the upper course.

Straps are thin pieces of iron running across the junction of two or more parts of a truss or frame of carpentry, branching out from the intersection in the direction of the several pieces, for the purpose of securing them to each other. They ought always to be double, *viz.* one strap on each side; and their ends strongly bolted to each of the pieces.

The uses of the various parts are illustrated as follows; and here it may be proper to observe, that though every one of the parts above defined may be found in the same roof, it is not necessary that a complete roof should have all these parts; the introduction of many of them depends on the distance of the walls, the contour of the roof, the partitions below, the quantity of head-room wanted in the garret-rooms, &c.

Of common roofs, the simplest construction is that which consists of two rafters, A B and B C, *Plate* XLII. *fig.* 8; D and E are wall-plates, on which the feet A and C of the rafters rest; the bottom of the rafters is cut in the form of a right angle (called by workmen a bird's mouth), reversed to the wall-plate, and is fixed to it with nails; but this form can only be applied to buildings that have their walls at no great distance from each other.

The next form is that of having two rafters, A B, B C, *Plate* XLII. *fig.* 7, a collar-beam D E, with two wall-plates, F and G, below. This form will admit of a greater distance between the walls than the other: the beam is placed in the situation D E, in order to give head-room within; but when the span, F G, of the walls is considerable, the parts A D and C E being considered as levers, and acted upon by the re-action of the walls, the rafters are either liable to be broken at the points D and E, or curved with a concavity on the upper edges.

The third form of common roofs consists of two rafters, A B, B C, *Plate* XLII. *fig.* 10, a tie-beam A C, for preventing the rafters from pushing out the walls, a collar or straining-beam D E, and two puncheons, or studs, F G and H I, for keeping the rafters straight: this construction is used for cheapness, and may be executed with safety in houses not exceeding forty-five feet wide; but it is necessary to have partitions immediately below, or at no great distance from the studs. Instead of supporting every opposite pair of rafters, as in this example, in many roofs of this construction, the rafters take the place of principals, and are fixed at 7, 8, 9, or 10 feet from each other, and purlins run over the heads of the puncheons at K and L; and at the ends of the collar-beams at M and N, between every two rafters, small rafters are fixed to the purlins, the wall-plates at bottom, and the ridge-tree at the top.

The most simple construction of a truss is that consisting of the following parts, *Plate* XLII. *fig.* 9. A B the tie-beam, cocked upon the wall-plates C and D; E K the king-post; A G and B H principal rafters, fixed to the king-post at the joggles, G and H; L M and N O struts, mortised into the rafters at L and N, and joggled to the king-post at M and O. Other names of timbers will be fully illustrated by the descriptions of other roofs in due order of succession. What has been said may suffice for the present.

Prop. III.

The position of several rafters, A B, B C, C D, D E, &c. *Plate* XLIII. *fig.* 1, being given in a vertical plane, joined together and moveable about the angular points B, C, D, E, &c. while the points A and G remain stationary; it is required to find the proportion of the forces at the angles, so that the rafters may be kept in equilibrio.

Through the points B, C, D, E, &c. draw the vertical lines B i, C m, D p, E s, &c. being the direction of the forces. Make B i of any indefinite length, and complete the parallelogram B h i k. Make C l equal to B k, and complete the parallelogram C l m n. Proceed in this manner with all the remaining parallelograms, making the two opposite forces in the direction of each rafter equal to each other, and the diagonals, B i, C m, D p, E s, &c. will represent the forces required, as is evident from the construction. Then, to find the proportion of the weights upon any two angles, the sine of any angle is the same with the sine of its supplement, therefore the sine of the angle A B C is the same as the sine of K b k, or B k i; and the sine of B C D the same as the sine of C n m; likewise the sine of the angle C m l is equal to the sine of the alternate angle m C n, and the sine of the angle D p o is equal to the sine of the angle p D q; moreover, the sine of the angle i B k is equal to the sine of the angle m C l, and the sine of the angle m C n is equal to the sine of the angle p D o, and so on: then, because the sides of triangles are as the sines their opposite angles, it will be by trigonometry,

B i : B k, or C l :: S · B k i, or A B C : S . B i k, or i B b
C l : l m, or D o :: S . C m l, or m C n : S . m C l, or i B k
D o : o p, or E r :: S . D p o, or p D q : S . p D o, or m C n
E r : s r, or F u :: S . E s r, or v F u : S . s E r, or p D q
F u : F v :: S · F v u, or v F w : S . v u F, or E F G

Therefore B i : F v :: S . A B C × S . v F u × S . v F w
: S . i B b × S . i B k × S . E F G

$$\text{Therefore B } i : \text{F } v :: \frac{\text{S.ABC}}{\text{S.}i\text{B}b \times \text{S.}i\text{B}k} : \frac{\text{S.EFG}}{\text{S.}v\text{F}u \times \text{S.}v\text{F}w}$$

That is, the weights on any two angles are as the sines of these angles directly, and reciprocally as the product of the sines of the two parts of these angles, divided by the vertical lines.

Cor. 1.—Hence the weights on any two angles are as the sines of the angles directly, and as the product of the cosines of the two parts of these angles reciprocally. For draw B H perpendicular to B i, and produce i B and A B to I and K; then will the angle K B I, equal to the angle b B i, be the cosine of the angle H B K; *viz.* the cosine of the angle of elevation of the rafter A B above the horizon; and because C B I is the supplement of i B C, the angles C B I and C B i have the same sine, and the angle C B I is the cosine of the angle H B C; *viz.* the angle of elevation of the rafter B C.

Cor. 2.—Hence also, the weights on any two angles are as the sines of the angles directly, and as the products of the secants of elevation jointly, because the secants of any two angles are reciprocally as the cosines of these angles.

Cor. 3.—The force which any rafter makes in its own direction is as the secant of its elevation. For make A P equal to B b; draw the lines P N, k H, n L, &c. parallel to the vertical lines B i, C m, &c. and draw A N, B H, C L, &c. parallel to the horizon; then because the angles N A P, H B k, L C n, &c. are the angles of elevation, and A N, B H, C L, &c. are all equal, if A N, B H, C L, &c. be considered as radii, A P, B k, C n, &c. are the secants of elevation, which also represent the forces on the rafters.

Cor. 4.—Hence the horizontal pressures at A and G are equal;

equal; for all the perpendiculars drawn from the oppofite angles of each parallelogram to meet the vertical diagonal, are all equal.

Cor. 5.—Hence, if the pofition of any two rafters, and the proportion of the weights, be given, the pofition of the remaining rafters may be determined.

Cor. 6.—If the vertical line S D V be drawn, the horizontal line A V G, and the lines A S, A R, A Q, A T, &c. be drawn parallel to the rafters A B, B C, C D, D E, &c. meeting the vertical line in S, R, Q, T; then will A S, A R, A Q, A T, repreſent the forces, and S R, R Q, Q T, the forces upon the angles; for A S, A R, A Q, A T, &c. are the ſecants of the elevation, and the triangles A S R, A R Q, A Q T, are all ſimilar to the triangles *h* B *i*, *l* C *m*, *o* D *p*, &c.

Cor. 7.—In every roof kept in equilibrio by the weights of the rafters, if U, V, W, &c. be the centres of gravity of the rafters, and alſo repreſent their weights; then the weight preſſing vertically on B, will be $\frac{AU \times U}{AB} + \frac{VC \times V}{BC}$, and the weight on C $= \frac{VB \times V}{BC} + \frac{WD \times W}{CD}$ and ſo on; hence $\frac{AU \times U}{AB} + \frac{VC \times V}{BC} : \frac{VB \times V}{BC} + \frac{WD \times W}{CD} :: \frac{S.ABC}{S.hBi \times S.iBk} : \frac{S.BCD}{S.lCm \times S.mCn}$.

Cor. 8.—Hence, if the rafters be priſmatic figures, the weights on the angles B, C, D, &c. will be reſpectively as $\frac{AB + BC}{2}$, $\frac{BC + CD}{2}$, $\frac{CD + DE}{2}$, and ſo on.

Prop. IV.

Given the vertical angle of a roof, and the proportion of the rafters on each ſide, to deſcribe the roof to a given width, ſo that it ſhall be in equilibrio.

Let the proportion of the rafters from the top downwards be as 2, 3, 4, that is, as 4, 6, 8; then the weight on the vertical angle is $\frac{4+4}{2} = 4$; on the next ſucceeding angle $\frac{4+6}{2} = 5$; and on the bottom angle $\frac{6+8}{2} = 7$. (*Plate* XLIII. *fig.* 2.) Now let A B C be the given angle. Make B A equal to B C; join A C, and draw D B E perpendicular to A C; then make D B to repreſent half the weight of the vertical rafter: let B D be divided into two equal parts; make B M five of theſe parts, and M E ſeven; join M A, M C, E A, E C; then from any ſcale of equal parts, make B F and B G each two parts; draw F H and G I parallel to M A and M C, and make F H and G I each equal to three equal parts of the ſame ſcale. Laſtly, draw H K and I L parallel to E A and E C, and make H K, I L, each equal to four equal parts; then K H, H F, F B, B G, G I, I L, are the rafters, in the proportion required.

How to reduce this proportion of figure to a given width is obvious; it is only drawing a figure, having a given ſide in the ſame proportion as another.

Prop. V.

The angular points at the meeting of every two rafters of a roof in equilibrio, by equal weights hung at the angles in vertical directions, equidiſtant from each other, are in the curve of a parabola.

Let A B C D E, &c. (*Plate* XLIII. *fig.* 3.) be kept in equilibrio by equal weights, ſuſpended at the angular points B, C, D, E, &c. in the equidiſtant directions B F, C G, D H, E I, &c. the points A, B, C, D, E, &c. are in the curve of a parabola.

For let B F meet A N at F. Draw A K parallel to D E, A L parallel to C D, and A M parallel to B C, cutting F B at K, L, M. Draw B Q, C P, D O, parallel to A N, cutting the middle line I E at Q, P, O.

Then, becauſe the weights on the angles are equal, F K, K L, L M, M B, are alſo equal, the firſt excepted, being half, or as the numbers 1, 2, 2, 2; therefore F K, F L, F M, F B, are as the odd numbers 1, 3, 5, 7: but becauſe of the equidiſtant lines B F, C G, D H, E I, &c. and the parallels D O, C P, B Q, A I, the triangles A F K, A F L, A F M, are reſpectively equal and ſimilar to the triangles D O E, C S D, B R C; therefore K F is equal to E O, L F equal to D S, and D S equal to O P, M F equal to C R, and C R equal to P Q: and laſtly, B F is equal to Q I; therefore E O, O P, P Q, Q I, are to one another as the numbers 1, 3, 5, 7; and E O, E P, E Q, E I, are as the ſquare numbers 1, 4, 9, 16; but the lines O D, P C, Q B, are to one another as 1, 2, 3, 4; therefore the abſciſſes E O, E P, E Q, E I, are as the ſquares of the ordinates O D, P C, Q B, I A, and the points A, B, C, D, E, are placed in the curve of a parabola. In the ſame manner it may be ſhewn, that this is the caſe, whatever be the number of ordinates.

Corol.—Hence a roof of this conſtruction may be deſcribed to any given height and vertical angle, or to a given width and height, with any number of rafters on each ſide.

Example.—To deſcribe a roof with any given number of rafters on each ſide to a given width and height, ſo that all the vertical lines paſſing through the angular points of the rafters ſhall be equidiſtant, and the rafters in equilibrio.

Let there be four rafters on each ſide, (*Plate* XLIII. *fig.* 3.) Let I N be half the width, and I E the height. Draw N T and E T parallel to I E and I N; divide N T into four equal parts N *f*, *f c*, *e d*, *d* T, and draw *d g* E, *e h* E, *f i* E; likewiſe divide I N into four equal parts I *c*, *c b*, *b a*, *a* N, and draw *c g*, *b h*, *a i*, parallel to I E. Join E *g*, *g h*, *h i*, *i* N, and theſe lines will be the rafters of half the roof required.

For let C B (*Plate* XLIII. *fig.* 4.) be the height, and A B half the baſe. Draw C D parallel to A B, and A D parallel to B C. In A B take any point *a*, and divide A D, ſo that *b* D may be to A D as B *a* to B A. Join *b* C, draw *a c* parallel to B C, meeting *b* C at *c*; and *c d* and *b e* parallel to A B, cutting B C at *e* and *d*, then the triangles C *d c* and C *e b* are ſimilar.

Therefore C *d* : C *e* :: *c d* : *e b*, or A B
And by conſtruction, C *e* : C B :: *a* B or *c d* : A B or *b e*
Therefore C *d* : C B :: cd^2 : AB^2
Therefore the point C is in the curve of a parabola.

Another method may be as follows: Let B E (*Plate* XLIII. *fig.* 4.) be half the width, B C the height. Produce B C to F, making C F equal to C B. Divide C F into four equal parts, C *f*, *f g*, *g h*, *h* F, and join *f* E, *g* E, *h* E. Divide B E into four equal parts, B *i*, *i k*, *k l*, *l* E, and draw the lines *i m*, *k n*, *l o*, parallel to B C, cutting the former lines *f* E, *g* E, *h* E, at *m*, *n*, *o*; the points *m*, *n*, *o*, are in the curve of a parabola. For the principles of this conſtruction, the reader may conſult Theorem VII. p. 123. vol. ii. Hutton's Mathematics.

Prop. VI.

To deſcribe a roof with four equal rafters, that ſhall be in

in equilibrio by the weight of the rafters; of a given width A E, *Plate* XLIII. *fig.* 5, and height F C.

Join E C, and bisect it in H, by a perpendicular D H G, meeting A E in G; on G, as a centre, with the distance G E or G C, describe the circle C E O. Draw K H I parallel to F E, meeting the vertical line O C in K, and the circle in I. Draw I D C, and join D E; then make the side C B A similar to C D E, and A B, B C, C D, D E, will be the rafters of the roof required.

For complete the parallelogram C D Q B, and join B D, I F, and draw C L perpendicular to C F, and equal to F G. On L, with the distance G E, describe the circle N I F, meeting the vertical line at N and F; produce E D to meet it also in M, and B C to P.

Then because K F is equal to K C, and R C equal to R Q, the triangles C I F and C D Q are similar; therefore I F is parallel to D Q: and because the two segments N I F and C E O are equal to one another, the angle N I F is equal to the angle C E O, equal to twice the angle C E F, or twice the alternate angle E C L equal to E C D + D C L, but E C D is equal to half the external angle M D C, and D C L is half the angle D C P equal to C D Q. Therefore the angle N I F is equal to the angles M D C + C D Q equal to the angle M D Q, and C F : C N :: C Q : C M; but C F and C N are equal, therefore C Q and C M are equal; but C Q is to C M as the weight on C is to the weight on B; therefore the weights on C and B are equal, and the rafters A B, B C, C D, D E, are in equilibrio.

Prop. VII.

Suppose it were required to construct a curb roof, the bottom rafter being in proportion to the upper rafter, as 2 to 3, and to a given vertical angle at the top, and to be of a given width A B, *Plate* XLIII. *fig.* 6.

Now the weight on the upper angle is to the weight on the lower angle, as $\frac{2\,HI}{2}$ is to $\frac{HI + IA}{2}$, that is, as $\frac{3+3}{2} = 3$ is to $\frac{3+2}{2} = 2\frac{1}{2}$; this is in the proportion of 6 to 5, or the half weight at H is to the bottom weight at I, as 3 is to 5.

Bisect A B by the perpendicular C D, and make the angle A E C equal to half the vertical angle, or the angle E A C equal to its complement. Make E D to E C as 5 to 3. Join D A and D B. Take A G of any length; draw F G parallel to A E, and make A G to G F as 2 to 3. Draw A F H, meeting C D at H; and H I parallel to F G or E A, cutting A D at I; make B K equal to A I, and join K H; then A I H K B is the contour of the roof required. This is so evident from its construction, that it does not require demonstration.

Prop. VIII.

In any roof constructed with two equal rafters only; as the height of the roof is to half the breadth of the building, so is half the weight of the roof to the horizontal thrust, or lateral pressure.

Let A B C, *Plate* XLIV. *fig.* 1, be a roof, having the two equal rafters A B, B C; join the bottom of the rafters A C; draw B D perpendicular to it; complete the parallelogram B E F G, and draw E G, cutting B D in H. Then, because the triangles B H E and B D A are similar, B D : D A :: B H : H E.

Cor. 1.—Hence, in a roof with two rafters and a tie-beam at the bottom, the tension, H E, of the tie-beam is $= \frac{DA \times BH}{BD}$.

Cor. 2.—Hence, also, B D : B A :: B H : B E, that is, as the height of the roof is to the length of the rafter, so is half the weight, represented by B H, of the roof to the compression of the rafters $= \frac{BA \times BH}{BD}$.

Cor. 3.—Half the weight of the roof, the tension of the tie-beam, and the compression of the rafters, are to one another as the height of the roof, half the breadth of the span, and the length of the rafters; for the triangle B H E is similar to the triangle B D A.

Prop. IX.

If a rafter bear any weight, or have a weight uniformly diffused over it, the force tending to break it is equal to the cosine of elevation, multiplied into the weight, divided by radius.

Let A B, B C, *fig.* 2, be two equal rafters; join A C, draw B G perpendicular to it, meeting it in G; and let the weight W be suspended by the string D E. Draw D F perpendicular to A B, and E F parallel to it; then if D E represent the weight, D F will represent the force tending to break the rafter; F E its tendency to push it from B towards A.

Now, because E F is parallel to A B, the alternate angles A D E and D E F are equal, and the angles D F E and A G B are right angles; the triangles E D F and B A G are similar; therefore A B : A G :: D E : D F $= \frac{AG \times DE}{AB}$, that is, as radius is to the cosine of elevation, so is the force employed to its tendency to break the rafter, that is, as R : cos. :: D E : D F $= \frac{\text{cos. elevation} \times DE}{R}$.

Cor. 1.—Hence the weight employed, the pressure in a direction of the length of the rafter at A, the tendency to break it, are as radius, the sine, and cosine of elevation.

Cor. 2.—Because D F $= \frac{\text{cos. elevation} \times DE}{R}$, and because the stress is as the length when the weight is given, the stress is as the cosine of elevation multiplied into the weight, and this product multiplied into the length of the rafter, the radius being a constant quantity.

Prop. X.

To prevent the rafters of a roof, with a tie-beam, from bending in the middle, and to remove lateral pressure from the walls, when there is no beam.

A variety of methods may be used for this purpose; but the best are those where the shortest and least quantity of timber are employed without producing a transverse strain upon any part. When a roof consists of two rafters only, no part of the rafters can be loaded between their extremities, nor indeed will they bear their own weight without producing a concavity on the upper side, which will be greater as the length of the rafter and weight applied to it are greater. Now because the shorter the rafters are at the same elevation, the greater the weight they will bear, and be more able to support their own weight; the thing to be done is to support them by a sufficient number of fixed points

points either from the roof itself, or other immoveable places. There are three points for this purpose; if the rafters have a tie-beam below, that is, at the vertex, and at the two extremities of the rafters, the triangle being immoveable at the angles, every force applied there tends either to compress or extend the sides of the frame without transverse strain.

Examples.—Let it be required to divide each of the rafters into three equal lengths, in order to support two purlins on each side; this may be done, as in *fig.* 3, by pieces, C E, C D, A G, A F, reaching from the two lower angles C and A, and to the opposite sides of the rafters A B and B C, intersecting each other at H and I, and halved upon each other at these intersections: this mode prevents the rafters from sagging, but does not afford any support to the tie-beam. The meeting of so many braces at the same point, too, gives little opportunity of making the ends entirely secure, even though assisted by iron straps. Another mode may be by introducing a king-post, B K, *fig.* 4, to which the strutts D H, E I, F M, G L, may be firmly joggled at H, I, M, L, and mortised to the rafter at D, E, F, G: this method keeps up the middle of the beam, but when the roof is low, and the span great, the strutts, D H and F M, require themselves to be supported, and are much too oblique to prevent a change of figure.

Another method may be as in *fig.* 5, with the king-post in the middle, as before, two queen-posts under the rafters at E and F, two strutts, H E and I F, joggled to the bottom of the king-post at H and I, and to the top of the queen-posts at E and F; and in order to secure the points N and P, two other braces, N Q, P R, are joggled to the bottom of the queen-posts at Q and R, and mortised into the rafters at the upper end. This construction supports the tie-beam in three different points, and each of the rafters in two. The timbers are much shorter than those of the preceding; but so many joggles are certainly an objection to this method, as the shrinking of the timber must be very considerable in three breadths, which would allow the roof to descend. When the span is great, and the points to be supported many, an excellent method may be as in *fig.* 6, where there are two arches of cast-iron or good English oak introduced, which abutt on the king-post, and at the other extremity at the ends of the beam. The rafters and the beam by this mode may be supported by as many equidistant points as we please.

When the tie-beam is removed from the bottom, as in *fig.* 7, and no fixed points are to be found from below, a longitudinal truss may be constructed, the end of which is shewn at A B, and the manner of framing it in *fig.* 9, the two ends being supposed to be firmly fixed into the gables; but where the length is great, the form of *fig.* 10, with a parabolic arch, would be much better: by this method, the rafters will be kept nearly in the same plane, and all lateral pressure from the walls will be removed; for it is evident that if the ridge-tree is supported, there can be no motion downwards in the direction of the rafters, the whole roof being hung to this longitudinal frame.

Prop. XI.

If a roof be constructed with two equal rafters, A M, C M, (*fig.* 8.) and if a tie extend from the bottom of each rafter to an intermediate point in the opposite rafter, and the ties halved together at their intersection B, forming with the rafters a quadrilateral M D B E at the vertex, and two triangles A D B and C E B; then if M D is equal to M E, and if C P represent the direction and quantity of force on the wall at C, the force tending to break the rafters at D and E is $\frac{S.PCK \times S.DME \times LK \times DM}{S.LCK \times R}$.

For complete the parallelogram P C L K; make M N equal to C L, and draw N O parallel, and M O perpendicular to A M. Now the triangles C B E and A B D may be looked upon as solid levers, (at least with regard to forces applied to the angles,) moveable round B. Then the force C P will communicate the force C L to the rafter, and C L is the power acting obliquely at M, upon the rafter A M: then because N O is parallel, and O M perpendicular to A M, O M is the force tending to break the rafter at D; O N that pushing it towards A: let M N be considered radius, then O M will be the sine of the angle D M N, or D M E; for produce A M to Q, and the angle N M Q will be the supplement of the vertical angle D M E, therefore the sine of N M Q, equal to the sine of the angle M N O, is the same with the sine of N M A; then by trigonometry,

$$LK : LC :: S.LCK : S.CKL \text{ or } S.PCK$$
$$NM \text{ or } LC : MO :: R : S.DME = S.MNO$$
$$\text{Therefore } LK : MO :: S.LCK \times R : S.PCK \times S.DME.$$

Hence $MO = \frac{S.PCK \times S.DME \times LK}{S.LCK \times R}$ = the force acting perpendicular to A M at M, but the force tending to break the rafter at D, is as the lever D M multiplied into this force; that is $= \frac{S.PCK \times S.DME \times LK \times DM}{S.LCK \times R}$.

Corol. 1.—Hence, if the angle D M E is a right angle, the force tending to break the rafter at D will be $\frac{S.PCK \times LK \times DM}{S.LCK}$.

Corol. 2.—Hence the rafters of every roof of this construction must sag in a greater or less degree, by the action of the rafters against each other at the point M, that is, they will be bent into curves concave on the upper edges; but if a diagonal connect the two vertical points M and B, this change of figure will be prevented.

Prop. XII.

To remove the lateral pressure of a roof without any intermediate beam, brace, or strutt.

Let A B, B C, (*Plate* XLV. *fig.* 1. N° 2.) be two rafters, and let there be constructed a strong wall-plate D E F G, N° 1, firmly bolted together at the angles; then if the roof is to be gable-ended, after having fixed the rafters to a common ridge-tree, let two curves be made of cast-iron, or good English oak, of a parabolic form, and let into the rafters, either on the upper or under surface, and firmly secured to them by bolts or nails, and at their lower extremities to the angles of the wall-plates, the vertex of each curve meeting the ridge-piece on each side of it, or nearly, as may be found convenient. One half of the plan N° 1. exhibits the form for the execution of a gable-ended roof, and the other for a hiped roof. The two sides, laid in plano for each form, are shewn in N° 3 and 4; at H I K L and M N O P, H L and D G represent the same wall-plate; D G, N O, and E F another wall-plate, I K and M P meeting the ridge on each side of it: but it must be observed, when the roof is to be hipt, that the ridge-tree must be very strong, as the compressure will be very great, the hip-rafters acting like powerful braces at the extremities of it. Hence it is evident that the wall-plates act as the tie-beams

beams of a common roof, and the curves as the rafters, or more naturally like an arch of a bridge in equilibrium. It has already been ſhewn that equal weights, acting in equidiſtant lines, require an arch of a parabolic form to keep them in equilibrio. In this it is to be conſidered, that as the arches are placed with their crown upwards, they are in a ſtate of compreſſion, and may be got out very conveniently in ſeveral lengths; but if the arches were inverted they would be in a ſtate of tenſion: each arch muſt then be in one piece; the ridge would be compreſſed by the tenſion of the two curves. This inverted diſpoſition of equilibration is not ſo ſecure as when the crown of the arches either meets the ridge or lies towards it. Though the above conſtruction will prevent lateral preſſure, it will not hinder the rafters from ſagging; but the addition of a collar-beam will effectually anſwer this purpoſe in all moderate ſpans.

Prop. XIII.

Given the conſtruction of a roof, of which not more than three timbers meet at the ſame junction, and a force in the direction of any one of the timbers; to find the forces communicated to the other timbers, ſo that the roof ſhall be in equilibrio.

Begin with the given force, and take a part of the line of its direction from the junction to repreſent it; then with the other two directions complete a parallelogram, and apply them from the next junctions on the ſame ſtraight line from which they were taken, and complete parallelograms as before. Proceed in this manner from one junction to another, until parallelograms have been made at every junction. Then the parts of theſe parallelograms in the directions of the timbers are the forces in theſe directions; then to know the ſtate of tenſion or compreſſion of any timber, obſerve that when two of the angles formed by three directions are leſs than two right angles, the middle force acts always contrary to the two extreme ones, as has already been explained; and that when any two of the angles of direction are greater than two right angles, then the forces will act towards or from the ſame point.

Example 1.—Let A B C D A (*fig.* 2.) be a roof, conſiſting of two rafters, A B, B C, two beams, C D, D A, and a king-poſt, D B, ſupported by the walls A O and C E. Let C E repreſent half the weight of the roof, or the re-action of the wall C E; complete the parallelogram C E F G; make D L equal to F C, and complete the parallelogram L M N D, then C F or D L is the force in the direction of the beam C D or A D, and D M the force in the direction of the poſt D B; then becauſe the angles E C F and F C G are leſs than two right angles, and becauſe the point C is preſſed by the re-action of the wall E C, it will alſo be preſſed by the force G C, and drawn by the force C F; therefore the beam C D is in a ſtate of tenſion, and the rafter B C in a ſtate of compreſſion. Again, becauſe C D B and B D A are greater than the two right angles, and becauſe C D is in a ſtate of tenſion, B D and D A are alſo in a ſtate of tenſion.

If B H be made equal to G C, and the parallelogram B H I K completed, and if B P be made equal to D M, then will P I be equal to twice C E, the preſſure on the walls.

Example 2.—Let A B C D E A (*fig.* 3.) be a roof ſupported by walls in the direction P A and Q C, and let there be two pieces of timber, B D and B E, connecting the angular points D and E to the ridge at B.

Take C F to repreſent half the weight of the roof, or the re-action of the wall Q C: complete the parallelogram C F G H, produce C D to K, make D K equal to G C, and complete the parallelogram D I K L; then G C or D K is the force in the direction of the timber C D or A E, and is in a ſtate of tenſion, becauſe the angles F C G and G C H are leſs than two right angles, and becauſe C F is in a ſtate of compreſſion; C H, the force in a direction of the rafter B C, is alſo in a ſtate of compreſſion; and becauſe any two of the three angles G D B, G D E, E D B, are greater than two right angles, and D C is in a ſtate of tenſion, the two pieces, D B and D E, are alſo in a ſtate of tenſion: that is, E A, E B, E D, D B, D C, are all ties. The force in D B or E B is D L, that in D E is D I.

If B R and B S be made equal to C H, and the parallelogram B R W S completed; and if B T and B U be made equal to L D, and the parallelogram B T V U completed, then will V W be equal to twice C F, that is, by reducing the force in the direction of the pieces B E and B D to an equivalent one.

Prop. XIV.

Given the lengths A B, B C, C D, D E, (*Plate* XLVI. *fig.* 1.) of the rafters of a roof and their angles of poſition, to find thoſe angles that require ties, and thoſe which require ſtrutts.

Let A B be to B C as 3 is to 4, that is, as 6 to 8, the proportion of the weight of the rafters; then if 8 be taken for the weight of each of the upper rafters, $\frac{8+8}{2} = 8$ is the weight on the vertical angle C, and $\frac{6+8}{2} = 7$, will be the weight on each of the vertical angles B and D, ſo that the weight on the vertical angle is to the weight on each of the lower angles, as 8 is to 7. Draw the vertical line B G F, and draw A G, A F, parallel to the rafters B C, C D; then if F G be to G B as 8 to 7, the rafters are in equilibrio, and require no ties. But ſuppoſe it ſhould be found that F G is to G B as 1 to 2; now as that will keep it in equilibrio, it would then require a very conſiderable addition laid on the angle B to keep it from ſpringing outwards, ſo that if two braces, F G and K L, N° 2, were fixed to the rafters A B, B C, C D, D E, theſe braces would be in a ſtate of compreſſion, and if the brace H I were fixed at the top it would be in a ſtate of tenſion: F G and K L only require firm butments, but H I to be well bolted. It may here be obſerved, that if the vertical angle only be braced and ſecured to the two rafters, the whole frame will then be immoveable.

Prop. XV.

To diſcover the effect of bracing the angles of a roof flat on the top, ſupported by puncheons at the bottom of the rafters, to accommodate a ſemicircular ceiling within.

Let A B C D E F (*fig.* 2. N° 1.) be the truſs, diveſted of its braces, the bottoms of the puncheons reſting firmly on the walls at A and F, and the joints at B, C, D, E, to be quite moveable, like rule joints. Now, as this diſpoſition of timbers would fall, and in falling, would aſſume the form of N° 2, the angles at C and D would become more and more obtuſe, while thoſe at B and E would become more and more acute; the latter would therefore require ſtraining-pieces, and the former ties: the ſtraining-pieces muſt have good abutments, and the ties be well bolted at their extremities.

Let N° 3 be the truſs, with braces diſpoſed in the lower angles: this diſpoſition will bend the rafters B C, D E, and the puncheons B A, E F, convex towards the outſide, which

is entirely occaſioned by the braces G H and N O: the camber-beam C D is no otherwiſe affected than by its own weight. Let it now be ſuppoſed, that the angles C and D, N° 4, are braced at I K, L M. In this diſpoſition, the puncheons B A and E F are not affected in reſpect of tranſverſe ſtrains; the rafters C B, D E, and beam C D, would all become concave on the outſide; and the points B and E, at the bottom of the rafters and top of the puncheons, would be puſhed out beyond the perpendicular of A and F, at the bottom: here it is neceſſary to obſerve, that the effect produced in this caſe on the rafters C B and D E is contrary to the effect produced in N° 3, by the braces being diſpoſed in the lower angles. Laſtly, ſuppoſe that all the angles are braced, as in N° 5, it is evident, ſince the braces H G, N O, produce a contrary effect to the braces K I, L M, theſe bending the rafters downwards, and thoſe upwards, that the rafters C B and D E will become nearly ſtraight, or aſſume an undulated line: the puncheons B A and E F, receiving the force of the braces H G and N O at the points G and O, muſt ſtill be bent, ſo long as the under ends G and O of the braces do not coincide with the under ends A and F of the puncheons: in this caſe, there is no other remedy than by giving the puncheons a ſcantling ſufficient to withſtand this tranſverſe ſtrain, or horizontal thruſt, at the points G and O: however, the ſhape of the contour may be pretty well ſecured by introducing two abutments, H I and M N, N° 6; theſe, by being bolted through the two ends, will add greatly to the ſtiffneſs of the rafters B C and D E: the bolts that go through the upper ends may alſo ſerve for the braces I K and L M: the ſhape of the horizontal beam C D will likewiſe be very much preſerved by the piece K L, bolted in three places, one at each end, into the braces I K and L M, and another in the middle: the contour of a roof, thus ſupported, would be quite unchangeable, if the rafters were inflexible; but as this is not the caſe, and as they are acted upon tranſverſely by the braces, the truſs will, therefore, in ſome degree, be expanded at B and E, and conſequently occaſion lateral preſſure on the walls; it will therefore be unfit for an oblong building, without other precautions for this purpoſe. By inſerting parabolic curves in the ſides B C and D E, as in *Plate* XLVI. *fig.* 1, it will be effectually prevented.

In roofs of this deſcription, joggle-pieces of wood ſhould never be uſed, as the ſhrinking of them would tend greatly to alter the outline of the rafters.

Having laid down ſuch principles as will enable the workman to judge of the ſtrength and ſtrain of timbers in the framings of carpentry, it will now be neceſſary to proceed to ſhew the mode of conſtructing roofs to anſwer various purpoſes; to give ſome practical obſervations relative to their ſtrength, and to ſhew the various modes of joining timbers, the forms of ſtraps, &c.

Plate XLVII. *fig.* 1. is the roof of the chapel of the royal hoſpital at Greenwich, conſtructed by Mr. S. Wyatt.

	Inches Scantling.
A A, The tie-beam, 57 feet long, the ſpan of the walls being 51 feet - - -	14 × 12
B, Queen-poſts - - - -	9 × 12
C, Braces - - - -	9 × 7
D, Straining-beam - - -	10 × 7
E, Straining-piece - - -	6 × 7
F, Principal rafters - - -	10 × 7
G, Camber-beam for the platform -	9 × 7
H, An iron rod, ſupporting tie-beam -	2 × 2

The truſſes are ſeven feet clear; the platform is covered with lead, which is ſupported by horizontal beams ſix by four inches.

The timbers of this truſs are well diſpoſed, and perhaps contain leſs wood than moſt roofs of the ſame dimenſions. The iron rod ſeems of no other utility than to prevent the middle compartment of the beam from ſagging.

Fig. 2. is the roof of St. Paul's, Covent-Garden, deſigned by Mr. Hardwick, and conſtructed by Mr. Wapſhot, in 1796.

	Inches Scantling.
A A, The tie-beam, ſpanning 50 feet 2 inches	16 × 12
B, Queen-poſts - - - -	9 × 8
C, Straining-beam - - -	10 × 8
D, King-poſt, 14 inches at the joggle -	9 × 8
E, Strutts - - - - -	9 × 8
F, F, Auxiliary rafters, at bottom -	10 × 8½
H, H, Principal rafters, at bottom -	10 × 8½
I, Studs ſupporting the principals -	8 × 8

This roof is much better conſtructed than the original one by Inigo Jones. A truſs of the preſent deſign contains only 98 cubic feet of timber, whereas that by Inigo Jones had 273, and was very inſufficient at the joggles, and had ſome of its timbers very ill diſpoſed: the interior truſs is well contrived for ſupporting the exterior, which reaches ſeven feet beyond the walls. The tie-beam has perhaps too much camber, being ſix inches; for ſince it acts as a ſtring, it will lengthen in the ſettling of the roof.

Fig. 3. is the roof of Drury-lane theatre, 80 feet 3 inches ſpan, and the truſſes 15 feet apart: conſtructed by Mr. Edward Gray Saunders.

	Inches Scantling.
A, Beams - - - -	10 × 7
B, B, Rafters - - - -	7 × 7
C, King-poſts - - - -	12 × 7
D, Strutts - - - -	5 × 7
E, Purlins - - - -	9 × 5
G, Pole-plates - - - -	5 × 5
H, Common rafters - - -	5 × 4
I, Tie-beam - - - -	15 × 12
K, Poſts to ditto - - -	15 × 12
L, Principal braces to ditto -	14 and 12 × 12
M, Strutts - - - -	8 × 12
N, Straining-beam - - -	12 × 12

The principal beams are truſſed in the middle ſpace with oak braces, five inches ſquare. This was requiſite on account of its width, which is thirty-two feet, that the floors might carry the work-ſhops neceſſary for the uſe of the theatre. This truſs is moſt admirably conſtructed, it is hardly equalled for ſtrength, ſtiffneſs, and lightneſs by any other, and will ſafely bear a load of nearly 300 tuns, which is four times more than ever it is likely to be loaded with.

Plate LVIII. *fig.* 1. is the deſign of a truſs-roof for a church, with a nave and two ſide aiſles. The beam of the middle compartment is kept from ſagging in the middle by two ſtrutts, reſting at the bottom on poſts over the columns, and connected together at the top by a ſtraining-piece. As the poſts firmly ſupport the middle of the rafters, keeping theſe points always ſtationary, there will be little danger of lateral preſſure from a roof of this conſtruction. All that is wanted further is to give the rafters ſtiffneſs, by fixing other pieces from the two fixed points of the tie-beam, and from the two poſts.

Fig. 2. is a deſign for the truſs of a curb-roof, with a door in the middle. The rafters are ſupported at equal diſtances, from

from fixed points of the truſs; the weight of the covering being always uniform, or nearly ſo.

Fig. 3, N° 1, a deſign for a roof, with lanterns in ſeveral ſtages, diminiſhing in the form of ſome Chineſe buildings. Theſe towers may be carried to any height, at pleaſure, by always truſſing in the plane of the diagonal between every two ſtages from the lower, to ſupport that immediately above. There are ſome excellent ſpecimens to be ſeen in the buildings of Deptford, belonging to the victualling office, called uſually the Red-houſe. N° 2. is a plan for the ſeat of the upper ſtage.

Fig. 4. is the deſign of a conic roof for a rotunda or circular building, ſupporting a lantern at the top. If the extent of the building is very large, the rafters would require to be ſupported in the middle; for this purpoſe the bottom piece may be continued, as is expreſſed by the dotted lines.

Fig. 5. is a deſign for a pent roof, ſupporting a lantern of an octagonal form. N° 1. is the form of the truſs; N° 2, the lower plan, with the ſeat of the poſts; N° 3, the plan of the upper part; N° 4, the truſs of the two tranſverſe parts.

Having deſcribed the form of roofs ſupporting lanterns, and the truſſes in which they may be executed with ſafety, it will now be proper to give a few examples of domes, and ſhew how they may be conſtructed under various circumſtances. If the dome to be conſtructed be on a circular plan, and have no lantern above, the ribs may be built in the following manner, with planks of convenient lengths in three thickneſſes. Having aſcertained the length of the ribs, and the number of pieces in that length, and having properly ſhaped all the pieces to the curve, the middle piece at the bottom may be one of theſe lengths; to each ſide may be joined two other pieces, one reaching to a third of the middle piece, and the other to two-thirds from the bottom; ſo that by continuing with planks of the whole length to the other extremity of the rib, the middle thickneſs will always be covered two-thirds from the bottom on one ſide, and one-third on the other; the deficiency at the top muſt be filled up with pieces, one of a third and the other of two-thirds, as at the bottom; the whole, being well bolted together and ſtrapped acroſs the joints, will be nearly as ſtrong as a ſolid rib. *Plate* LIX. *fig.* 1 ſhews the manner of conſtructing this kind of dome; N° 1 being the ſemi-plan, N° 2 the elevation, N° 3 the manner of building the rib. In domes of this kind it may ſometimes be neceſſary to diſcontinue the ribs, in order to divide the ſpaces more equally for the horizontal ribs. It is evident that a dome built in this manner may be carried almoſt to any degree of extent, provided that it have a ſufficient number of horizontal ribs. Of this conſtruction is the Halle du Bled at Paris, of 200 feet in diameter, the invention of a judicious carpenter, the Sieur Molineau, a man of little education in the point of ſcience, but of conſiderable mechanical experience, from which he formed his theory. Being convinced that a very thin ſhell of timber might not only be ſo ſhaped as to be nearly in equilibrio, but that, if well connected with horizontal ribs, it would have all the ſtiffneſs that was neceſſary; he accordingly preſented his ſcheme to the magiſtracy of Paris: the grandeur of the idea pleaſed them, but they doubted of the poſſibility of its being put in practice. Being a great public work, they prevailed on the Academy of Sciences to conſider it. The members, who were competent judges, were ſtruck with the juſtneſs of Mr. Molineau's principles, and aſtoniſhed that a thing ſo plain had not become familiar to every houſe-carpenter. It quickly became an univerſal topic of converſation, diſpute, and cabal in the polite circles of Paris. But the Academy having given a favourable report of their opinion, the project was immediately carried into execution and ſoon completed, and now ſtands as one of the greateſt exhibitions of Paris. The circular ribs which compoſe this dome conſiſt of planks 9 feet long, 13 inches broad, and 3 inches thick, made in three thickneſſes, as in that already deſcribed. At various diſtances theſe ribs were connected horizontally by purlins and iron ſtraps, which made ſo many hoops to the whole. When the work had reached ſuch a height, that the diſtance of the ribs was two-thirds of the original diſtance, every ſecond (now conſiſting of two ribs, very near each other,) was in like manner diſcontinued, and the void glazed. A little above this the heads of the ribs are framed into a circular ring of timber, which forms a wide opening in the middle, over which is a glazed canopy or umbrella, with an opening between it and the dome, for allowing the heated air to get out. All who have ſeen this dome ſay, that it is the moſt beautiful and magnificent object they ever beheld.

The only difficulty which occurs in the conſtruction of wooden domes, is when they are loaded in the upper part by a heavy lantern or cupola. Such a dome as has now been deſcribed would be in danger of being cruſhed at the top inwardly; the moſt effectual method of preventing which is by making the ribs in the form of truſſes, as in *Plate* LIX. *fig.* 2, where the ſtraight pieces connecting the two extremities of the exterior ſide, forming as it were the baſe of a truſs in a common roof, act contrary to the nature of a tie-beam; they reſiſt the vertical preſſure of the lantern, without having any tendency to burſt out the ſides, by acting entirely longitudinally on the wall-plate. In order to ſecure the lantern, horizontal braces are fixed from the bottom of the lantern to the middle of the principal braces under the joggles, ſo that the whole is reſolved into triangles, which are all immoveable at the angles. The wall-plates ſhould be framed as the ribs of a dome, conſtructed as in the laſt example.

When a dome is to ſupport a heavy cupola of ſtone, ſuch a conſtruction as that of the cathedral of St. Paul's, London, may be employed. *Fig.* 3. N° 1. exhibits the truſs of this dome, taken from accurate meaſurement. A *a a* A, a dome of brick, two bricks thick, which, as it riſes every five feet, has a courſe of ſtrong bricks 18 inches long, bonding through the whole thickneſs. B *b b* B is a cone, built with bricks one foot ſix inches in thickneſs, for ſupporting the heavy cupola above, of Portland ſtone, which is 21 feet diameter, and near 61 feet high, and alſo the timber-work of the dome. The horizontal or hammer-beams, C,C, &c. being curiouſly tied to the corbels D, D, D, &c. with iron cramps, which are bedded into the corbels with lead, and bolted to the hammer-beams. N° 2. ſhews more particularly the manner of tying the hammer-beams to the corbels.

This dome is boarded from the baſe upwards, and the ribs are therefore fixed horizontally, having their ſides in planes tending to the centre of the dome. The contour of the dome is formed of two circular ſegments, which meet in the axis like a pointed arch. The ſcantlings of the curve rib of the truſs are 10 inches by 11½ at the bottom, and 6 inches by 6 at top. It has a very ſtrong double iron chain, linked together at the bottom of the cone, and ſeveral other leſs ones between that and the cupola, which may be ſeen in that beautiful ſection of St. Paul's, engraved by Rooker. This dome was turned upon a centre, which was ſupported without any ſtandards from below. As every ſtory of the ſcantling was circular, and the ends of the ledgers meeting like ſo many rings, and truly wrought, it ſupported itſelf; and as it was both centering and ſcaffolding it remained for the

the uſe of the painter, there being a ſpace of twelve feet between it and the dome. This machine, it is ſaid, was original of its kind.

Roof, *Rotative*, or *Rotatory*, in *Aſtronomy*, is one which is made to turn round in a horizontal direction, ſo that its openings or doors may be directed to any azimuthal line in the concave expanſe of the heavenly regions. In a tranſit room, where a meridian line is the only one that is wanted, a fixed roof, with trap-doors opening at different altitudes above one another, ſufficiently anſwers the purpoſe of the aſtronomer; but in an obſervatory, where an inſtrument that meaſures azimuths as well as altitudes is placed; or where a good teleſcope, of either the achromatic refracting, or reflecting conſtruction, is uſed, for viewing the ſtars and planets in various parts of the heavens on the ſame evening, a rotative roof is indiſpenſably requiſite. The conſtruction which has been moſt generally adopted, and which we ſhall firſt deſcribe, was contrived by the ingenious Mr. Smeaton, one of whoſe papers, of the date of 1788, now lying before us, was deſigned for the late Mr. Aubert's obſervatory at Highbury, and will ſupply us with materials ſufficient for the purpoſe of illuſtration. In *Plate* XXII. of *Aſtronomical Inſtruments*, *fig.* 1. repreſents a ſection of the whole roof along that plane, which paſſes through the doors, or opening, that divides it into two equal portions; *fig.* 2. is the plan of the ſame, and ſerves to illuſtrate *fig.* 1; in both theſe, *a*, *a*, are the rafters, or door-cheeks, covered by two oblong doors meeting at the apex, and ſo contrived by cloſe fitting, as to exclude the rain and ſnow when nicely made. An enlarged ſection acroſs one of theſe doors is ſeen in *fig.* 3, and will be explained preſently. The frame of the roof is covered with alternate boards of deal of a triangular ſhape, tongued into one another at the edges, and when perfectly put together with ſtrong glue, and ſeveral times painted over, will be light, and will laſt ſeveral years; but if a coat of copper, particularly of tinned copper of Mr. Wyatt's patent manufactory, be ſuperadded, the weight will not be conſiderable, and the durability will be enſured. A ſquare foot of Mr. Wyatt's copper of the thinneſt kind weighs a pound, and therefore a given number of ſquare feet will be covered by ſo many pounds weight. An edge plate, formed into a circle, terminates the eaves, and conceals a ſtrong annular ſupport, which reſts on ten rollers, five of which are ſeen in *fig.* 1, three as circles, and two at the extremities of the roof in ſection as ſmall parallelograms. All the ten rollers are repreſented in the ring ſeen in *fig.* 4, which is united by five pairs of hinges that connect the five equal portions thereof, as ſeen on the plane of the ring; while each of theſe five portions contain two rollers ſeen in ſection, and one handle projecting inwards. The uſe of the hinges is to allow each of the five portions of the ring to yield to the preſſure of the ſuperincumbent roof, in order that all the rollers may be made to act in every poſition of the roof, in the event of any of the parts becoming diſtorted or partially worn. This ring, which receives the pivots of the rollers, lies intermediate between the roof and fixed circle that bears the whole weight, and is repreſented by the letters *b*, *b*, in *fig.* 1, the fixed circle or bed being denoted by the letters *c*, *c*; both which, in the ſection, appear as ſtraight lines, though they are circles or rings, as above deſcribed, and the fixed one, *c c*, reſts on ſtrong upright pieces, *d*, *d*, properly braced by frame-work, which it is not neceſſary to ſhew. From this ſhort deſcription the reader will now conceive that the roof is ſeparated from the bed *c c*, by exactly the whole diameter of the rollers, which therefore ought to be turned nicely to the ſame dimenſions, in order to preſerve the horizontal poſition of the ring, and to make the rollers act ſmoothly, when the roof is puſhed round by any force internally applied; but unleſs ſome proviſion is made, more than we have yet deſcribed, the roof might be puſhed from its bed, and be upſet; to avoid this accident a groove is made along the upper face of the annular bed *c c*, in which the rollers move, and while all the parts of this contrivance remain unaltered by the weather, the action of the rollers is uniform, and the conſtruction anſwers its purpoſe in a ſatisfactory manner: but in many inſtances, we learn that the work of turning a large roof, thus conſtructed, becomes laborious, in conſequence of either the ring of rollers, or the groove in the bed, taking an elliptical ſhape, in a ſmall degree, by partial ſhrinking or ſwelling in different ſtates of the atmoſphere; in which caſe the rollers bind in the groove, and require mechanical force to move them, in certain parts of the revolution; which force will of courſe ſtrain the joints, and ultimately deſtroy the union of the different parts of the ſtructure. It is, therefore, of importance that an attention be paid to the grain of the wood, as well as to its being ſeaſoned, before the upper covering be attached; which precaution will prevent the bad effect of external moiſture. At *e*, in *fig.* 3. is one of the hinges of the doors, attached firſt to the ſide of the door, and then to a piece of wood that lies over the roof to receive the ſcrews, without penetrating the roof itſelf; and the crank-ſhape of the ſection of the door will explain how it claſps the door-cheeks, ſo as to exclude the admiſſion of rain or ſnow, ſo long as the materials do not warp or decay. The handle-piece, *f*, puſhes the door back, and brings it cloſe again, by the aid of a ſtaff with a hook at the end, that takes hold of the ring at the lower extremity of the handle *f*, when the roof is too far elevated for the reach of the human hand. During the peruſal of this account of the mechaniſm of Smeaton's rotatory roof, it may have occurred to the reader, that the rollers might have been attached to the annular portion of the roof, which now reſts on the upper extremities of the rollers, and that conſequently the ring, that now carries the ſaid rollers, and that is repreſented by *fig.* 4, might have been omitted. But the inventor had a good practical reaſon for the introduction of this ring, which may not yet have occurred to our reader; and it might perhaps puzzle him to diſcover it, without our aſſiſtance. Smeaton knew very well that the roof with rollers, or ſmall wheels under it, would move in a groove made in the bed to receive them; but he knew, moreover, that, to move in a *circular* groove, the diameters of the rollers could not be *great*, without ſticking faſt againſt the ſides of the ſaid groove; and, alſo, that the pivots of the rollers muſt be *ſtrong*, to ſupport the whole roof. The relative diameters of the rollers, and of their pivots, on which the quantity of friction depends, would not conſequently produce, under theſe circumſtances, the eaſy motion of the roof that conſtitutes a leading object of the aſtronomer: the ring was, therefore, introduced, for the purpoſe of diminiſhing the friction *one-half*, without altering the neceſſary dimenſions of the rollers, and of their pivots; which effect may be thus explained. In the firſt place, ſuppoſing the roof to be moving forwards on rollers attached to it, like a carriage on wheels; in this caſe, the velocity of the roof and of the rollers, or of the carriage and wheels, would be the ſame; and the horizontal diſtance paſſed over in a given number of revolutions of the roller, or wheels, would be meaſured by the circumference of the roller, or wheel, multiplied by its number of revolutions; and the mechanical diminution of friction would be as the diameter of the roller to that of the pivot of the axis, or of the wheel to that of its axle. When a motion is thus produced in a roof, or in a carriage,

a carriage, we may ſay that it *rides* on, or *is carried* by its roller, or wheel, and that with the ſame velocity with which the roller or wheel moves forwards, by virtue of its rotations. But, in the next place, let the rollers be conſidered as attached to the ring in *fig.* 4, which has as many holes cut through it as there are rollers for them to paſs through; and let us conceive this ring to be put in motion, as it is placed on its circular bed *c c*, without any reference to the roof. In this ſituation, the ring rides on, or is carried by the rollers with their velocity, as the roof or carriage was on our firſt ſuppoſition. Let now the roof reſt on wedges placed on the ring, but ſo as *not to touch* the rollers, and it will alſo ride as before, with the velocity of the rollers; but remove the wedges, and let the roof fall upon the upper edges of the rollers, and it will now have two motions combined: for, firſt, it will ride in common with the ring on which it reſts, in the way we have deſcribed; and, ſecondly, it will be urged by the rollers acting on its annular face, as ſo many toothleſs pinions, with a ſimilar velocity with which it *rides* on the rollers, along with the ring; or, in other words, the roof will have *double* the *velocity* of the ring on which the rollers are fixed. To underſtand this effect more clearly, let the reader ſuppoſe himſelf in an open carriage. While he ſits ſtill, he is carried with the velocity of his vehicle; but if he ſhould venture to place his foot on the circumference of one of the wheels, in getting out, while the vehicle is in motion, he will run the riſk of being toſſed forward by the ſaid moving wheel with an *increaſed velocity*, that will convince him of the danger of ſuch an experiment. This effect is familiar to all, but the cauſe is not generally conſidered, perhaps but little underſtood.

In order that the adaptation of all the parts that are connected with the rollers may be the more evident, we have given an enlarged ſection of one corner of the roof, near the eaves, within the ring of *fig.* 4, which, therefore, may be conſidered as a ſeparate figure, in which the ſame letters repreſent the ſame parts as in *fig.* 1: namely, *a* is one of the rafters, forming one of the door-cheeks, projecting above the covering of the roof; *b b*, the roller, ſeen both in ſection and plan; *c*, a ſection of the fixed annular bed; *g*, a ſection of the moveable annular part of the roof, on which the eaves lie; and *g h*, an iron cranked bar, ſcrewed to *g* above, and therefore moving with the roof, but in ſuch way, that the crooked part at *h* lies juſt below an annular piece *i*, attached to the bed *c*; ſo that if any blaſt of wind, or other external force, ſhould move the roof, it will be ſecured from overſetting, by the crank-bar at *h* catching the ſaid fixed piece *i*; and if four or more of theſe crank-bars be uſed, the roof will be ſecure in all directions.

The objection which we have ſtated, as applying to the conſtruction of Smeaton's roof, has very lately been obviated by the Rev. W. Pearſon of Eaſt Sheen, Surrey, who has juſt finiſhed a rotative dome, to receive a large and very accurate circular inſtrument for meaſuring azimuths, as well as altitudes, by Troughton; which inſtrument was originally ordered by the Ruſſian Academy, but was countermanded by reaſon of the ravages committed by the French in Ruſſia, at the time that the conſtruction of it was in hand. This dome is repreſented in ſkeleton in *fig.* 5, where the circular rafters are ſeen at ſixteen equal diſtances, excluſive of the opening, *a a*, *a a*, which is nearly nine inches, through which the teleſcope of the inſtrument, placed on the top of the pillar A, is directed to any part of the heavens. This ſemicircular opening, which divides the dome into two equal portions, or quarters of an oblong ſphere, is covered by five doors, two on each ſide, and one at the ſummit; but in ſuch a way, that a ſmall door on one ſide faces a large one on the other, and the top door takes in five or ſix inches more on one ſide than on the other, ſo that there is no altitude to which the teleſcope may not be directed, by reverſing the poſition of the dome, *i. e.* by turning it juſt half round, when neceſſary; and yet the fittings are ſo contrived, that any one of the doors may be opened, while the reſt are ſhut. The two quarters of the oblong ſphere are connected by braſs bars at the points where the doors meet, and grooves are made on the edges of the rafters, that form the door-cheeks; ſo that any rain, that may be driven into the ſides or ends of the doors, runs down theſe grooves to the eaves, and diſappears, without being admitted within. We have not thought it neceſſary to ſhew theſe doors, which turn back on hinges, placed at their edges, upon the roof, which is covered firſt with triangular ſlips of deal about three-eighths thick, and then with tinned copper from Wyatt's manufactory; which metal being eaſily ſeamed, requires not the aid of many nails. The ornament at the top, being light, turns back with the top-door, and lies alſo on the roof, while obſervations are made in or near the zenith. The rotative part of this roof is of the ſimpleſt conſtruction that can well be imagined, and yet is ſafe, and more free from friction than Smeaton's, though made with the utmoſt care. The ring of rollers is here entirely left out, and three large balls of lignum vitæ are ſubſtituted in a detached ſtate, that is, without any fixed axis of motion, or pivots; and a four-ſided circular tunnel is ſo formed of wood, that theſe balls, by their ſimilarity of dimenſions, keep their relative diſtances from one another, and act as friction-rollers both in a vertical and horizontal direction; nay, even in both at once, whenever they happen to come in contact with either of the ſides of the ſaid tunnel. The balls, which are $4\frac{1}{4}$ inches in diameter each, are ſhewn in *fig.* 5. at oppoſite diameters of the dome, near the eaves, as though four were uſed, for the ſake of exhibiting their mode of poſition and action; but three only are much better, becauſe in every ſituation of their revolution they are certain to bear equal ſhares of the whole weight, when the bed is horizontal; and therefore none of them will refuſe to move, when the dome is puſhed round; but ſhould they happen to gain ground of one another in moving forwards, by any difference in their diameters, they will reſume their original ſituations reſpectively during the backward motion of the dome. *Fig.* 6. is an enlarged ſcale of the tunnel and of one of the balls, in which A is a portion of the roof, terminated by the annular piece of deal B, which is lined with the annular piece of wainſcot C, to both which the covering-piece D above the eaves is ſcrewed; E is a piece of wainſcot forming the inner ſide of the tunnel, and G is a continuation of one of the upright planks attached to the annular bed H, and forms the exterior ſide of the ſame. All the four ſides of the ſquare tunnel, which we called circular, becauſe it ſurrounds the circular erection, are either of wainſcot, or lined with wainſcot, to come in contact with the lignum vitæ which compoſes the balls; though the rings of deal, B and I, might have been in contact with the balls, if they had been hard enough; but the weight of a dome, of nearly ten feet diameter, covered with copper, would, in that caſe, have produced hollow places, that might have impeded the uniform motion of the balls. The piece J is one of the ſupporters of the bed I, to which the deal planks G are made faſt, and alſo the external pilaſters that ornament the vertical portion of the ſtructure. In this dome the velocity of the ſuperſtructure, as in Smeaton's, is double to that of the balls; and as theſe are left at liberty to turn in any direction, where an obſtacle to motion is preſented to any of them, they in-

ſtantly right themſelves, and ſet forwards again with their load without impediment, and without groaning. A cranked bar attached to the piece E, and bending below a ring, faſt to the bed I, but not ſhewn in the figure, prevents the dome from overturning by either accident or violence, and by the aid of a thumb-ſcrew fixes it in any given poſition. This conſtruction was, we believe, ſuggeſted firſt by Mr. Troughton, and as it has not been long in uſe, we cannot foreſee what objections may hereafter apply to it; but we give the particulars of it from a perſuaſion, that it will be found to be a conſiderable improvement on Smeaton's, and that it may ultimately be generally adopted.

Roofs, in *Rural Economy*, are formed of many different ſorts of materials. Thatch was formerly almoſt in general uſe for covering the roofs of farm-buildings; but it is obviouſly objectionable on many accounts; it not only ſerves as a hiding-place for rats, mice, inſects, birds, and other ſorts of vermin; but it is extremely periſhable in its nature, ſubject to be much damaged by high winds, and of courſe liable to frequent repairs, and, above all, highly dangerous from its combuſtible nature; it is, therefore, probably the moſt improper, the leaſt ſafe, and, in the end, the moſt expenſive material that can be employed for the purpoſe. Mr. Middleton, however, thinks that it keeps out the ſummer's heat and winter's cold more effectually than any other material now in uſe; but that, as it is not quite ſo compact and ſightly as ſlates or tiles, and the ſtraw being of ſuch value for other purpoſes, it will probably be ſuperſeded by them. Tiles, though little expoſed to danger from fire, do not, by any means, conſtitute a good roof, being ill calculated for preſerving grain or other farm produce. In ſummer they admit a heat very unfriendly to hay, corn, or ſtraw, while, in winter, they are equally objectionable, on the ground of tranſmitting moiſture in a high degree, while ſlates, though more expenſive at firſt, are liable to none of theſe objections, eſpecially when of the more thick kind. A roof covered with them, therefore, anſwers every uſeful purpoſe, and is very durable, laſting half a century, with very ſlight repairs in any way.

In the Middleſex Report on Agriculture, it is remarked on this important ſubject, in ſpeaking of the roofs of houſes, that pantiles are ſo eaſily heated through by the ſun during the ſummer months, that the rooms underneath are as hot as an oven; while, in the winter ſeaſon, in every common froſt, theſe tiles are ſo completely frozen through, as to become as cold as a covering of ice. Theſe extremes muſt conſequently have a very bad effect on the health of the inhabitants. The blue ſlates are ſo very thin, as to be equally liable to the ſame objection, particularly as they are now laid on moſt of our faſhionable houſes, under Wyatt's patent. They are rather better when laid on in the common manner, that is, on double laths, but much better on boards. Plain tiles make a conſiderably more temperate covering for houſes than either pantiles or ſlates, by reaſon of their being laid double and in mortar, and thereby forming a much thicker and cloſer roof. In this they are nearly equalled by the thick or ſtone ſlating of the midland counties; they might alſo be glazed of a ſlate colour; in which caſe they would make a roof more handſome, temperate, and durable than any other covering material now known.

Some other ſubſtances have been had recourſe to in this intention. In different parts of the country, cements of various kinds, and coarſe paper laid over with reſin, tar, &c. and other ſimilar matters, have been tried, but with no very promiſing ſucceſs as to their application. In ſome parts of Devonſhire, though ſlate is by no means difficult to be procured, a ſubſtitute for that ſort of covering is, Mr. Vancouver aſſerts, getting very much into uſe, which is prepared in the following manner:—three parts of whiting, five of ſand, one of pounded charcoal, and one of bone-aſhes, to a barrel of common tar, to which are added four pounds of black reſin; the two laſt materials are to be melted together, and, when boiling, the other ingredients are to be added in ſmall quantities, keeping them conſtantly ſtirred and in motion over the fire, until the whole maſs becomes of a conſiſtence fit for uſe. Then the roof, being previouſly covered over with ſheathing-paper ſecurely nailed down, is to be carefully and evenly ſpread with the liquid hot from the copper, to the thickneſs of about three quarters of an inch; which will coſt, at the cauldron, about thirty-five ſhillings for each ſquare of ten feet. The ſame meaſure of the common ſlate roof will coſt about thirty-two ſhillings. The roofs for this ſort of compoſition are pitched very flat, and, from the lightneſs of the ſcantling which is neceſſary in their conſtruction, come conſiderably cheaper than thoſe required for carrying ſlate or tiles.

Materials of the reed and heath kinds have alſo been tried as coverings for the roofs of farm-houſes and cottages, in places where they are capable of being procured in ſufficient quantities for ſuch purpoſes; and, though they are conſiderably more durable than common ſtraw thatch, they are ſubject to all the inconveniencies and objections of that ſort of covering. Indeed, no kind of material that has hitherto been made uſe of for forming the coverings of the roofs of buildings are quite free from imperfections of ſome ſort or other. It is conſequently a matter of great individual, as well as national importance, to be acquainted with a ſubſtance which is not liable to any ſuch defects, as a good, cheap, and durable material of ſuch a nature, for this uſe would evidently be a moſt valuable diſcovery, as ſuch a material is ſtill clearly wanting for this purpoſe.

Roof, *Attic of a.* See Attic.

Roof, *Falſe.* See False.

Roof, *Hip.* See Hip *Roof*, and Roof, ſupra.

Roof-*Trees*, or Ruff-*trees*, are the timbers, in a ſhip, which go from the half-deck to the forecaſtle. See Rough-*Tree*.

The term is alſo uſed for the upper timbers of any building; whence, in the northern counties, it is common to ſignify a whole family, by ſaying all under ſuch-a-one's roof-tree.

Roof-*Tyles*. See Tyle.

ROOFING, in *Rural Economy*, ſometimes a word applied provincially to the ridge-cap of thatched roofs. It alſo ſignifies any ſort of material employed in forming the roof of a building, whether in the frame-work, or covering. In the buſineſs of roofing farm or other buildings, the chief circumſtance neceſſary to be attended to, is that of tying the two ſide-parts well together, and in a ſafe manner, by means of the wall-plates and binding-beams; eſpecially thoſe erections which are of the more long kind, without any croſs-walls to ſtiffen and ſupport them. It has been remarked, that it is generally for want of attention to theſe matters that farm-buildings, as well as thoſe of other ſorts, are ſo frequently ſeen propped up with ſhores and buttreſſes; or fallen to the ground half a century ſooner, perhaps, than they would have done under a better and more judicious management. And it ought, indeed, to be a general principle, or line of conduct, which every careful and intelligent manager ſhould follow in erecting ſuch buildings;—a principle which is equally applicable to the other parts as well as the timber and the covering: which is, that of ſparing no requiſite expenditure; as a few ſhillings, or pounds, of additional

tional coſt, in the firſt inſtance, may be the ſaving of ten times the ſum in the end.

In the work of repairing buildings of this nature, the roofing claims equally the regard of the manager, with thoſe of the foundations and other external parts. But the inſide works, in all caſes, more commonly and properly demand the notice of the occupiers.

ROOGEN, in *Geography*, a town of the duchy of Courland; 36 miles E.N.E. of Piltyn.

ROOK, in *Ornithology*, a well-known bird of the crow-kind. See CORVUS *Frugilegus*.

Great care ſhould be taken to guard againſt theſe miſchievous birds at the time when the wheat is juſt ſhooting up; for they perceive it ſhooting much ſooner than the farmer can, and are led by the ſhoot to pick it up. They muſt therefore be carefully kept off the ground until about a week or ten days after this ſeaſon; for at the end of that time the blade will be grown up, and the grain ſo exhauſted of its ſubſtance, that they will not give themſelves any trouble to pick it out of the ground. They ſeldom or ever moleſt the wheat, which is ſown about Michaelmas; becauſe ſo much grain of the late harveſt then lies ſcattered about the fields, that they find it much eaſier to pick up there, than to ſearch for corn under ground in new-ſown lands. They often do harm when the ſnow is going off from the green wheat towards the end of winter; for having been pinched for food during that ſeaſon, they then greedily pluck up the young plants, in order to come at the remainder of the ſeeds ſtill adhering to their roots; and are greatly aſſiſted in this by the looſe ſtate of the earth at that time.

And they are alſo highly deſtructive to pea and bean crops in the early ſpring ſeaſon, when they firſt appear above the ground, as they dig up the whole, both root and ſtem, even when conſiderably advanced in growth. They muſt, therefore, be kept off with great care. A great many contrivances have been invented to frighten them away, ſuch as feathers ſtuck up, the limbs of rooks ſcattered about the ground, dead rooks hung on ſticks, the gun, a boy to halloo, and toſs a dead rook up in the air. Mr. Tull found this laſt to be the moſt effectual. It is probable, however, that firing at them frequently with a gun is the moſt certain means of deterring them from doing ſuch injuries, as they have a great diſlike to the ſmell of gunpowder.

It is remarked by Mr. Marſhall, in his Rural Economy of Norfolk, that the method of frightening rooks in practice there, eſpecially when they take to patches of corn, which are lodged before harveſt, is ſimply to ſtick up a tall bough in the part infeſted; and if a gun be fired near the place, before the bough is ſet up, this ſimple expedient ſeldom fails of being effectual. And that if rooks make an attack after ſeed-time, or when they take generally to the crop before harveſt, a boy is ſet to ſcare them; they being ſeldom attempted to be ſhot at in Norfolk; where a notion prevails, and is perhaps well founded, that rooks are eſſentially uſeful to the farmer, in picking up worms and grubs; eſpecially the grub of the cock-chaffer, which, it is believed, is frequently injurious to the meadows and marſhes of that country. This opinion alſo prevails in other diſtricts, and has moſt probably ſome foundation in truth, as they are often ſeen to follow the plough cloſe to pick up ſuch grubs.

It has indeed been ſtated, and ſuppoſed by ſome, that theſe birds do as much good by the deſtruction of grubs, inſects, worms, and other ſimilar ſorts of animals, as they produce miſchief by their attacks and ravages on the crops of the farmer; an inſtance in favour of which is noticed to have occurred on the Yorkſhire ſide of the county of Lancaſter, where it is ſaid they wholly devoured, deſtroyed, and removed ſome ſort of inſects, which, like locuſts, had ſeized upon and taken poſſeſſion of the graſs-plants of a large track of graſs-land in that neighbourhood in the early ſpring ſeaſon, and nearly eat up and conſumed the whole of it, to the very great alarm of the farmers of the vicinity; but which, on the firſt flight of the young rooks, were ſoon obſerved to be completely eaten up and deſtroyed, as was evident from the freſh graſs quickly ſpringing up and the ſurface becoming green again.

Theſe birds are, however, in general conſidered as the greateſt peſts and plagues of the farmers in the above and ſome other northern diſtricts, as they not only deſtroy the ſeed-wheat when newly ſown, but drag out of the earth the ſpires of the grain or pulſe ſeeds with them altogether, in the manner already ſuggeſted.

They are alſo, in theſe diſtricts, equally deſtructive of the potatoe crops, both at the time of ſetting or putting them into the ground, and when they are coming up, as they eat and drag them out with great eagerneſs, thereby cauſing much irregularity and miſchief in them. That they may ſometimes, however, be uſeful in the above manner may readily be ſuppoſed; but they exiſt in ſuch vaſt numbers in theſe, and ſome other parts of the country, that the ravages and injuries which they commit, very greatly preponderate over any good they are capable of performing in the ways that have been already ſtated.

They are, on the whole, an impudent and miſchievous race of birds, with which, all the means the farmer can poſſibly take in the way of ſcaring them, are too often of very little avail. They frequently go to very great diſtances, ſo that the ravages they are productive of are of an extenſive nature, and not confined to particular places or tracts of country only. The only ſafety for the farmer, therefore, ſeems to conſiſt in the prevention of their breeding and rearing their young, and their deſtruction and eradication, as much as poſſible, in other ways. See ROOKERY.

ROOKE, LAWRENCE, in *Biography*, an able mathematician, was deſcended from a reſpectable family, and born at Deptford, in Kent, in the year 1623. He was educated in grammar-learning at Eton ſchool, whence he removed, in 1639, to King's college, in the univerſity of Cambridge, where he took his degrees. In 1650 he went to Oxford, where he had apartments in Wadham college, for the ſake of improving in the ſociety of Dr. Wilkins, and Mr. Seth Ward. He at length became a fellow-commoner of the college, and made it his principal place of reſidence for ſome years, during which he aſſiſted Mr. Boyle in his chemical experiments. In 1652, Mr. Rooke was elected profeſſor of aſtronomy at Greſham college, and in the ſame year he made ſome obſervations, at Oxford, on the comet which appeared in the month of December, and which obſervations were printed by Mr. Ward in 1653. In 1657, Mr. Rooke exchanged the aſtronomical profeſſorſhip at Greſham college for that of geometry. He was one of the gentlemen by whoſe exertions the Royal Society was firſt formed, though he did not live long enough to ſee it eſtabliſhed by the royal charter. Among the men of rank who cultivated his acquaintance was the marquis of Dorcheſter, who was not only a patron of learning, but very learned himſelf; and after the reſtoration, that nobleman frequently entertained Mr. Rooke as a viſitor at his ſeat at Highgate, whence he uſed to bring him in his carriage every Wedneſday to the Royal Society, which then met weekly at Greſham college. Mr. Rooke had always a tender conſtitution, and walking from

from Highgate to London on a hot ſummer's day, he took cold, which proved fatal to him. He died in June 1662, in the 40th year of his age. He was highly eſteemed by his contemporaries, as will appear from the following teſtimonies. Dr. Pope, in his life of Ward, biſhop of Saliſbury, ſpeaking of Mr. Rooke, ſays he was profoundly ſkilled in all ſorts of learning: "I durſt," ſays he, "venture my life upon the truth of any propoſition which he aſſerted, either in mathematics, natural philoſophy, or hiſtory, for I never knew him affirm any thing poſitively, that was dubious. And when I have aſked his opinion of an hypotheſis, his uſual anſwer was, I have no opinion. He was very modeſt, and ſparing of his words, unleſs among intimate friends, and never talked idly. I may truly ſay I never was acquainted with any perſon who knew more and ſpoke leſs." Mr. Hooke places him among thoſe who were moſt eminent for their knowledge and improvement of aſtronomy. Dr. Sprat, in his Hiſtory of the Royal Society, ſpeaks of him as "a man of a profound judgment, a vaſt comprehenſion, prodigious memory, and ſolid experience. His ſkill in mathematics was reverenced by all the lovers of thoſe ſtudies, and his perfection in many ſorts of learning deſerves no leſs admiration."

The only pieces which were publiſhed from his papers conſiſt of "Obſervationes in Cometam, qui menſe Decembri Anno 1652 apparuit;" "Directions for Seamen going to the Eaſt and Weſt Indies," which were drawn up at the appointment of the Royal Society, and inſerted in their Tranſactions for 1665; "A Method for obſerving the Eclipſes of the Moon;" "A Diſcourſe concerning the Obſervations of the Eclipſes of the Satellites of Jupiter;" and "An Account of an Experiment made with Oil in a long Tube." Ward's Life of the Greſham Profeſſors.

Rooke, *Sir* George, a celebrated naval commander, the ſon of ſir William Rooke, knight, of an ancient and honourable family in the county of Kent, was born in 1650. Though deſtined for another profeſſion, a ſtrong inclination for the ſea-ſervice induced him to enter into the navy. His firſt ſtation was that of a volunteer, in which he diſtinguiſhed himſelf by his undaunted courage and indefatigable application to buſineſs. He very ſoon obtained the poſt of lieutenant, from whence he roſe to that of captain before he was thirty years of age, which was conſidered as a very extraordinary circumſtance, at a time when no man, be his quality what it would, was advanced to that ſtation before he had given ample teſtimonies of his being able to fill it with honour. Theſe preferments he obtained during the reign of Charles II. and under his ſucceſſor, James II., he was appointed to the command of the Deptford, a fourth rate man of war. His obligations to the Stuart family did not prevent his hearty concurrence in the revolution, and in 1689 he was appointed by admiral Herbert as commodore, with a ſquadron on the coaſt of Ireland. In this ſtation he concurred with major-general Kirke in the famous relief of Londonderry. Soon after he was employed in eſcorting the duke of Schomberg's army, and landing them ſafe near Carrickfergus, facilitated the ſiege of that place, and, after it was taken, ſailed with his ſquadron along the coaſt; where he firſt looked into the harbour of Dublin, manned all his boats, and inſulted the place where king James was in perſon; and in the night of the 18th of September, he formed the deſign of burning all the veſſels in the harbour, which he would certainly have executed, if the wind had not ſhifted and driven him out to ſea. In 1690 he was, upon the recommendation of the earl of Torrington, appointed rear-admiral of the red, and in that rank he ſerved in the fight off Beachy-Head, in which unfortunate affair it was admitted, on all hands, that he had done his duty. He was employed twice or thrice to convoy king William to Holland, and in 1692 he was promoted to the rank of vice-admiral of the blue, when he ſerved in the famous battle of La Hogue. This was on the 22d of May, and he behaved with ſuch diſtinguiſhed courage as to obtain the moſt marked applauſe of admiral Ruſſel, it being owing to his vigorous behaviour that the laſt ſtroke was given to that important day, which threw the French entirely into confuſion, and forced them to run ſuch hazards, in order to ſhelter themſelves from their victorious enemies. The next day was, however, ſtill more glorious, for vice-admiral Rooke had orders to go into La Hogue and burn the enemy's ſhips as they lay. There were thirteen large men of war, which had crowded up as far as poſſible, and the tranſports, tenders, and ſhips with ammunition, were diſpoſed in ſuch a manner that it was thought impoſſible to burn them. Moreover, the French camp was in ſight, with all the troops intended to have been employed in an invaſion of this country, and ſeveral batteries upon the coaſt well ſupplied with heavy artillery. Notwithſtanding all theſe preparations, admiral Rooke performed the buſineſs entruſted to him with ſo much ſkill and judgment, that he deſtroyed twelve ſhips of the line, and one fifty-ſix gun frigate. This deſperate enterpriſe he effected with the loſs of ten men only. The behaviour of the vice-admiral at La Hogue appeared to the king ſo great, and ſo worthy of public notice, that, having no opportunity at that time of providing for him, he ſettled upon him a penſion of 1000*l.* *per annum* for his life. In 1693 the honour of knighthood was conferred upon him, and he was, at the ſame time, made vice-admiral of the red.

The grand fleet of the Engliſh and Dutch proceeding to ſea in the month of May, ſir George Rooke was detached from it with a ſquadron of twenty-three ſhips of both nations, to convoy a large fleet of merchantmen up the Mediterranean. The French, in the mean time, had been indefatigable in repairing their loſſes, and with a very powerful fleet, of which the Engliſh miniſtry had obtained no proper intelligence, were lying in Lagos-bay, off Portugal, to intercept the combined fleet. On deſcrying the enemy, admiral Rooke ordered the ſmaller ſhips to make their eſcape into the neareſt Spaniſh ports, and ſtood off under an eaſy ſail for the protection of the reſt. Two Dutch men of war, and a great number of merchant-ſhips, were captured: the conduct of the Engliſh admiral was, however, not only exempt from all blame, but he received the thanks of the merchants, and his promotion was not in the leaſt impeded by this misfortune, which was owing to the miſmanagement of the miniſters. In 1696, having the chief command of the Channel fleet, he was ordered to prevent the Toulon fleet from getting into Breſt, which, from the defective manning of his ſhips, he was unable to accompliſh. On this account he underwent a long examination before the houſe of commons, but nothing appeared upon which a charge againſt him could be founded. He continued in command till the peace of Ryſwick, in 1697. He was choſen member of parliament for Portſmouth, and in this capacity he performed the duties of his ſtation with activity and energy; however, as he moſtly voted with the Tories, great pains were taken by the oppoſite party to ruin him in the king's opinion; but, to the honour of king William, when preſſed to remove ſir George Rooke from his ſeat at the admiralty, he anſwered reſolutely, "I will not." "Sir George (continued his majeſty) ſerved me faithfully at ſea, and I never will diſplace him for acting as he thinks moſt for the ſervice of his country in the houſe of commons:" an anſwer truly worthy of a Britiſh prince, as it tends to preſerve the freedom of the conſtitution, and the liberty

liberty of parliament. In 1700 he was ſent with an Engliſh ſquadron, in conjunction with a Dutch one, into the Baltic, to preſerve the balance of power in the North, where a confederacy had been formed againſt Charles XII., the young king of Sweden. Rooke bombarded Copenhagen, and a peace being effected in the courſe of the year, he returned. In the following year he acted as commander of the Channel fleet; and being a ſecond time choſen repreſentative for Portſmouth, he continued to act with the oppoſition. This line of conduct was conſidered as highly meritorious with the miniſtry of queen Anne, who ſucceeded to the crown in 1702; and when war with France was declared, he was appointed as vice-admiral of England, to an united Engliſh and Dutch fleet, in an expedition againſt Cadiz, the duke of Ormond being commander of the land forces. The plan failed, probably for want of a proper degree of cordiality between the ſea and land-ſervice. Soon after, ſir George obtaining intelligence that twenty-two Spaniſh galleons, guarded by a ſquadron of French men of war, were arrived in the harbour of Vigo, ſailed thither; and ſending a detachment of his fleet, with fire-ſhips, into the harbour, deſtroyed all the enemy's men of war, and a number of galleons, and took the reſt. A vaſt booty was brought home, and a new coinage of ſilver, with the ſtamp Vigo, was iſſued as a national memorial of this brilliant ſucceſs. On his return home, ſir George Rooke was appointed to a ſeat in the privy council, and an inquiry having been moved in the houſe of lords into his conduct at Cadiz, it was voted that he had honourably diſcharged his duty.

In 1704 he was appointed to the command of the fleet deſtined to convey to Liſbon Charles, at that time competitor for the crown of Spain. Having performed that ſervice he proceeded to the Mediterranean, where he cruiſed for ſome time. On his return through the Straits, he was joined by ſir Cloudeſley Shovel with a large reinforcement, and ſeveral ſchemes of further ſervice being propoſed, he determined to make a ſudden attempt on Gibraltar. This he carried into execution in July, and the prince of Heſſe, with the land forces, being diſembarked on the neck, the ſhips proceeded to cannonade the fortifications at the mole. The enemy were driven from their guns, and a party of ſeamen landing, took poſſeſſion of the batteries. The governor, intimidated by this bold and unexpected action, capitulated; and that important fortreſs has ever ſince remained in the hands of the Engliſh. Sir George Rooke then proceeded to Malaga, where he encountered the French fleet under the count de Touloufe. The numbers on each ſide were nearly equal in ſhips of the line, but the French were ſuperior in men and guns. The engagement, which enſued Auguſt 13th, was undecided, neither party loſing a ſhip, and each returned to their own ports.

Factions now ran high in the nation; and ſir George Rooke, perceiving that as he roſe in credit with his country, he loſt his intereſt with perſons in power, reſolved to retire from public buſineſs, and prevent the affairs of the nation from receiving any injury on his account. Thus, almoſt immediately after he had taken the important fortreſs of Gibraltar, and beaten the whole naval force of France in the battle of Malaga, he was conſtrained to quit his command: and as the Tories had before driven the earl of Orford from his poſt immediately after the battle of La Hogue, ſo the Whigs returned them the compliment, by making uſe of their aſcendancy to the like purpoſe with regard to ſir George Rooke. After this return for the important ſervices he had done his country, ſir George Rooke paſſed the remainder of his days as a private gentleman, and, for the moſt part, at his ſeat in Kent. "His zeal for the church," ſays the diſcerning Campbell, "and his ſtrict adherence to the Tories, made him the darling of one ſet of people, and expoſed him no leſs to the averſion of another, which is the reaſon that an hiſtorian finds it difficult to obtain his true character from the writings of thoſe who flouriſhed in the ſame period of time. For my part, I have ſtudied his actions, and his behaviour, and from thence have collected, that he was certainly an officer of great merit; if either conduct or courage could entitle him to that character."

In party matters he was perhaps too warm and eager; but in action he was perfectly cool and temperate, gave his orders with the utmoſt ſerenity; and as he was careful in marking the conduct of his principal officers, ſo his candour and juſtice were always conſpicuous in the accounts he gave of them to his ſuperiors; he there knew no party, no private conſiderations, but commended merit wherever it appeared.

In private life he was a good huſband and a kind maſter, lived hoſpitably towards his neighbours and left behind him a moderate fortune: ſo moderate, that when he came to make his will, it ſurpriſed thoſe that were preſent; but ſir George exclaimed, "I do not leave much, but what I have was honeſtly gotten; it never coſt a ſailor a tear, or the nation a farthing." He died in January 1708, in the 58th year of his age, and was interred in the cathedral of Canterbury. He had been thrice married, and left one ſon only. Sir George Rooke has merited very highly the reputation of a brave and able ſeaman, who maintained the honour of the Britiſh flag, at a period when its ſuperiority was much leſs decided than it has been during the preſent reign. Stockdale's edition of Campbell's Lives of the Admirals, vol. iv.

ROOKERY, in *Rural Economy*, a term applied to a nurſery of rooks, or place where they build their neſts, and collect in large numbers.

There are every where in many of the northern and other counties of the kingdom, numbers of ſuch deteſtable nurſeries of theſe miſchievous and rapacious vermin, where they are ſuffered to breed and multiply in countleſs multitudes, to the great deſtruction of the hopes of the farmer and the nation at large. If it be neceſſary that ſuch repoſitories of miſchief to the produce of the huſbandman ſhould be preſerved and kept up, for the vernal ſport and amuſement of their proprietors, certainly ſome other more certain and effectual means than thoſe of the croſs-bow kind ſhould be had recourſe to for the deſtruction of their young, in order that they may be kept ſufficiently reduced and thinned in their numbers, to obviate, in as great a meaſure as poſſible, their baneful depredations and effects on the ſeeds and produce of the farmer.

The rooks fly from theſe deſpicable abodes, which are the head-quarters or dwellings where they collect and repoſe themſelves, as well as breed, to very conſiderable diſtances, in order to execute and effect their different miſchievous and rapacious attacks on the newly ſown or riſing crops of the huſbandman, as they but ſeldom commit ſo much depredation on the fields which are near home.

They collect together during the ſeverity of the winter ſeaſon, eſpecially in the more northern diſtricts, from the different neighbouring ſmall rookeries to be protected in large ones, and the woods which may happen to be near them; and thus render themſelves ſecure at this inclement period, ſeparating in the early ſpring to form their neſts and breed in their particular rookeries.

In Lancaſhire, the whole track of the Fildes, as well as ſome others, is beſet with theſe deſtructive and impudent birds,

birds, from the vaſt rookeries and woods of Rawcliff-Hall and other halls in the ſame neighbourhood, without the owners of them ever ſuſpecting that they harbour and ſupport a breed of deſtructive vermin, which greatly injure and leſſen the agricultural produce of the county. The ſame is alſo the caſe in a variety of other diſtricts of the kingdom. Therefore ſome ſteps ſhould be taken, either by ſeverely taxing them, or ſome other means, in order that the miſchievous conſequences of ſuch nurſeries may be leſſened, or wholly prevented, by their affording the convenience of breeding and rearing of ſo many of theſe birds.

ROOKPOUR, in *Geography*, a town of Bengal; ſix miles N. of Kiſhenagur. N. lat. 24° 28′. E. long. 86° 46′.

ROOM, in *Building*. See BUILDING.

ROOM, *Cook*. See COOK-*Room*.

ROOM, *Fruit*, in *Gardening*, a place conſtructed for the purpoſe of ſtoring and laying up different articles of the fruit kind. Rooms of this nature are contrived in many different ways, but the beſt are perhaps thoſe made with drawers and ſhelves for containing and preſerving this ſort of produce in all the different kinds and ſtates of it. An ingenious plan and contrivance of this deſcription has lately been ſuggeſted and delineated in the ſecond volume of the Tranſactions of the Horticultural Society, by Mr. Maher, who has found it, in ſeveral years' experience, extremely uſeful in keeping fruit, eſpecially of the apple and pear kinds.

It is repreſented as conſiſting of a long ſquare form, the inſide of which is fitted up, from the top to near the bottom, with drawers in different diviſions, according to the ſize of the room. The number of each of the drawers is marked upon it, and a ſpace left oppoſite to each ſuch number, for inſerting the name of the particular kind of fruit it may contain.

The lower rows of drawers have cloſe bottoms, and are termed ſweating drawers, as the fruit is put into them immediately after it is gathered, in order to undergo that operation. Then, in the courſe of ten or fifteen days, accordingly as the apples and pears may be found to have come forward, they are ſorted, and the other drawers prepared for receiving them, by covering the bottoms of them with very clean wheat ſtraw, which has been thoroughly ventilated and rendered quite dry in the open air. The bottoms of the drawers for this purpoſe are to be formed in open trellis work.

It is recommended, as ſaving much time and trouble in running up and down ſtairs, to have theſe rooms built upon the ground ſurface; and that the door and window of each ſhould have ſlides, in order to admit a free circulation of air, when the weather is fine; but in damp days, or when it rains, the rooms ſhould conſtantly be kept ſhut up in a cloſe manner.

It is alſo adviſed, that a ſlate and pencil ſhould hang in the rooms, the former of which ſhould be divided into ſeven different columns, in which may be put down what fruit is delivered out each day in the week, for the ſatisfaction of families and ſervants.

Where theſe kinds of rooms are conſtructed with ſhelves, they ſhould be formed of ſuch ſorts of wood as communicate no bad ſmells or taſtes, and have thin ſlips of boards faſtened on their fore parts to prevent the fruits from falling off from them. Some adviſe their being covered all over with a very coarſe canvas, in order to prevent any ſort of injury in the above way. The fruit is then to be laid ſingly in rows all over the ſurfaces of the ſhelves after being well dried, but never heaped over each other. Some cover it by means of the ſame ſort of canvas or by paper, taking care to turn it, and remove all that is damaged, two or three times during the winter ſeaſon.

When the fruit is firſt laid upon the ſhelves, the earlieſt ſhould be put upon the loweſt ſhelves, and ſo on to the higheſt in their proper order. As this requires much time in many inſtances, it ſhould always be done at every leiſure period.

Many, however, think it the beſt way of keeping fruit, to firſt put it in glazed earthen pans, well packed and cloſed with covers, which are then to be placed on the ſhelves in theſe drying rooms.

Theſe ſorts of rooms ſhould conſtantly be placed in the moſt convenient ſituations, and contiguous to the rooms deſigned for other ſorts of garden produce.

ROOMS, *Flight of*. See FUGUE.

Rooms in houſes might be warmed by the ſteam of boiling water conveyed in pipes along their walls. See Phil. Tranſ. N° 476. p. 370. ſeq.

This contrivance is a copper with a ſtill-head, and a lead or copper pipe fixed to this head, which conveys the hot ſteam of the boiling-water through the different rooms intended to be warmed.

ROOMS, in *Ship-Building*, the different vacancies between the timbers, and likewiſe thoſe between the beams, as the maſt-rooms, capſtan-rooms, hatch-rooms, &c. Alſo the different apartments or places of reſerve, of which there are a number in a ſhip, as the bread-room, an apartment in the hold abaft for containing the bread for the ſhip's uſe. The ſpirit-room is adjoining the after-hold, to contain the ſpirituous liquors for the ſhip's uſe. The captain's and lieutenant's ſtore-rooms are two apartments built next each other on the ſtarboard ſide of the after platform abaft, for thoſe officers to ſtow their wine, &c. in. On the oppoſite ſide to the above is the ſteward's room, whence moſt of the proviſions are iſſued, and which is the place appointed for the purſer's ſteward to tranſact his buſineſs in. Sail-rooms are built between decks, upon the orlop or lower deck, to contain the ſpare ſails. Beſides theſe, there are ſeveral other ſtore-rooms, in which the carpenter's, boatſwain's, and gunner's ſtores are kept. Filling-room is a place parted off in the magazine; it is lined with ſheet-lead, and therein the powder is ſtarted, in order to fill the cartridges.

ROOM *and Space*, the diſtance from the moulding edge of one timber to the moulding edge of the next timber, which is always equal to the ſiding of two timbers, and the room or opening between.

ROOMS, in a military ſenſe, are thoſe parts of a building or barrack, which, by ſpecific inſtructions, the different barrack-maſters muſt provide, and furniſh for the accommodation of the king's troops in Great Britain or elſewhere. The ſchedule, as publiſhed by authority, deſcribes the number of rooms allowed in barracks for the commiſſioned, warrant, and non-commiſſioned officers, and private men, to be as follows:

Cavalry Rooms.—Field-officers, each two rooms; captains, each one ditto; ſubalterns, ſtaff, and quarter-maſters, each one ditto; the ſerjeants of each troop of dragoons, and the corporals of each troop of horſe, one ditto; eight rank and file, one ditto; officer's meſs, two ditto.

Infantry Rooms.—Field-officers, each two ditto; captains, each one ditto; two ſubalterns, one ditto; ſtaff, each one ditto; twelve non-commiſſioned officers, and private men, one ditto; officer's meſs, two ditto; ſerjeant-major, and quarter-maſter ſerjeant, one ditto. When there are a ſufficient number of rooms in a barrack, one may be allowed to each ſubaltern of infantry.

ROONAY, in *Geography*, a town of Bengal; 33 miles S.E. of Ghidore.

ROOP, a term applied to ſignify a hoarſeneſs, ſuch as happens among animals of the cattle kind.

ROOPAPOUR, in *Geography*, a town of Hindooſtan, in Oude; 31 miles E.N.E. of Manickpour.

ROOPAT, a town on the E. coaſt of Sumatra. N. lat. 1° 3′. E. long. 101° 12′.

ROOPGUNGE, a town of Bengal; 34 miles N.N.W. of Dinagepour.

ROOPGUR, a town of Hindooſtan, in Guzerat; five miles S. of Surat.

ROOPNAGUR, a town of Hindooſtan, in the country of Agimere; 30 miles E. of Agimere. N. lat. 26° 39′. E. long. 75° 52′.

ROOPOUR, a town of Hindooſtan, in the circar of Sirhind; 58 miles N. of Sirhind.

ROOS, Philip, better known by the name of *Roſa da Tivoli*, in *Biography*, was the ſecond ſon of a painter, whoſe name was John Hendrick Roos; and he was born at Frankfort in 1655. His early inclination to the art practiſed by his father, and the proficiency he exhibited, gained him the favour of the landgrave of Heſſe, at whoſe court the father and an uncle of Philip, called Theodore Roos, reſided; and for whom they painted, conjointly, compoſitions of animals, landſcapes, and figures.

This prince became the patron of Philip alſo, and preſented him with a ſum of money to proſecute his ſtudies at Rome, from whence he never returned to repay the obligation. He married a beautiful woman, daughter of an hiſtorical painter, Giacinto Brandi, but was diſſipated and extravagant.

He took up his reſidence at Tivoli, from whence comes his cognomen of Roſa da Tivoli, and there he imitated and combined the forms he met with. His pictures are generally made up of a group of ſheep, goats, or cattle, a herdſman or woman, and a piece of building, illumined with ſtrong contraſts of light and ſhade, and touched with uncommon ſpirit and freedom. That latter quality is their bane, for relying upon its effect upon the obſervers, and working generally from neceſſity, or the ſpur of the moment, he was tempted to reſt ſatisfied with incorrectneſs and commonplace. His ſhadows are generally too dark and too brown, effected by leaving the dark ground upon which he worked; but the arrangements of his lights are ingenious and capitally executed, and the colour is frequently rich and full. He died in 1705, at the age of 50.

ROOSAND, in *Geography*, a town of Norway; 48 miles N.N.E. of Romſdal.

ROOSEBURG, a ſmall iſland in the Meuſe; 3 miles N.E. from the Brill.

ROOT, (Radix,) in *Botany* and *Vegetable Phyſiology*, an important part of the vegetable body, being the baſis of the whole, and what is firſt produced from the ſeed, when evolved by the proceſs of germination. Its uſes are, to fix the plant to a commodious ſituation, and to derive nouriſhment for its ſupport. This organ is therefore perhaps indiſpenſably neceſſary, at the firſt period of the growth of vegetables; and it uſually continues to be ſo, at leaſt amongſt what are termed the more perfect kinds; the *Cuſcuta*, or Dodder, being almoſt a ſolitary inſtance, of a phænogamous plant, parting with its root at an early age, and truſting for its future ſuſtenance to the vegetable bodies on which it paraſitically fixes. In ſome cryptogamous tribes the roots, though leſs diſcernible to us, are not the leſs effective for the performance of one or other of theſe functions. Thus, the cruſtaceous Lichens have not only a conſiderable inequality of ſurface underneath, inſinuating itſelf into every minute irregularity of the ſtone or bark over which they ſpread, but ſeveral of them have very diſtinguiſhable, fibrous, branched roots; witneſs *Lichen ſaxifragus*, Sm. Tranſ. of Linn. Soc. v. 1. 82. t. 4. f. 4, and *L. tartareus*. The Submerſed *Algæ*, or Sea-weeds, ſeem, at firſt ſight, to be merely fixed by their ſmall diſk-like roots; though many of them have branched and entangled radicles, inſinuating themſelves among pebbles at the bottom of the ſea, which laſt may well be organs of nouriſhment, as well as of ſupport. But even ſuch as are fixed by a mere diſk, are found, if cut down to that part, to ſprout up again with all the rapidity and vigour of a full-grown ſhrub, treated in the ſame manner. Hence it appears that the diſk in queſtion muſt act as an organ for imbibing nutriment. That proceſs indeed ſeems not to be accompliſhed, as uſual, by the baſe, or under part, eſpecially conſidering the nature and ſize of the bodies to which this kind of root is commonly attached. But ſomething analogous may be obſerved in ſeveral paraſitical plants of the *Orchis* family, (ſee Orchideæ,) whoſe thick fibrous roots lie naked upon the bark or branches of trees; and if they do imbibe a part of their ſuſtenance from the latter, ſhould ſeem alſo to be indebted conſiderably to the atmoſphere, (to which a much larger portion of their ſurface is conſtantly expoſed,) as ſea-weeds are to the circumambient water. With the roots of paraſitical ferns, indeed, as well as the ſupplementary radicles, thrown out from the climbing ſtem of the *Cuſcuta*, the caſe may be different, as both are inſinuated into the bark of the plants on which they grow. Floating ſea-weeds, and abundance of freſh-water plants nearly related to them, agree with the *Cuſcuta* ſo far, that after vegetating on ſome fixed ſpot, to which the parent ſeed attaches itſelf, they ſoon ſeparate therefrom, and can derive nothing ſubſequently from thence. But being entirely diſengaged, they can obtain matter of growth and nouriſhment, in future, from no other ſource, than the water in which they float. Who ſhall ſay whether ſuch nutriment is abſorbed by their whole ſurface; or whether the various and multiplied, fibrous or tubercular, appendages of their curious, and often complex, ſtructure, may not, many of them, be analogous to the fibrous radicles, thrown out by the ſtems of the Dodder?

The moſt uſual economy of the roots of plants is to be immerſed in the earth, they having always a tendency to grow downwards, as ſtems in general have to aſcend. Dr. Darwin's ſimple and luminous explanation of this phenomenon is quite ſufficient, and precludes all others. He conceives that each part elongates itſelf in the direction in which it is moſt ſtimulated; the infant ſtem being moſt acted upon by air, the radicle by moiſture.

A root commonly conſiſts of two parts; the *caudex*, or body, and *radicula*, the fibre. The latter, generally greatly multiplied, branched, and extended, is the eſſential organ of nouriſhment.

The duration of roots is either annual, biennial, or perennial. Annual Roots, conſiſting chiefly of numerous fibres, belong to plants whoſe exiſtence is limited to one ſummer, as Barley, and a vaſt tribe of field or garden flowers, many of which muſt occur to every one's recollection. Biennial Roots produce, the firſt ſeaſon of their growth, only herbage, and, living through the enſuing winter, bear flowers and fruit, or ſeed, in the following ſummer, after which they periſh; for they never bloſſom or fructify but once, any more than annual herbs. Their exiſtence indeed may be prolonged by accidents which hinder their flowering, year after year, in ſome caſes; but after perfecting ſeed, or even

even bloſſoms, they die. Wheat, as cultivated with us, may be termed biennial; but is more properly an annual, which is ſown and ſprings up the ſeaſon before it flowers, as many annual weeds often do; while the ſeeds of others, perhaps of the ſame ſpecies, remain latent in the earth, awaiting the approach of ſpring. More genuine biennials are ſome ſpecies of *Verbaſcum*, the *Digitalis purpurea* or Fox-glove, &c. Perennial Roots belong to plants which live and bloſſom through many ſucceſſive ſeaſons, to an indefinite period, as is the caſe, not only with all trees and ſhrubs, but with many herbaceous plants, whoſe entire ſtems and foliage are frequently annual. Such are the bulbous roots of Tulips, Hyacinths, Anemonies, &c. and the large fleſhy ones of Rhubarb, and the *Gentiana lutea*, with many others, whoſe herbage dies every year entirely down to the ground; while other perennial roots, principally of a fibrous nature, are never deprived of herbage, as the *Gentiana acaulis*, *Lamium album*, and moſt perennial graſſes. Several plants of hot climates, naturally perennial, and even ſhrubby, become annuals in our gardens, as the Common Naſturtium, *Tropæolum*, which is capable of being increaſed by cuttings, nearly as well as by ſeeds, and thus its double-flowered variety is preſerved. The ſame thing may be ſaid of the *Hemimeris urticifolia*. The Tree Mallow, *Lavatera arborea*, wild in Pembrokeſhire, and occaſionally ſeen in gardens, exemplifies, in a remarkable manner, the durability of the vital principle in ſeeds, as well as in biennial plants hindered from flowering. Nearly twenty years ago the ſeeds of this large and handſome ſhrubby plant were ſown in a garden under our obſervation. From that period many of the young plants have, every year, ſprung up, but the winter uſually deſtroys them. A few have, now and then, ſurvived a mild winter, and attaining a large ſize, have borne flowers, dying entirely at the end of autumn, nor do we believe that any of them has ripened ſeeds, ſo as to repleniſh the ſtock in the earth. At leaſt this has not been the caſe for eight or nine years paſt. We have never taken the pains to ſhelter a young plant of this ſpecies in a ſtove, or green-houſe, through one or more winters; but Linnæus, with whom it was a favoured exotic, aſſerts that it will ſometimes wait, for ſeveral years, for a proſperous flowering ſeaſon, even in the open ground, though periſhing afterwards, with the firſt cold, in ſpite of all the protection it can receive.

The *Caudex*, or Body of the root, in the Turnip, aſſumes the appearance of a ſtem, by riſing conſiderably above the ſurface of the ground. Such is partly the caſe with onions, and many exotic bulbous plants. Linnæus ſpeaks of the ſtem of a tree as a *caudex*, or root above ground. Perhaps the *caudex* may be as properly termed a ſubterraneous ſtem. This analogy nevertheleſs is ſcarcely correct, the line of demarcation being much more ſtrictly drawn between an annual ſtem, and its perennial root, than between the branches of any tree and its trunk.

The fibres of the root, at leaſt their growing extremities that imbibe nouriſhment from the earth, into which they are gradually and continually inſinuating themſelves, are, in every common caſe, ſtrictly annual. The powers of roots lie dormant through our winters, or in bulbous plants, inhabitants of arid burning ſands, through the ſummer of ſuch climates. After they have begun to form freſh radicles, they cannot without deſtruction, or great danger, be tranſplanted; nor can even herbs with fibrous roots be ſafely removed, while their fibres are in a progreſſive ſtate, very young annuals alone excepted.

Botaniſts, as well as gardeners and agriculturiſts, diſtinguiſh ſeveral kinds of roots, whoſe nature requires attention from thoſe who wiſh to be maſters of their economy or cultivation. The following are the principal heads under which they may be comprehended.

1. *Radix fibroſa*, a Fibrous Root, the moſt ſimple of all, conſiſts entirely of fibres, undivided or branched, neceſſarily connected indeed by a common head, or by the baſe of the ſtem. Theſe fibres convey nouriſhment directly to the ſtem or leaves. Such conſtitute, in general, the roots of graſſes, and of moſt annual herbs; which latter requiring no reſerved ſtore of proviſion for another ſeaſon, have no need of a *caudex* in which it might remain through the winter. While ſuch roots exiſt, they keep growing, ſucceſſively forming new fibres, as well as elongating their older ones. Their fibres are occaſionally remarkably ſhaggy, or downy; whether to increaſe the ſurface for more ample abſorption, or to fix the plant more firmly in the ground, we cannot always directly determine. Botanical experience has taught us, that very downy or woolly fibres are eſpecially appropriated to graſſes that inhabit looſe blowing ſand.

2. *Radix repens*, a Creeping Root, is rather perhaps a ſubterraneous ſtem, branching off horizontally, extending itſelf at the extremity, and decaying at its origin, throwing out fibres as it goes, which are the efficient or actual roots. Such a root is extremely tenacious of life, as any portion of it will grow. Weeds which have this ſort of root, as Couch-graſs and Mint, are the moſt difficult of all things to eradicate, except perhaps the deeply deſcending roots, partly fleſhy, of *Convolvulus arvenſis*, and *Carduus*, or rather *Cnicus*, *arvenſis*, whoſe more vertical poſition enables them to run ſo far into the ground as to be hardly acceſſible. The widely creeping roots, well guarded with hard and durable ſheaths, and ſupported by long woolly fibres, which belong to many ſea-ſide, or ſand, graſſes, render ſuch plants of great importance in the economy of nature. They bind down the looſe ſand, and form barriers againſt the encroachments of the ocean itſelf. The whole country of Holland is perhaps indebted for its very exiſtence to ſuch natural mounds, judiciouſly foſtered and imitated by art. The three principal graſſes that ſerve ſo valuable a purpoſe are *Carex arenaria*, *Arundo arenaria*, and *Elymus arenarius*, all plentiful on our ſandy ſhores.

3. *Radix fuſiformis*, a Spindle-ſhaped, or Tap Root, like the Carrot, Parſnep, Radiſh, and many common plants, of biennial, perennial, or more rarely annual duration. Its form is beſt calculated for penetrating deeply into the ground, or rather is owing to the reſiſtance encountered by the young deſcending radicle. The *caudex*, of a fleſhy juicy ſubſtance, abounding with peculiar ſecretions, and pregnant with the materials of the future herb, throws out numerous fibres, which are the real roots.

4. *Radix præmorſa*, an Abrupt Root, is nothing more than an oblong or ſpindle-ſhaped, vertical or horizontal, fleſhy root, whoſe progreſs has been impeded, either by want of vigour, or by ſome mechanical interruption, ſo that it ſeems to have been cut or broken off. The name alludes to an ancient opinion of its having been bitten off, by no leſs a perſonage than "the divel," out of ſpite to mankind. Hence ſeveral plants, with ſuch a root, were relied on for their ſuppoſed medical virtues, which nothing but hereſy and ſchiſm could doubt.

5. *Radix tuberoſa*, a Tuberous or Knobbed Root, is of various kinds. This ſort of root belongs to perennial plants, its knobs, whether of themſelves annual, biennial, or perennial, being reſervoirs of nouriſhment, and of vital energy, in which the reſources of the herb are huſbanded through the winter. Such are the Potatoe, and Jeruſalem Artichoke. Many of the Vetch or Pea tribe have

have likewiſe ſmall annual tubercles to their roots, by which theſe plants are enabled better to ſupport the caſual privations of a barren, dry ſoil. The knobs of Pæonies and *Spiræa Filipendula* are perennial, and analogous to bulbs. In the Orchis family they are biennial, whether ſimply oval, hand-ſhaped, or faſciculated; for in each caſe the plant of the ſeaſon lives on that portion of its root which was formed during the preceding year, and meanwhile makes a new pair of knobs, or bulbs, to bloſſom in the following ſummer, or at leaſt to produce herbage, whether circumſtances may admit of flowers or not. There is reaſon to believe that certain ſpecies of this family, as the Linnæan *Ophrys ſpiralis*, often produce a mere tuft of leaves, without flowering at all, for many ſucceſſive years, in ſpots which, in favourable ſeaſons, are profuſely decorated and perfumed with that charming little flower.

6. *Radix bulboſa*, a Bulbous Root, is often ſolid, as in the common *Crocus*, and its near relations *Ixia*, *Gladiolus*, the ſplendid *Tigridia*, &c. In the Onion tribe, the bulbous root conſiſts of concentric layers, enveloping one another, as alſo in the more ſolid root of the Tulip. The Lily has a ſcaly bulb, exactly analogous to the laſt; but as the leaves of this plant are narrow, and in ſome meaſure whorled, not ſheathing, like thoſe of the Onion and Tulip, the layers of its roots, having the cloſeſt affinity to leaves, aſſume a ſimilar arrangement. The ſtrict analogy of ſuch coated or ſcaly bulbs with leaf-buds, indeed one might almoſt ſay their identity, appears from the ſcaly axillary buds of the Orange Lily, and other ſpecies, formed on the upper part of the ſtem, which, falling to the ground, become actual bulbous roots, without any transformation. Similar buds in *Dentaria* become, by a ſlight alteration, the tuberous ſcaly root proper to that genus. The conſtitution of bulbous roots is admirably ſuited for plants inhabiting hot ſandy countries, ſubject to long drought. After flowering, their withered herbage ſerves like wings to diſperſe them far and wide, till the firſt rains cauſe them to fix their ſprouting radicles in the moiſtened ſoil, where they ſpeedily put out freſh leaves and bloſſoms, during the favourable ſeaſon; after which their life and energy are locked up again in the bulb, or perhaps multiplied in ſeeds, for the ſucceeding year. The ſeeds of the *Ixia* and *Gladiolus* families are no leſs admirably adapted to the circumſtances of their ſandy and windy country; ſuch as are winged being readily wafted, and the large poliſhed round kinds, as extenſively rolled, over the open deſarts which they are appointed to adorn.

7. *Radix articulata*, or *granulata*, a Jointed or Granulated Root, does not eſſentially differ from a ſcaly bulb. The Wood Sorrel, *Oxalis Acetoſella*, for inſtance, has, as it were, a ſcaly bulb, pulled out into an oblong form, and connected by a thread; while the *Saxifraga granulata* has a ſeries of ſubterraneous buds, like ſolid bulbs. *S. cernua* and *bulbifera* have axillary buds, formed on their ſtems, like *Dentaria*, which become granulated roots.

The object of Nature is nearly the ſame throughout all theſe ſeemingly different productions; to eſtabliſh a reſervoir, in which the vital force of the plant, as well as its material reſources, are ſtored up; till the former is ſtrengthened, in conſequence of ſuſpended action, and the latter are matured by reſt. Such aſſiſtance is occaſionally afforded to plants whoſe roots have naturally hardly any thing of a fleſhy ſubſtance, whenever they are expoſed to danger from viciſſitude, or from interrupted ſupplies. Thus graſſes with fibrous roots, accidentally ſtationed in a ſoil too dry or fluctuating, have a power of becoming bulbous. For the ſame reaſon, bulbous roots, when deſired to be had in great ſize or perfection, ſhould firſt be ſupplied with plentiful nouriſhment, and then be checked in the too luxuriant growth of their herbage. By ſome treatment of this kind, exotic bulbs, which ſeldom afford flowers in our gardens or ſtoves, becauſe of the uniformity of their languid exiſtence, may perhaps be made to bloſſom more frequently than they do. Sudden and abundant ſupplies of heat, food, or moiſture, and as ſudden checks of one or the other, at the diſcretion of the cultivator, are likely to have this effect. In general, an interruption of the luxuriance of a root, favours its production of flowers and of ſeeds. The latter are ſeldom perfected in the more luxuriant ſorts of Mint, except by greatly reſtraining the growth of the roots, in a garden-pot, dry border, or otherwiſe. The bulbous lilies will often form ſeeds, if their buds are ſtripped off, but ſeldom in their ordinary ſtate of culture.

A juſt attention to the nature and conſtitution of each different kind of root, will teach us to underſtand its beſt mode of cultivation, tranſplantation, &c. and will account for thoſe general practices, founded on experience, which are too well known to require illuſtration here, and properly come under the notice of the agriculturiſt and gardener.

Root, in *Huſbandry*, the lower part of a plant, or that which is in the ground, and by which it adheres to the earth, draws its nouriſhment, and tranſmits it to the other parts. For the method of clearing lands from the roots of trees, under-wood, &c. ſee Reclaiming *Lands*.

It may be noticed, that the roots of plants are of uſe to them principally in two reſpects, namely, to give them ſtability in the ground, that they may not be diſplaced, or blown down by high winds, or other accidents; and by their ſpreading in the ground, for collecting, and perhaps in ſome meaſure preparing, food for the whole plant. Plants are, however, in part fed or nouriſhed from the air, fine vapours, dews, &c.; which enter by their leaves and branches, but principally by what is abſorbed and taken up by their roots: for which reaſon the farmer takes infinite pains to prepare the land by tillage and manure, whereby it is opened, pulverized, and not only made more eaſily penetrable for the roots to ſpread in, and collect their nouriſhment, but rendered more proper for being impregnated with ſuch matters, as well as for retaining and conveying them to their fibrous roots in order to be drank up.

Roots, in the intention of the farmer, may alſo be divided into two ſorts, namely, perpendicular or tap-roots, which penetrate deep, and run down into the ground, uſually ſingly, ſuch as carrots, parſneps, and the roots of ſome trees, as the oak, &c. And thoſe that divide near the ſurface of the ground, and ſpread out in it in various directions, which are called horizontal and fibrous roots, and if very ſmall, capillary roots. The tap-roots have alſo fibrous roots iſſuing from their ſides, all round the tap-root; and theſe lateral roots are longeſt near the ſurface of the ground, and gradually ſhorter as the tap-roots deſcend deeper into the ſoil.

And further, the ſurfaces of roots are ſoft and ſpongy, more particularly in the ſmall or fibrous roots, and theſe are furniſhed with abſorbent veſſels, the mouths of which drink up the vegetable food, and diſtribute it to all parts of the plant. As the large roots are more cloſe and hard on their ſurfaces, it would appear that they are chiefly intended for the ſupport and ſtability of the plant, while the fibrous roots collect the nouriſhment for the ſupport of the plant as well as the large roots. The branches of roots are formed with their extreme ends pointing from the ſtem of the plant, and hence it appears that roots, when once well formed, do not afterwards increaſe, or extend further longitudinally; they lengthen at their ends, but not at their intermediate

termediate parts, for if they did, the branches, being left behind, would be drawn back, with their ends pointing towards the ſtem; but they are conſtantly found in a contrary poſition, with their ends pointing in a direction from the ſtem. If a root is cut it extends no farther in length, as already obſerved, but new roots are formed near the cut end of the old root; two or more new or young roots being formed in the room of the former old one. Hence the fibrous roots of plants are multiplied by cutting them with a ſpade or hoe; and this is often a great benefit to the plant. The pores of the fibrous roots are the mouths of the abſorbent veſſels, by which the whole plant is fed, and the more they are multiplied the more nouriſhment they collect for it.

And thus a plant that naturally extends its roots to a conſiderable diſtance, is in danger of being killed by tranſplanting, unleſs it is alſo furniſhed with fibrous roots, which muſt be carried with it to the new ground; or new ones muſt be formed to make the plant thrive. Hence it is that plants which have long ſtraggling roots are removed with difficulty; but plants of the ſame kind and age, and that grow in the ſame ground, are tranſplanted with ſafety and ſucceſs, if they have been previouſly dug round with a ſpade, whereby their fibrous roots have been cut and multiplied, ſo that they riſe with a ball of earth adhering to them.

Beſides, there is a communication between the different roots of a plant, as when ſome of them are well nouriſhed the others are benefited thereby. If ſome of the roots of a plant be laid in dry earth or ſand, and others in water, the latter will furniſh the dry roots with water ſufficient to keep them and the earth about them moiſt, ſo long as they have a ſupply of water; it is for this reaſon that deep rooting plants are little affected by drought; the tap-roots finding moiſture below, ſend ſome of it up to the roots near the ſurface; for which reaſon, alſo, lucern and ſaintfoin flouriſh in dry hot weather, in which common graſs, and other fibrous-rooted plants, that do not deſcend deep, are ſcorched and burnt up. And as roots communicate moiſture to each other, they therewith alſo communicate nouriſhment; for it is found by experience, that drilled plants, well hoed on each ſide of a row only, are better nouriſhed than ſown plants ſtanding at equal diſtances, or upon an equal ſurface of ground with the drilled, and not hoed. Beſides theſe ſorts of roots, ſome kinds of grain, as that of wheat, have them double, or what may be termed two ſets; the firſt coming directly from the grain or ſeed, while the latter ſhoots ſome time afterwards from the top or crown. Hence they are denominated *ſeminal* and *coronal* roots. The ſeminal root is, Dr. Hunter ſays, puſhed out at the ſame time with the germ, which, together with the farina, nouriſhes the plant during the winter, before the crown and coronal roots are formed. But that in the ſpring, when the crown has become ſufficiently large, it detaches a number of ſtrong fibres, which puſh themſelves obliquely downwards. Theſe are the coronal roots ſerving to nouriſh the plant till it arrives at maturity. And he adds, that a ſmall pipe preſerves the communication between them and the ſeminal roots. This makes an eſſential part of the plant, and is obſerved to be longer or ſhorter, according to the depth that the ſeed has been buried. But on the contrary, it is remarkable, that the crown is always formed juſt within the ſurface. Its place is the ſame, whether the grain has been ſown deep or ſuperficial. And that as the increaſe of this ſort of grain depends upon the vigorous abſorption of the coronal roots, it is obvious why they fix themſelves ſo near the ſurface, where the ſoil is the moſt rich, and contains the largeſt proportion of nutritious ſubſtances. It is alſo evident, that as this ſort of grain muſt be expoſed to the ſeverity of the winter ſeaſon, its roots are admirably diſpoſed to withſtand its effects.

It is evident, that theſe facts, and thoſe connected with the nature of the roots of different plants of the graſs kind, lead to many important conſiderations in the practice of the farmer, and fully ſhew the neceſſity as well as utility of his being perfectly acquainted with the nature, form, and mode of growth of the roots of ſuch plants as have been introduced into the field culture.

All thoſe ſorts of fleſhy roots which run to a conſiderable depth in the ground, as is the caſe with the carrot, parſnep, beet, mangel wurzel, liquorice, and ſome others of the ſame nature, conſtantly require a great depth of cultivation and tillage to ſecure good and full crops. And the various leſs fleſhy roots, which run deeply in the earth, ſuch as thoſe of beans, hops, parſley, red clover, lucern, ſaintfoin, and many ſorts of graſſes, as well as the common and Swediſh turnip, &c. alſo ſtand in need of a rather fine and deep preparation of the ſoil in order to afford equal and full crops.

Among the grain kinds of crops, wheat, from the nature of its root, demands the deepeſt and fineſt tillage; but neither this nor any of the others require any great depth of ploughing merely on that account, as the roots always ſpread out very near the ſurface. The ſame is the caſe with moſt of the cabbage ſorts, yet the land ſhould always be well prepared for them.

Much difference of opinion has been entertained by different inquirers reſpecting the cauſe of the conſtant downward direction of roots and the upward growth of ſtems. Some have ſuppoſed it to depend on the quality of the ſap juice which circulates within them; others have, with greater ingenuity and plauſibility, aſſerted it to be owing to the living principle or power in them, and the ſtimulus of the air and moiſture upon different parts of them. And more lately, and with ſtill greater probability, it has been attributed to circumſtances of a mechanical nature, as depending on the principle of gravity. This notion has been beautifully illuſtrated and explained by the experiments of Mr. A. Knight, by placing moiſtened beans in favourable ſituations for vegetating upon the circumferences of wheels moving with different degrees of velocity in vertical and horizontal poſitions.

The roots of large old trees, which have been felled, are often got out of the ground in a cheap convenient manner by blaſting or blowing them with gunpowder, by means of a boring auger contrived for the purpoſe. See Blasting.

Roots, in *Gardening*, are of many different kinds, which vary conſiderably in their nature. They moſtly conſiſt of a ſtock, or thick main part, which ſtrikes into the earth or ſoil, and of fibrous or thread-like parts, which terminate, and are ſent off from different portions of it, ſpreading themſelves to great diſtances in the ground, for the purpoſe of collecting the nouriſhment and ſupport of the particular plant.

The peculiarities of ſtructure, and the direction in the ſtock parts of roots, have led to ſeveral diſtinctions in regard to their kinds.

In this way we have *perpendicular* and *horizontal* roots, or thoſe which deſcend and run down into the earth or ſoil in a ſtraight downward direction; and thoſe which run or paſs along under the ſurface of the ground in a ſuperficial tranſverſe manner: *ſimple* and *compound* or *branched* roots, or ſuch as are perfectly ſingle, and without any ſort of ſubdiviſion in their parts, and ſuch as are divided in a lateral

lateral branched manner, with many ſubdiviſions and ramifications: *ſpindle-ſhaped* and *tapering* roots, or thoſe which have oblong thick upper parts, which taper in a regular gradual manner to the lower extremities: of this nature are the roots of the common radiſh, the parſnep, the carrot, and many others: *bulbous* and *tuberous* roots, or thoſe which have a roundiſh, oval, ſwelling, bulbous form, and which are compoſed, in ſome caſes, of many ſucculent imbricated ſcales, and in others, of numerous involving coats, including three diſtinct ſorts, as ſcaly bulbs, having the parts lying over one another, as in the root of the lily; tunicated bulbs, which are formed of ſeveral different tunics or coats involving each other in a cloſe manner, as in the onion; and ſolid bulbs, as in the tulip; and thoſe which are of a thick, fleſhy, knobby, ſolid, lumpy form, whether of a roundiſh, irregularly knobbed or oblong ſhape, whether conſtituted of only one knob, or of ſeveral collected into bundles: examples of theſe ſorts are met with in the roots of the potatoe, the Jeruſalem artichoke, anemone, pæony, &c. as well as in all thoſe which are made up of a ſolid fleſhy ſubſtance: *fibrous* and *creeping* roots, or ſuch as are wholly compoſed of numerous radical or ſlender fibrous parts, and are the moſt common ſort, eſpecially in various deſcriptions of herbaceous plants, conſiſting of roots of the perpendicular, horizontal, ſimple, and branched kinds; ſome of which are very thin and fine, like threads, others ſomewhat of a fleſhy nature; and ſuch as run along immediately under the ſurface of the ground to a conſiderable length or diſtance, emitting and ſending forth at certain points ſmall fibres below and ſhoots at the upper parts: *globular* and *bundled* roots, or ſuch as have roundiſh, fleſhy, ſolid roots of the tuberous deſcription, as in the earth-nut, &c. and ſuch as are compoſed of many ſmall, oblong, fleſhy kernelly parts or knobs, which are all connected on the upper part, and terminated underneath in radicles or fibres, as in the ranunculus, &c.: theſe are alſo often termed *grumous* roots: *granulous aggregate* and *pendulous cluſtered* roots, or thoſe which conſiſt of many roundiſh knobs, like grains of corn, the whole of which is congregated together, ſo as to form a root; and thoſe which are compoſed of ſeveral roundiſh fleſhy knobs or tubers, which are ſtrung on and ſuſpended, as it were, at the ends of fibres, as in the aſphodel and many others: *handed tuberous* and *teſticulated* roots, or ſuch as have oblong tuberous forms of them which divide and ſpread out like an open hand, and ſuch as are compoſed of two roundiſh, egg-like, tuberous knobs, united in ſomewhat a teſticulated manner: *jointed* and *woody* roots, or thoſe which are long, thickiſh, and jointed at certain diſtances; and thoſe which are conſtantly becoming of a hard, tough, woody nature, as thoſe of moſt trees, ſhrubs, and under-ſhrubs: and *downright* or *tap* roots, or thoſe which have a main fleſhy part, that runs directly downwards in a perpendicular manner, as in the carrot, parſnep, beet, &c. as well as in ſome ſorts of trees and ſhrubs.

Garden roots are likewiſe further divided and diſtinguiſhed according to the time of their duration or laſting in the ſoil or ground. In this reſpect, there are *annual* roots, or thoſe which continue or endure for one year only, at the fartheſt, and then wholly periſh and decay, as in all the annual plant kind: *biennial* roots, or ſuch as continue and laſt out for two years, or thereabouts, only, after which they entirely decay and are deſtroyed; and *perennial* roots, or ſuch as are of many years' duration or continuance. In ſome caſes of this nature both the roots and ſtems are perennial, while in others only the former.

Roots of the garden deſcription, for the moſt part, penetrate and inſert themſelves into the ſoil or ground, in order to draw and derive nouriſhment and ſupport from it; but there are ſome few which form exceptions to this rule, as the root of the miſletoe, which attaches and fixes itſelf to the branches or other parts of trees, being inſerted between their bark and wood, whence it acquires its means of ſupport, the ſtem proceeding in a downward direction from it, &c.

In bulbous roots of different kinds, there are great differences in regard to their habits of growth, in ſo far at leaſt as relates to the depths which they require to be in the earth or ſoil; ſome ſtanding in need of being quite ſuperficial, while others neceſſarily deſcend to conſiderable depths below the ſurface. Theſe circumſtances therefore probably require much greater attention in their cultivation than has hitherto been beſtowed upon them, in order to procure good roots of ſuch kinds.

The roots of different kinds of garden plants require to be taken up at particular ſeaſons, and to be kept and preſerved for uſe in different manners, according to their different natures, and the purpoſes for which they are intended. All the roots of the different flower bulb and tuberous kinds may be taken up when the ſtalks decline towards the end of ſummer, or the beginning of the ſucceeding ſeaſon; they ſhould then be rendered perfectly dry by ſome gentle means, ſuch as expoſing them to a dry current of air and a middling degree of heat, when thinly ſpread out in a ſieve, or ſome other convenient manner; afterwards, when this has been perfectly accompliſhed, they may be put into drawers in dry ſituations, or hung up in bags in ſimilar places.

Bulbous culinary roots of the onion kind have been attempted to be kept in many different ways, as by laying them thinly in dry rooms, roping them and hanging them up in dry airy places, and burning or charring the root parts of the bulbs; but they ſeem not to be capable of being long preſerved without ſhooting while in the open air, in any way that has hitherto been made trial of in ſuch intention. The beſt methods of proceeding with them are probably thoſe of taking them from the ground after ſome dry weather, expoſing them thinly to the ſun and air until they are become, in every reſpect, perfectly in a ſtate free from any ſort of mould or moiſture, and then either to have them roped and hung up, or ſpread out in a thin manner upon a dry boarded floor. The warmth or heat of the ſun or fire ſhould never be ſuffered to penetrate into the places where they are kept, but they ſhould be naturally dry.

Tuberous roots, ſuch as thoſe of the potatoe, in the general keeping crop, ſhould always be taken up during a dry ſeaſon, and be afterwards, as quickly as poſſible, by mild means, made thoroughly dry and free from any mouldy matter that may hang about them, when they may be laid up in any place which is free from damp, taking care to cover them ſufficiently thickly with dry ſtraw when the weather is froſty. Roots of the Jeruſalem artichoke, and other ſimilar kinds, may be preſerved in the ſame way, but without the uſe of the ſtraw, as they do not ſtand in need of it.

Perpendicular and tap-roots, ſuch as thoſe of the carrot, parſnep, beet, and others of the ſame fleſhy kind, ſometimes require to be laid up in order to preſerve them in a juicy moiſt ſtate. This is beſt accompliſhed by the uſe of dry light ſand, or other ſimilar materials of a light dry nature, packing them up in layers one over the other, each ſort together, in a ſeparate manner. In this way they may be well preſerved in a ſtate fit for conſtant uſe. The roots of celery and cardoons may alſo be preſerved in the ſame way with much ſucceſs and advantage when neceſſary.

It is occaſionally neceſſary that the tap-roots of ſeedling plants, while they are in the nurſery, ſhould be ſhortened, with the view of preventing their ſtriking down too deep into a bad ſubſoil, as well as to force out lateral horizontal roots in greater abundance nearer to the ſurface of the ground, where the ſoil is good, that they may derive more full nouriſhment and ſupport, and thereby thrive in a better and more expeditious manner.

The roots of annual and biennial plants ſtand in need of being renewed every year, or at the end of every two years, by the ſowing of their ſeeds, or the ſetting of ſome other part of them: and the perennial roots are continued by the parting, dividing, ſlipping, cutting, and reſetting of them or their different parts, as well as by various other methods, as may be ſeen fully deſcribed under their different proper heads.

Roots, in *Medicine*. The principal roots uſed in the practice of phyſic, are rhubarb, rhaponticum, ſarſaparilla, ipecacuanha, jalap, zedoary, galangal, caſſumenar, gentian, turmeric, liquorice, madder, &c. See Rhubarb, Sarsaparilla, Ipecacuanha, &c.

There are ſeveral ways of preparing roots for medicinal uſe in the eaſtern nations, which ſtrongly alter them from their original form and appearance. An inſtance we have of this in the drug called ſalep, which is no other than the root of an orchis thus prepared.

Other roots they alſo prepare in the ſame manner, or ſomething like it; an inſtance of which we have in ſome of the oriental ginſeng, which is clear and pellucid, as a reſin, and friable like one, retaining very little of the ſtructure or appearance of the root. Kæmpfer gives the method by which the people in the Eaſt do this, and it may be well worth trying on ſome of our own roots.

The Chineſe, this author informs us, give their ginſeng its colour and tranſparence in this manner. They macerate the freſh root for three days in cold rice-water, then expoſe it in cloſe veſſels to the vapour of the ſame water; after which they carefully and leiſurely dry it, and it becomes hard and brittle, of a browniſh-red colour, and as tranſparent as a reſin.

All the ginſeng of China is not of this ſort; and it has been ſuppoſed by ſome, that ſuch as was ſo had aſſumed that appearance by age, as many of the more ſucculent roots, which have very ſmall fibres, will become much leſs opaque when perfectly dry than they were at firſt; but experience ſhews that this is not the caſe; for many perſons have kept the oriental ginſeng a great many years, but it has never been known to aſſume that appearance. There is no doubt, however, but that if the Weſt Indian ginſeng were treated in this manner, it would equal the prepared ginſeng of the Eaſt; for the roots of ſome of our umbelliferous plants, particularly the ſkirret, may be made clear and tranſparent in this manner, by only boiling it in common water, and afterwards drying it in the open air. Mem. Acad. Scienc. Par. 1740.

Roots, *Flower*. See Flower.

Root *of Oſteocolla*, a word uſed to expreſs a ſort of ſoft and rotten matter, on which the oſteocolla of Germany is found in ſandy grounds.

The workmen ſeek after the oſteocolla by the direction of certain lumps of a white marley matter, which they find lying on the ſands; under this they always find a parcel of rotten vegetable matter, branching out from a main ſtem or trunk, at ten or twelve feet deep up to the ſurface; this rotten ſubſtance they call the root of the oſteocolla; and they obſerve, that where the matter they ſeek after is not found round it at the time of their digging, they need only mark the place, and dig again a year afterwards, and they will find it formed in a perfect manner. The oſteocolla found near Frankfort is all of this kind; and we find the holes in the centre of all the pieces through which this root had paſſed. It is ſo tender, that it uſually moulders away on the oſteocolla being expoſed to the air; but ſometimes they waſh it out. Phil. Tranſ. N° 39.

It is not eaſy to conceive what this is, unleſs the remains of foſſile branches of trees; but even then it is as difficult to account for the formation of the oſteocolla about them, as there is none of it found concreted where they are not. We have a ſort of oſteocolla found with us in what we call *petrifying ſprings*; but as this is done in the water, it is eaſier to conceive how it becomes ſo pure, than how a ſoft and pappy ſubſtance, found in the midſt of a bed of ſand, comes not to have ſome ſand embodied in it.

Root, *Indian Arrow*. See Arrow-*root*.

Root, *China*. See Smilax.

Root, *Falſe China*, a ſpecies of *Senecio*; which ſee.

Root, *Fever*, a ſpecies of *Trioſteum*; which ſee.

Root, *Hollow*, a ſpecies of *Adoxa*; which ſee.

Root, *Roſe*. See Rose-*root*.

Root, *Seminal*. See Seminal.

Root, *Snake*. See Snake-*root*.

Root, *Black*, or *Wild Snake*, of America, a ſpecies of *Actæa*; which ſee.

Root, *Dr. Witt's Rattle-ſnake*, a ſpecies of *Prenanthes*; which ſee.

Root, *Senegaw Rattle-ſnake*, a ſpecies of *Polygala*; which ſee.

Root, *Sweet*, a ſpecies of *Glycirrhiza*; which ſee.

Root *of Scarcity*, in *Agriculture*, the common name of a plant of the tap-rooted fleſhy kind, that has much reſemblance to the beet, and which is now cultivated to a very large ſize both in the root and top, as cattle food, where a proper ſort of ſeed is provided. It is a very hardy vegetable, is eaſily grown, and much reliſhed by horſes as well as neat cattle. See Mangel *Wurzel*.

Root-*Crops*, ſuch ſorts of field crops as afford their produce in roots, ſuch as potatoes, turnips, carrots, parſneps, &c. Theſe ſorts of crops conſtantly require to have the ground peculiarly prepared for them. See theſe ſeveral heads.

Some of the crops require that the land be well pulverized and prepared before they are put into it, and afterwards to have the mould well ſtirred and laid up about them while they are growing. They ſhould alſo, in many inſtances, be at firſt, or in a gradual manner, thinned, ſet out, and left at ſuitable diſtances for gaining their full and perfect ſtates of growth. Some of them ſtand in need of being regularly taken up out of the ground at the proper ſeaſon and ſtored up, as the potatoe, carrot, parſnep, beet, &c. while others may often remain in the ſoil until they are conſumed, as the various ſorts of turnips, and ſome others, not only without ſuſtaining any great injury, but ſometimes with much benefit. The Swediſh turnip is, however, frequently ſtored up with utility and convenience. When laid up they require to be in a dry condition on the outſide, and to be depoſited in dry ſituations. Potatoes ſhould always be kept dry and ſecured from froſt, by means of ſtraw or other ſimilar matters being laid round them.

Root-*Grafting*. See Engrafting.

Root-*Houſe*, in *Rural Economy*, the place where roots are depoſited for the more readily ſupplying live-ſtock of different kinds with them. It is of much conſequence to the farmer to have this place as near as poſſible to the ſtables, feeding-houſes, and cattle-ſheds. Theſe houſes are eſſentially neceſſary

neceſſary wherever there is a number of cows or other ſorts of cattle to be ſupported on roots of the carrot, parſnep, turnip, and potatoe kinds, as well as for cabbages, as without them it would not be only inconvenient, but in many caſes, in ſevere weather, impoſſible to provide them for the daily ſupply of ſuch ſtock. The cabbages ſhould not, however, ever be kept long in theſe houſes, as they are very apt to take on the putrid fermentation, and become uſeleſs. The farmer ſhould be careful that the yard-man conſtantly keeps ſuch places perfectly clean and ſweet, in order that the roots may contract no bad ſmell, as cattle are in many caſes extremely nice in their feeding, and when once diſguſted with any ſort of food of this kind, ſeldom take to it again in a proper manner.

Root-houſes are always the beſt and ſweeteſt when laid over on the inſides with a coarſe plaſter, or boarded with ſome rough common boarding material. They may in many caſes be divided for different ſorts of roots, with great advantage and convenience. The doors of them ſhould for the moſt part be large, ſo that the carts may be backed and readily emptied in at them without any difficulty.

Root, in *Arithmetic* and *Algebra*, denotes a quantity which, being multiplied by itſelf, produces ſome higher power, and it is called the 2d, 3d, 4th, &c. root, according to the number of times that the multiplication by itſelf is performed, that number being always one leſs than the denomination of the root: thus, if a number is multiplied once by itſelf, it is called the ſquare root, or 2d root of the product; if twice, it is called the cube, or 3d root; if three times, the biquadrate, or 4th root; and ſo on to other roots, which, beyond the 4th, are commonly denoted by the 5th, 6th, &c. root; though ancient authors, and even ſome modern ones, uſe particular denominations for all higher roots, as we do for the ſquare root and cube root. Thus, the

2d root,	is called the	*ſquare* root.
3d root	—	*cube* root.
4th root	—	*quadrato-quadratum*, or *biquadratic* root.
5th root	—	*ſurſolid* root.
6th root	—	*quadrato-cubo*.
&c.		&c.

But ſuch diſtinctions are uſeleſs, and are, therefore, now commonly omitted.

For the method of extracting the roots of numbers, ſee the articles Approximaton and Extraction; and for a table of the ſquare roots and cube roots of numbers, ſee the concluſion of this article.

Roots *of Equations*, in *Algebra*, denote ſuch a number or quantity as, when ſubſtituted for the unknown quantity, will produce an equality between both ſides of the equation: thus, in the equation

$$x^3 - 6x^2 + 11x = 6, \text{ or } x^3 - 6x^2 + 11x - 6 = 0;$$

if we ſubſtitute 1 inſtead of x, we have $1 - 6 + 11 = 6$; therefore 1 is a root of that equation: if we ſubſtitute 2 inſtead of x, we have $2^3 - 6 . 2^2 + 11 . 2 = 6$; therefore 2 is alſo a root of the ſame equation: and if we ſubſtitute 3 for x, then $3^3 - 6 . 3^2 + 11 . 3 = 6$; and, therefore, 3 is likewiſe a root of the ſame equation: hence the roots are 1, 2, and 3; that is, there are three diſtinct numbers, which, when ſubſtituted for x, will produce the equality required. And it is the ſame in all equations, *viz.* it has always as many roots, real or imaginary, as there are units in the index of the higheſt power of the unknown quantity. This property has place in equations of the moſt ſimple forms, as $x^2 = 1$, $x^3 = 1$, $x^4 = 1$, $x^5 = 1$, &c. each of theſe having as many roots as there are units in the exponent of the power: thus, the

two ſquare roots of 1, are $+1$ and -1;

three cube roots of 1, are $1, -\frac{1}{2}, +\frac{1}{2}\sqrt{-3}$, and $-\frac{1}{2}, -\frac{1}{2}\sqrt{-3}$;

four 4th roots of 1, are $1, -1, +\sqrt{-1}$, and $-\sqrt{-1}$;

five 5th roots of 1, $\begin{cases} \text{are } 1, \dfrac{-1+\sqrt{5}}{4} \pm \sqrt{\left\{\left(\dfrac{-1+\sqrt{5}}{4}\right)^2 - 1\right\}} \\ \text{and } \dfrac{1-\sqrt{5}}{4} \pm \sqrt{\left\{\left(\dfrac{-1-\sqrt{5}}{4}\right)^2 - 1\right\}} \end{cases}$

the two latter forms containing each two roots, in conſequence of the ambiguous ſign, $\pm$, which enters into their compoſition.

The doctrine of the roots of equations is one of the moſt intricate, but at the ſame time moſt intereſting, of any branch of algebra. The method of finding the roots of quadratic equations is found in the earlieſt algebraic authors; it is even given, though ſomewhat different in form, in the *Bija Ganita*, a Sanſcrit algebra, written about the latter end of the 12th, or the beginning of the 13th century, tranſlated into Perſian in 1634, and lately into Engliſh by Mr. Strachey, of the Eaſt India Company's Bengal civil eſtabliſhment. The ſolution of cubic equations was firſt publiſhed by Cardan about 1540, though it is clear that he was not the inventor of the method, having received it from Tartaglia, who is commonly conſidered as the real author; however, Lagrange attributes the general inveſtigation to Hudde, a celebrated Dutch mathematician, a contemporary of Deſcartes and Fermat. Equations of the 4th degree were firſt ſolved by Ferrari, a pupil of Cardan's, and publiſhed by the latter in 1540; ſince which time no further extent has been given to the ſubject, the 5th, and all higher equations having reſiſted the whole accumulated power of the modern analyſis. Still, however, many important properties of the roots of equations have been diſcovered; the whole theory has been reduced to one uniform principle of operation; and approximations have been made in all thoſe caſes where direct methods of ſolution were unattainable. We cannot, of courſe, enter upon this ſubject at any great length; but a ſummary of the moſt intereſting particulars, though not accompanied, in all caſes, with their demonſtration, will not, we preſume, be unacceptable to the general reader; in the enumeration of which we ſhall avail ourſelves of the Introduction to Barlow's Mathematical Tables.

General Properties of the Roots of Equations.

1. Every equation of the general form

$$x^m + Ax^{m-1} + Bx^{m-2} + Cx^{m-3} + \&c. + K = 0$$

has m roots real or imaginary (ſee Imaginary *Roots*); and may be ſuppoſed to be formed by the continued product of m factors,

$$(x - \alpha)\ (x - \beta)\ (x - \gamma)\ (x - \delta)\ \&c. = 0,$$

where $\alpha, \beta, \gamma, \delta$, &c. are the roots of the equation.

2. The imaginary roots of an equation always enter in pairs, and if $a + b\sqrt{-1}$ be one of thoſe roots, $a - b\sqrt{-1}$ is another of them; ſo that the ſum of every pair of them is a real quantity, and the ſquare of their difference a real negative quantity; and an equation can have no imaginary root but is reducible to the above form. Theſe properties of the imaginary roots of equation are generally attributed to d'Alembert.

3. Since

3. Since every equation

$$x^m + Ax^{m-1} + Bx^{m-2} + Cx^{m-3} + \&c. + K = 0$$

is composed of the factors

$$(x - \alpha)\ (x - \beta)\ (x - \gamma)\ (x - \delta)\ \&c. = 0,$$

it is obvious, that if, by any means, one of those roots, as α, can be found, the original equation may be divided by $(x - \alpha)$, and thence be reduced to another of lower dimensions.

4. If we suppose the signs of each of the roots of an equation to be changed, then the co-efficient of the second term of that equation will be equal to the sum of all those roots so changed; the co-efficient of the third term equal to the sum of all the products that can be formed with them, taken two and two at a time; the co-efficient of the fourth term equal to all the products that can be formed with them, taken three and three at a time; and so on to the absolute term, which is equal to the product of all the roots; thus, if a, b, c, d, be the roots of an equation, then the co-efficient of the first term being 1, that of the

$$\begin{aligned} 2\text{d} &= -(a + b + c + d) \\ 3\text{d} &= (ab + ac + ad + bc + bd + cd) \\ 4\text{th} &= -(abc + abd + acd + bcd) \\ 5\text{th} &= abcd \end{aligned}$$

5. If the substitution of any two numbers, m and n, instead of the unknown quantity of an equation, give results with contrary signs, one, or some odd number, of the real roots of the equation, are contained between those two limits.

6. And conversely, if two numbers be substituted for the unknown quantity of an equation, which comprise between them any odd number of the roots of that equation, the results thus obtained must necessarily have contrary signs. But if two, or any even number of roots, be comprised between those limits, then no change of signs will take place in the results. See a demonstration of these properties in Barlow's Tables.

7. Therefore, when we substitute for the unknown quantity of an equation the several terms of the progression, 0, 1, 2, 3, &c. it will furnish us with the integral limits of all the real positive roots of that equation, provided it has not any that differ from each other by a quantity less than unity, or if it have any odd number of such roots; but if two, or any even number of its roots, be comprised between two consecutive integers, then these substitutions will not enable us (at least not by the change of sign) to discover the integral limits between which they are comprised.

8. But if we substitute for the unknown quantity the several terms of the progression, 0, Δ, 2 Δ, 3 Δ, &c. Δ being supposed less than the difference of any two of the real roots of the equation, then the limits of every real positive root will be indicated by the several changes of signs in the respective results.

The above two properties have chiefly reference to Lagrange's method of approximation.

9. If, in an equation, whatever real value be substituted for the unknown quantity, the result is always positive, it is certain that all the roots of that equation are imaginary.

10. The signs of all the roots of an equation may be changed from positive to negative, or from negative to positive, by changing the signs of the alternate co-efficients, *viz.* the 2d, 4th, 6th, &c.; and hence the finding the real roots of an equation is reduced to that of finding positive roots only.

11. Every equation of an odd degree has at least one real root, which will be positive if the last term be negative, or negative if that term be positive.

12. Every equation of even dimensions, having its last term negative, has at least two real roots, one positive and the other negative; but if its last term be positive, it furnishes us with no means of judging of the nature of the roots.

13. The first term of an equation having (as we have supposed throughout) unity for its co-efficient, its greatest positive root will be less than the greatest negative co-efficient plus 1.

14. And the absolute term of an equation being divided by the sum of that term, and the greatest co-efficient having a contrary sign, will give a limit less than the least root of that equation.

15. An equation, having unity for the co-efficient of its first term, and integral co-efficients for all its others, cannot have a fractional root, *viz.* its roots must be either integral, irrational, or imaginary.

16. An equation cannot have more real positive roots, than there are variations in the succession of the signs of its co-efficients, nor more real negative roots than there are permanencies of signs.

Therefore, when all the roots of an equation are real, there are precisely as many positive roots as there are variations, and as many negative roots as there are permanencies.

17. When any term of an equation is wanting, or has its co-efficient equal to zero, and the preceding and following terms have the same signs, the equation has necessarily some imaginary roots.

18. An equation cannot have all its roots comprised between two consecutive integers, nor between any two integers, of which the difference is not greater than 2.

These properties, the demonstrations of which are given by different algebraical authors, may frequently be advantageously consulted in determining the nature and limits of the roots of equations.

On the Forms of the Roots of Equations.—We have before observed, that the roots of equations, beyond those of the fourth degree, cannot be generally exhibited in an analytical form; yet from the analogy discoverable in those of inferior dimensions, there seems little doubt but that those of the fifth and higher dimensions partake of the same form.

When an equation of the second, third, or fourth degree has its second term taken away, to reduce it to its most convenient form for solution, the roots will have the following form.

Second Degree.

$x = a\sqrt{p}$, $x = a'\sqrt{p}$, where a, a', are the roots of 1.

Third Degree.

$x = \sqrt[3]{p^3} + \sqrt[3]{q}$, $x = a'\sqrt[3]{p} + a^2\sqrt[3]{q}$, $x = a^2\sqrt[3]{p} + a\sqrt{q}$, where a and a^2 are the two imaginary roots of $\sqrt[3]{1}$.

Fourth Degree.

$$\left.\begin{aligned} x &= \sqrt[4]{p} + \sqrt[4]{q} + \sqrt[4]{r} \\ x &= a\sqrt[4]{p} + a^2\sqrt[4]{q} + a^3\sqrt[4]{r} \\ x &= a^2\sqrt[4]{p} + a^3\sqrt[4]{q} + a\sqrt[4]{r} \\ x &= a^3\sqrt[4]{p} + a\sqrt[4]{q} + a^2\sqrt[4]{r} \end{aligned}\right\}$$

where a, a^2, a^3, are the three imaginary roots of $\sqrt[4]{1}$.

Whence

Whence it is very natural to infer, that in an equation of the fifth degree, the roots will have the form,

$$x = \sqrt[5]{p} + \sqrt[5]{q} + \sqrt[5]{r} + \sqrt[5]{s}$$
$$x = a\sqrt[5]{p} + a^2\sqrt[5]{q} + a^3\sqrt[5]{r} + a^4\sqrt[5]{s}$$
$$x = a^2\sqrt[5]{p} + a^4\sqrt[5]{q} + a\sqrt[5]{r} + a^3\sqrt[5]{s}$$
$$x = a^3\sqrt[5]{p} + a^1\sqrt[5]{q} + a\sqrt[5]{r} + a^2\sqrt[5]{s}$$
$$x = a^4\sqrt[5]{p} + a\sqrt[5]{q} + a^2\sqrt[5]{r} + a^3\sqrt[5]{s}$$

where a, a^2, a^3, a^4, are the four imaginary roots of $\sqrt[5]{1}$.

This generalization of the forms of the roots of equations, though generally attributed to Euler, is, we believe, due to Waring; but neither of these able analysts were able to derive from it the solution of any general equation above the fourth degree. On the subject of equations, *viz.* of finding their roots, we would refer the reader to Waring's "Meditationes Algebraicæ," Lea's "Resolution of the higher Equations in Algebra," La Grange's treatise on the resolution "Des Equations Numeriques," and the Introduction to Barlow's "Mathematical Tables," from which we have extracted the following general synopsis of resolution. See also Bonnycastle's Algebra.

General Synopsis of the direct and approximate Methods of ascertaining the Roots of Numbers and Equations.

Extraction of the Roots of Numbers.

I. Let n represent the index of the root,

x the number of which the root is required,

r an approximate value of $\sqrt[n]{x}$;

which may be found by trial, or otherwise, as near as convenient, and either in excess or defect: then will,

$$1.\ \sqrt[n]{x} = r + \frac{2r(x - r^n)}{(n+1)r^n + (n-1)x} \text{ very nearly.}$$

And using this new approximate value in the same way, another value may be found still nearer; and so on, to any degree of accuracy required.

This general formula resolves itself into the following particular ones; *viz.*

$$2.\ \sqrt{x} = r + \frac{2r(x - r^2)}{3r^2 + x}.$$

$$3.\ \sqrt[3]{x} = r + \frac{r(x - r^3)}{2r^3 + x}.$$

$$4.\ \sqrt[4]{x} = r + \frac{2r(x - r^4)}{5r^4 + 3x}.$$

$$5.\ \sqrt[5]{x} = r + \frac{r(x - r^5)}{3r^5 + 2x}.$$

$$6.\ \sqrt[6]{x} = r + \frac{2r(x - r^6)}{7r^6 + 5x}.$$

$$7.\ \sqrt[7]{x} = r + \frac{r(x - r^7)}{4r^7 + 3x}.$$

&c. &c.

By the Binomial Theorem.

II. Let $(a + b)$ represent any binomial, and n the index of the root or power, which may be either positive or negative, integral or fractional; then will

$$(a + b)^n =$$

$$(1)\ a^n + \frac{n}{1}a^{n-1}b + \frac{n(n-1)}{1.2}a^{n-2}b^2 + \frac{n(n-1)(n-2)}{1.2.3}a^{n-3}b^3 + \&c.$$

If b be negative, the odd powers of b will also be negative; that is,

$$(a - b)^n =$$

$$(2)\ a^n - \frac{n}{1}a^{n-1}b + \frac{n(n-n)}{1.2}a^{n-2}b^2 - \frac{n(n-1)(n-2)}{1.2.3}a^{n-3}b^3 + \&c.$$

Otherwise: let $\frac{m}{n}$ represent the index, and put $\frac{b}{a} = Q$; also, let A, B, C, D, &c. represent the first, second, third, &c. terms of the series, with their proper signs; then will

$$(a + b)^{\frac{m}{n}} = (a + aQ)^{\frac{m}{n}} =$$

$$(3)\ \overset{A}{a^{\frac{m}{n}}} + \overset{B}{\frac{m}{n}AQ} + \overset{C}{\frac{m-n}{2n}BQ} + \overset{D}{\frac{m-2n}{3n}CQ} + \frac{m-3n}{4n}DQ + \&c.;$$

which is by far the most convenient form in the case of fractional or negative indices.

ROOTS OF EQUATIONS.

QUADRATIC EQUATIONS.

III. Let $x^2 + ax - b = 0$, or $x^2 + ax = b$, represent any quadratic equation, a and b being either positive or negative; then will

$$x = \frac{-a}{2} \pm \sqrt{\left(\frac{a^2}{4} + b\right)}.$$

But if a and b, independent of the sign by which they are preceded, be always supposed positive; then this general formula resolves itself into the four following particular ones, *viz.*

$$1.\ x^2 + ax - b = 0, \text{ where } x = \frac{-a}{2} \pm \sqrt{\left(\frac{a^2}{4} + b\right)}.$$

$$2.\ x^2 - ax - b = 0, \text{ where } x = \frac{a}{2} \pm \sqrt{\left(\frac{a^2}{4} + b\right)}.$$

$$3.\ x^2 - ax + b = 0, \text{ where } x = \frac{a}{2} \pm \sqrt{\left(\frac{a^2}{4} - b\right)}.$$

$$4.\ x^2 + ax + b = 0, \text{ where } x = \frac{-a}{2} \pm \sqrt{\left(\frac{a^2}{4} - b\right)}.$$

By Sines and Tangents.

IV.

$$1.\ x^2 + px = q.$$

Put $\frac{2}{p}\sqrt{q} = \tan. z$; then

$$x = \begin{cases} +\sqrt{q} \times \tan. \frac{1}{2}z, \text{ or} \\ -\sqrt{q} \times \text{cos}. \frac{1}{2}z. \end{cases}$$

2. x^2

2. $x^2 + px = q$.

Put $\frac{2}{p}\sqrt{q} = \tan. z$; then

$$x = \begin{cases} +\sqrt{q} \times \text{cof. } z, \text{ or} \\ -\sqrt{q} \times \tan. z. \end{cases}$$

3. $x^2 + px = -q$.

Put $\frac{2}{p}\sqrt{q} = \text{fin. } z$; then

$$x = \begin{cases} -\sqrt{q} \times \tan. \frac{1}{2} z, \text{ or} \\ -\sqrt{q} \times \text{cof. } \frac{1}{2} z. \end{cases}$$

4. $x^2 - px = -q$.

Put $\frac{2}{p}\sqrt{q} = \text{fin. } z$; then

$$x = \begin{cases} +\sqrt{q} \times \tan. \frac{1}{2} z, \text{ or} \\ +\sqrt{q} \times \text{cof. } \frac{1}{2} z. \end{cases}$$

Cubic Equations.

By Cardan's Rule.

V. Let $x^3 + ax - b = 0$, or $x^3 + ax = b$, represent any cubic equation wanting its second term, and in which a and b may be either positive or negative; then will

$$1.\ x = \sqrt[3]{\left\{\frac{b}{2} + \sqrt{\left(\frac{b^2}{4} + \frac{a^3}{27}\right)}\right\}} + \sqrt[3]{\left\{\frac{b}{2} - \sqrt{\left(\frac{b^2}{4} + \frac{a^3}{27}\right)}\right\}}.$$

$$2.\ x = \sqrt[3]{\left\{\frac{b}{2} + \sqrt{\left(\frac{b^2}{4} + \frac{a^3}{27}\right)}\right\}} - \frac{\frac{1}{3} a}{\sqrt[3]{\left\{\frac{b}{2} + \sqrt{\left(\frac{b^2}{4} + \frac{a^3}{27}\right)}\right.}}.$$

Which latter form is frequently the most convenient, as it requires only one extraction of the cube root, whereas the former requires two.

The second term of a cubic equation may be taken away by the following formulæ:

Let $y^3 + py^2 + qy + r = 0$.

Assume $y = \frac{x - p}{3}$; $a = 9q - 3p^2$; and $b = 9pq - 2p^3 - 27r$;

so shall $x^3 + ax - b = 0$ be the transformed equation required, which will, under this form, have integral coefficients.

When a is negative, that is, when the equation is $x^3 - ax = b$, the preceding formula becomes

$$3.\ x = \sqrt[3]{\left\{\frac{b}{2} + \sqrt{\left(\frac{b^2}{4} - \frac{a^3}{27}\right)}\right\}} + \sqrt[3]{\left\{\frac{b}{2} - \sqrt{\left(\frac{b^2}{4} - \frac{a^3}{27}\right)}\right\}}.$$

And here, when $\frac{a^3}{27} > \frac{b^2}{4}$, both branches of the root become imaginary, and the equation is said to be of the irreducible case; no solution being then obtainable by this rule, except in those cases in which the cube root of each of these branches can be found in other binomial surds, which, when possible, is done by the following formulæ:

(1) $\sqrt[3]{(a \pm \sqrt{b})} = x + \sqrt{y}$.

(2) $x^3 - \frac{3}{4} x \sqrt[3]{(a^2 - b)} - \frac{1}{4} a = 0$.

(3) $y = x^2 - \sqrt[3]{(a^2 - b)}$.

By Sines and Tangents.

VI. In this case, it is necessary to separate the above general formula into the following particular ones, according as a and b are positive or negative, as follows; *viz.*

Form 1. $x^3 + ax - b = 0$.
2. $x^3 + ax + b = 0$.
3. $x^3 - ax - b = 0$.
4. $x^3 - ax + b = 0$.

1. *Solution of Form* 1: $x^3 + ax - b = 0$.

Put $\frac{b}{2}\left(\frac{3}{a}\right)^{\frac{3}{2}} = \tan. z$; and $\sqrt[3]{\tan. (45^\circ - \frac{1}{2} z)} = \tan. u$.

Then $x = 2\sqrt{\frac{a}{3}} \times \cot. 2u$.

2. *Solution of Form* 2: $x^3 + ax + b = 0$.

Put $\frac{b}{2}\left(\frac{3}{a}\right)^{\frac{3}{2}} = \tan. z$; and $\sqrt[3]{\tan. (45^\circ - \frac{1}{2} z)} = \tan. u$.

Then will $x = -2\sqrt{\frac{a}{3}} \times \cot. 2u$.

3. *Solution of Form* 3: $x^3 - ax - b = 0$.

This form resolves itself into two cases, according as $\frac{2}{b}\left(\frac{a}{3}\right)^{\frac{3}{2}}$ is less or greater than 1.

In the first case, put $\frac{2}{b}\left(\frac{a}{3}\right)^{\frac{3}{2}} = \text{cof. } z$, and $\sqrt[3]{\tan. (45^\circ - \frac{1}{2} z)} = \tan. u$.

Then will $x = 2\sqrt{\frac{a}{3}} \times \text{cosec. } 2u$.

In the second case, put $\frac{b}{2}\left(\frac{3}{a}\right)^{\frac{3}{2}} = \text{cof. } z$, then has x the three following values, *viz.*

1. $x = 2\sqrt{\frac{a}{3}} \times \text{cof. } \frac{z}{3}$.

2. $x = -2\sqrt{\frac{a}{3}} \times \text{cof. } \left(60^\circ + \frac{z}{3}\right)$.

3. $x = -2\sqrt{\frac{a}{3}} \times \text{cof. } \left(60^\circ - \frac{z}{3}\right)$.

4. *Solution of Form* 4: $x^3 - ax + b = 0$.

This has also two cases, according as $\frac{2}{b}\left(\frac{a}{3}\right)^{\frac{3}{2}}$ is less or greater than 1.

In the first case, put $\frac{2}{b}\left(\frac{a}{3}\right)^{\frac{3}{2}} = \text{cof. } z$, and $\sqrt[3]{\tan. (45^\circ - \frac{1}{2} z)} = \tan u$.

Then will $x = -2\sqrt{\frac{a}{3}} \times \text{cof. } 2u$.

In

In the ſecond caſe, put $\frac{b}{2}\left(\frac{3}{a}\right)^{\frac{3}{2}} = \text{cof. } z$, then has x the three following values:

$$1.\quad x = -2\sqrt{\frac{a}{3}} \times \text{cof. } \frac{z}{3}.$$

$$2.\quad x = 2\sqrt{\frac{a}{3}} \times \text{cof. } \left(60^\circ + \frac{z}{3}\right).$$

$$3.\quad x = 2\sqrt{\frac{a}{3}} \times \text{cof. } \left(60^\circ - \frac{z}{3}\right).$$

The two latter caſes of forms 3 and 4 belong to the irreducible caſe, each of which gives three real roots or values of x; whereas the other forms have each only one real root. See IRREDUCIBLE *Caſe*.

By infinite Series.

Let $x^3 + ax = b$ repreſent any cubic equation, in which a and b may be each either poſitive or negative.

Aſſume $\frac{2b}{\sqrt[3]{[2(27b^2 + 4a^3)]}} = \varphi$, and $\frac{27b^2}{27b^2 + 4a^3} = \pi$; then,

$$1.\begin{cases} x = \varphi \times [1 + \frac{2.5}{6.9}\pi + \frac{2.5.8.11}{6.9.12.15}\pi^2 + \frac{2.5\ldots17}{6.9\ldots21}\pi^3 + \&c.], \text{ or} \\ x = \varphi \times [1 + \frac{2.5}{6.9}\pi A + \frac{8.11}{12.15}\pi B + \frac{14.17}{18.21}\pi C + \&c.] \end{cases}$$

In which laſt form, A, B, C, &c. repreſent the preceding terms.

Again, aſſume $2\sqrt[3]{\frac{b}{2}} = \varphi$, and $\frac{27b^2 + 4a^3}{27b^2} = \pi$; then,

$$2.\begin{cases} x = \varphi \times [1 - \frac{2}{3.6}\pi - \frac{2.5.8}{3.6.9.12}\pi^2 - \frac{2.5\ldots14}{3.6\ldots18}\pi^3 - \&c.], \text{ or} \\ x = \varphi \times [1 - \frac{2}{3.6}\pi A - \frac{5.8}{9.12}\pi B - \frac{11.14}{15.18}\pi C - \&c.] \end{cases}$$

In which, alſo, A, B, C, &c. are the preceding terms.

Both theſe ſeries are correct analytical expreſſions for the value of x, in the general cubic equation $x^3 + ax = b$; but they are not equally commodious for the purpoſes of ſolution.

The former muſt be uſed in all caſes when a is poſitive, as alſo when a is negative, and $4a^3$ *greater* than $54b^2$; and the latter when a is negative, and $4a$ *leſs* than $54b^2$; becauſe then π, in both caſes, will be leſs than unity, and the ſeries will, therefore, be converging ones.

BIQUADRATIC EQUATIONS.

By Simpſon's Rule.

VIII. Let $x^4 + ax^3 + bx^2 + cx + d = 0$, be any equation of the fourth degree, in which a, b, c, d, may be any numbers at pleaſure, poſitive, negative, or zero.

Find the values of p, q, and r, by means of the three equations

$$8p^3 - 4bp^2 + (2ac - 8d)p - a^2d + 4bd - c^2 = 0$$
$$q = \sqrt{(\tfrac{1}{4}a^2 + 2p - b)}$$
$$r = \frac{ap - c}{2q};$$

then will the four roots of the propoſed equation be contained in the following formulæ;

$$x = -\frac{\frac{1}{2}a - q}{2} \pm \sqrt{\left\{\left(\frac{\frac{1}{2}a - q}{2}\right)^2 + r - p\right\}}$$
$$x = -\frac{\frac{1}{2}a + q}{2} \pm \sqrt{\left\{\left(\frac{\frac{1}{2}a + q}{2}\right)^2 - r - p\right\}}$$

The above rule was only generalized by Simpſon, it is originally due to Ferrari, though commonly aſcribed to Bombelli.

By Deſcartes' Rule.

IX. Let $x^4 + ax^2 + bx + c = 0$, be any biquadratic equation, wanting its ſecond term.

Find the value of y in the double cubic equation

$$y^6 + 2ay^4 + (a^2 - 4c)y^2 - b^2 = 0;$$

then will the four values of x be compriſed in the formulæ

$$x = \tfrac{1}{2}y \pm \sqrt{\left(-\tfrac{1}{4}y^2 - \tfrac{1}{2}a - \frac{b}{2y}\right)}$$
$$x = \tfrac{1}{2}y \pm \sqrt{\left(-\tfrac{1}{4}y^2 - \tfrac{1}{2}a + \frac{b}{2y}\right)}$$

By Euler's Rule.

X. Let $x^4 - ax^2 - bx - c = 0$, be any biquadratic equation, wanting its ſecond term, a, b, and c, being any numbers, poſitive, negative, or zero.

Aſſume $f = \frac{1}{2}a$; $h = \frac{b^2}{64}$; $g = \frac{1}{16}a^2 + \frac{1}{4}c$.

Then find the three roots of the cubic equation

$$y + fy^2 + gy - h = 0,$$

which let be p, q, and r.

Then will the four values of x in the original equation be expreſſed as follows.

When b is poſitive,

1ſt root	$x =$	$\sqrt{p} + \sqrt{q} + \sqrt{r}$
2d	$x =$	$\sqrt{p} - \sqrt{q} + \sqrt{r}$
3d	$x =$	$-\sqrt{p} + \sqrt{q} - \sqrt{r}$
4th	$x =$	$-\sqrt{p} - \sqrt{q} + \sqrt{r}$

When b is negative,

1ſt root	$x =$	$\sqrt{p} + \sqrt{q} - \sqrt{r}$
2d	$x =$	$\sqrt{p} - \sqrt{q} + \sqrt{r}$
3d	$x =$	$-\sqrt{p} + \sqrt{q} + \sqrt{r}$
4th	$x =$	$-\sqrt{p} - \sqrt{q} - \sqrt{r}$

EQUATIONS IN GENERAL.

By Approximation.—Firſt Method.

XI. Let $x^n + ax^{n-1} + bx^{n-2} + cx^{n-3} + dx^{n-4} + \&c. = 0$, be any general equation, in which a, b, c, d, &c. are any numbers, poſitive, negative, or zero; then r being an approximate value of x, we have

1. $x =$

$$1.\ x = \frac{(n-1)\,r^n + (n-2)\,a\,r^{n-1} + (n-3)\,b\,r^{n-2} + (n-4)\,c\,r^{n-3} + \&c}{n\,r^{n-1} + (n-1)\,a\,r^{n-2} + (n-2)\,b\,r^{n-3} + (n-3)\,c\,r^{n-4} + \&c.}$$

nearly, which general form resolves itself into the following particular ones; *viz.*

Equations of the third Degree.

$$2.\ x^3 + a\,x^2 + b\,x + c = 0;$$

$$x = \frac{2\,r^3 + a\,r^2 - c}{3\,r^2 + 2\,a\,r + b}.$$

Equations of the fourth Degree.

$$3.\ x^4 + a\,x^3 + b\,x^2 + c\,x + d = 0;$$

$$x = \frac{3\,r^4 + 2\,a\,r^3 + b\,r^2 - d}{4\,r^3 + 3\,a\,r + 2\,b\,r + c}.$$

Equations of the fifth Degree.

$$4.\ x^5 + a\,x^4 + b\,x^3 + c\,x^2 + d\,x + e = 0;$$

$$5.\ x = \frac{4\,r^5 + 3\,a\,r^4 + 2\,b\,r^3 + c\,r^2 - e}{5\,r^4 + 4\,a\,r^3 + 3\,b\,r^2 + 2\,c\,r + d}$$

&c. &c.

By the second Method.

XII. Let $x^n + a\,x^{n-1} + b\,x^{n-2} + c\,x^{n-3} + d\,x^{n-4} + \&c. = w$, be any general equation, as before, and r an approximate value of x; then making

$$r^n + a\,r^{n-1} + b\,r^{n-2} + c\,r^{n-3} + d\,r^{n-4} + \&c. = v$$

we shall have

$$1.\ x = r + \frac{(w-v)\,2\,r}{(n-1)\,w + (n+1)\,r^n + (n-1)\,a\,r^{n-1} + (n-3)\,b\,r^{n-2} + \&c.}$$

Or,

$$2.\ x = r + \frac{(w-v)\,2\,r}{(n-1)\,v + (n+1)\,r^n + (n-1)\,a\,r^{n-1} + (n-3)\,b\,r^{n-2} + \&c.}$$

The first formula being applicable to the case in which r is greater than unity, and the second to those in which it is less.

These general formulæ resolve themselves into the following particular ones; *viz.*

Equations of the third Degree.

$$3.\ x^3 + a\,x^2 + b\,x = w;$$

$$x = r + \frac{(w-v)\,r}{w \text{ or } v + 2\,r^2 + a\,r}.$$

Equations of the fourth Degree.

$$4.\ x^4 + a\,x^3 + b\,x^2 + c\,x = w;$$

$$x = r + \frac{(w-v)\,2\,r}{3\,w \text{ or } 3\,v + 5\,r^4 + 3\,a\,r^3 + b\,r^2 - c\,r}$$

Equations of the fifth Degree.

$$5.\ x^5 + a\,x^4 + b\,x^3 + c\,x^2 + d\,x = w;$$

$$x = r + \frac{(w-v)\,r}{2\,w \text{ or } 2\,v + 3\,r^5 + 2\,a\,r^4 + b\,r^3 - d\,r}$$

The latter formulæ, which are by far the most converging, were first published by Mr. Barlow, in No. 12. of Leybourn's Mathematical Repository; with reference to which we propose giving one example by way of illustration.

Example.—Given $x^3 - 2\,x = 5$.

Assume $r = 2$, then (by formula 1),

$$\begin{aligned} r^3 &= 8 & 2\,r^3 &= 16 \\ -2\,r &= -4 & w &= 5 \\ \hline v &= 4 & & 21 \text{ divisor.} \\ w &= 5 \\ \hline w - v &= 1 \\ r &= 2 \end{aligned}$$

whence $\frac{1 \times 2}{21} = .094$.

Therefore $x = 2.094$ nearly.

Assume, therefore, $r = 2.094$, then,

$$\begin{aligned} r^3 &= 9.181846584 & 2\,r^3 &= 18.363693168 \\ -2\,r &= 4.188 & w &= 5 \\ \hline v &= 4.993846584 & & 23.363693168 \\ w &= 5. \\ \hline w - v &= .006153416 \\ r &= 2.094 \\ r\,(w-v) &= .012885253 \end{aligned}$$

whence $\frac{.012885253}{23.3636931} = .0005515$.

Therefore $x = .0945515$ nearly; which is true to the nearest figure in the eighth place, by only two substitutions.

TABLE of Square Roots and Cube Roots, from 1 to 1200.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
1	1.0000000	1.0000000	51	7.1414284	3.7084298	101	10.0498756	4.6570095
2	1.4142136	1.2599210	52	7.2111026	3.7325111	102	10.0995049	4.6723287
3	1.7320508	1.4422496	53	7.2801099	3.7562858	103	10.1488916	4.6875482
4	2.0000000	1.5874011	54	7.3484692	3.7797631	104	10.1980390	4.7026694
5	2.2360680	1.7099759	55	7.4161985	3.8029525	105	10.2469508	4.7176940
6	2.4494897	1.8171206	56	7.4833148	3.8258624	106	10.2956301	4.7326235
7	2.6457513	1.9129312	57	7.5498344	3.8485011	107	10.3440804	4.7474594
8	2.8284271	2.0000000	58	7.6157731	3.8708766	108	10.3923048	4.7622032
9	3.0000000	2.0800837	59	7.6811457	3.8929965	109	10.4403065	4.7768562
10	3.1622777	2.1544347	60	7.7459667	3.9148676	110	10.4880885	4.7914199
11	3.3166248	2.2239801	61	7.8102497	3.9364972	111	10.5356538	4.8058955
12	3.4641016	2.2894286	62	7.8740079	3.9578915	112	10.5830052	4.8202845
13	3.6055513	2.3513347	63	7.9372539	3.9790571	113	10.6301458	4.8345881
14	3.7416574	2.4101422	64	8.0000000	4.0000000	114	10.6770783	4.8488076
15	3.8729833	2.4662121	65	8.0622577	4.0207256	115	10.7238053	4.8629442
16	4.0000000	2.5198421	66	8.1240384	4.0412401	116	10.7703296	4.8769990
17	4.1231056	2.5712816	67	8.1853528	4.0615480	117	10.8166538	4.8909732
18	4.2426407	2.6207414	68	8.2462113	4.0816551	118	10.8627805	4.9048681
19	4.3588989	2.6684016	69	8.3066239	4.1015661	119	10.9087121	4.9196847
20	4.4721360	2.7144177	70	8.3666003	4.1212853	120	10.9544512	4.9324242
21	4.5825757	2.7589243	71	8.4261498	4.1408178	121	11.0000000	4.9460874
22	4.6904158	2.8020393	72	8.4852814	4.1601676	122	11.0453610	4.9596757
23	4.7958315	2.8438670	73	8.5440037	4.1793390	123	11.0905365	4.9731898
24	4.8989795	2.8844991	74	8.6023253	4.1983364	124	11.1355287	4.9866310
25	5.0000000	2.9240177	75	8.6602540	4.2171633	125	11.1803399	5.0000000
26	5.0990195	2.9624960	76	8.7177979	4.2358236	126	11.2249722	5.0132979
27	5.1961524	3.0000000	77	8.7749644	4.2543210	127	11.2694277	5.0265257
28	5.2915026	3.0365889	78	8.8317609	4.2726586	128	11.3137085	5.0396842
29	5.3851648	3.0723168	79	8.8881944	4.2908404	129	11.3578167	5.0527743
30	5.4772256	3.1072325	80	8.9442719	4.3088695	130	11.4017543	5.0657970
31	5.5677644	3.1413806	81	9.0000000	4.3267487	131	11.4455231	5.0787531
32	5.6568542	3.1748021	82	9.0553851	4.3444815	132	11.4891253	5.0916434
33	5.7445626	3.2075343	83	9.1104336	4.3620707	133	11.5325626	5.1044687
34	5.8309519	3.2396118	84	9.1651514	4.3795191	134	11.5758369	5.1172299
35	5.9160798	3.2710663	85	9.2195445	4.3968296	135	11.6189500	5.1299278
36	6.0000000	3.3019272	86	9.2736185	4.4140049	136	11.6619038	5.1425632
37	6.0827625	3.3322218	87	9.3273791	4.4310476	137	11.7046999	5.1551367
38	6.1644140	3.3619754	88	9.3808315	4.4479602	138	11.7473444	5.1676493
39	6.2449980	3.3912114	89	9.4339811	4.4647451	139	11.7898261	5.1801015
40	6.3245553	3.4199519	90	9.4868330	4.4814047	140	11.8321596	5.1924941
41	6.4031242	3.4482172	91	9.5393920	4.4979414	141	11.8743421	5.2048279
42	6.4807407	3.4760266	92	9.5916630	4.5143574	142	11.9163753	5.2171034
43	6.5574385	3.5033981	93	9.6436508	4.5306549	143	11.9582607	5.2293215
44	6.6332496	3.5303483	94	9.6953597	4.5468359	144	12.0000000	5.2414828
45	6.7082039	3.5568933	95	9.7467943	4.5629026	145	12.0415946	5.2535879
46	6.7823300	3.5830479	96	9.7979590	4.5788570	146	12.0830460	5.2656374
47	6.8556546	3.6088261	97	9.8488578	4.5947009	147	12.1243557	5.2776321
48	6.9282032	3.6342411	98	9.8994949	4.6104363	148	12.1655251	5.2895725
49	7.0000000	3.6593057	99	9.9498744	4.6260650	149	12.2065556	5.3014592
50	7.0710678	3.6840314	100	10.0000000	4.6415888	150	12.2474487	5.3132928

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
151	12.2882057	5.3250740	201	14.1774469	5.8577660	251	15.8429795	6.3079935
152	12.3288280	5.3368033	202	14.2126704	5.8674643	252	15.8745079	6.3163596
153	12.3693169	5.3484812	203	14.2478068	5.8771307	253	15.9059737	6.3247035
154	12.4096736	5.3601084	204	14.2828569	5.8867653	254	15.9373775	6.3330256
155	12.4498996	5.3716854	205	14.3178211	5.8963685	255	15.9687194	6.3413257
156	12.4899960	5.3832126	206	14.3527001	5.9059406	256	16.0000000	6.3496042
157	12.5299641	5.3946907	207	14.3874946	5.9154817	257	16.0312195	6.3578611
158	12.5698051	5.4061202	208	14.4222051	5.9249921	258	16.0623784	6.3660968
159	12.6095202	5.4175015	209	14.4568323	5.9344721	259	16.0934769	6.3743111
160	12.6491106	5.4288352	210	14.4913767	5.9439220	260	16.1245155	6.3825043
161	12.6885775	5.4401218	211	14.5258390	5.9533418	261	16.1554944	6.3906765
162	12.7279221	5.4513618	212	14.5602198	5.9627320	262	16.1864141	6.3988279
163	12.7671453	5.4625556	213	14.5945195	5.9720926	263	16.2172747	6.4069584
164	12.8062485	5.4737037	214	14.6287388	5.9814240	264	16.2480768	6.4150687
165	12.8452326	5.4848066	215	14.6628783	5.9907264	265	16.2788206	6.4231583
169	12.8840987	5.4958647	216	14.6969385	6.0000000	266	16.3095064	6.4312276
167	12.9228480	5.5068784	217	14.7309199	6.0092450	267	16.3401346	6.4392767
168	12.9614814	5.5178484	218	14.7648231	6.0184617	268	16.3707055	6.4473057
160	13.0000000	5.5287748	219	14.7986486	6.0276502	269	16.4012195	6.4553148
170	13.0384048	5.5396583	220	14.8323970	6.0368107	270	16.4316767	6.4633041
171	13.0766968	5.5504991	221	14.8660687	6.0459435	271	16.4620776	6.4712736
172	13.1148770	5.5612978	222	14.8996644	6.0550489	272	16.4924225	6.4792236
173	13.1529464	5.5720546	223	14.9331845	6.0641270	273	16.5227116	6.4871541
174	13.1909060	5.5827702	224	14.9666295	6.0731779	274	16.5529454	6.4950653
175	13.2287566	5.5934447	225	15.0000000	6.0822020	275	16.5831240	6.5029572
176	13.2664992	5.6040787	226	15.0332964	6.0911994	276	16.6132477	6.5108300
177	13.3041347	5.6146724	227	15.0665192	6.1001702	277	16.6433170	6.5186839
178	13.3416641	5.6252263	228	15.0996689	6.1091147	278	16.6733320	6.5265189
179	13.3790882	5.6357408	229	15.1327460	6.1180332	279	16.7032931	6.5343851
180	13.4164079	5.6462162	230	15.1657509	6.1269257	280	16.7332005	6.5421326
181	13.4536240	5.6566528	231	15.1986842	6.1357924	281	16.7630546	6.5499116
182	13.4907376	5.6670511	232	15.2315462	6.1446337	282	16.7928556	6.5576722
183	13.5277493	5.6774114	233	15.2643375	6.1534495	283	16.8226038	6.5654144
184	13.5646600	5.6877340	234	15.2970585	6.1622401	284	16.8522995	6.5731385
185	13.6014705	5.6980192	235	15.3297097	6.1710058	285	16.8819430	6.5808443
186	13.6381817	5.7082675	236	15.3622915	6.1797466	286	16.9115345	6.5885323
187	13.6747943	5.7184791	237	15.3948043	6.1884628	287	16.9410743	6.5962023
188	13.7113092	5.7286543	238	15.4272486	6.1971544	288	16.9705627	6.6038545
189	13.7477271	5.7387936	239	15.4596248	6.2058218	289	17.0000000	6.6114890
190	13.7840488	5.7488971	240	15.4919334	6.2144650	290	17.0293864	6.6191060
191	13.8202750	5.7589652	241	15.5241747	6.2230843	291	17.0587221	6.6267054
192	13.8564065	5.7689982	242	15.5563492	6.2316797	292	17.0880075	6.6342874
193	13.8924440	5.7789966	243	15.5884573	6.2402515	293	17.1172428	6.6418522
194	13.9283883	5.7889604	244	15.6204994	6.2487998	294	17.1464282	6.6493998
195	13.9642400	5.7988900	245	15.6524758	6.2573248	295	17.1755640	6.6569302
196	14.0000000	5.8087857	246	15.6843871	6.2658266	296	17.2046505	6.6644437
197	14.0356688	5.8186479	247	15.7162336	6.2743054	297	17.2336879	6.6719403
198	14.0712473	5.8284767	248	15.7480157	6.2827613	298	17.2626765	6.6794200
199	14.1067360	5.8382725	249	15.7797338	6.2911946	299	17.2916165	6.6868831
200	14.1421356	5.8480355	250	15.8113883	6.2996053	300	17.3205081	6.6943295

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
301	17.3493516	6.7017593	351	18.7349940	7.0540041	401	20.0249844	7.3741979
302	17.3781472	6.7091729	352	18.7616630	7.0606967	402	20.0499377	7.3803227
303	17.4068952	6.7165700	353	18.7882942	7.0673767	403	20.0748599	7.3864373
304	17.4355958	6.7239508	354	18.8148877	7.0740440	404	20.0997512	7.3925418
305	17.4642492	6.7313155	355	18.8414437	7.0806988	405	20.1246118	7.3986363
306	17.4928557	6.7386641	356	18.8679623	7.0873411	406	20.1494417	7.4047206
307	17.5214155	6.7459967	357	18.8944436	7.0939709	407	20.1742410	7.4107950
308	17.5499288	6.7533134	358	18.9208879	7.1005885	408	20.1990099	7.4168595
309	17.5783958	6.7606143	359	18.9472953	7.1071937	409	20.2237484	7.4229142
310	17.6068169	6.7678995	360	18.9736660	7.1137866	410	20.2484567	7.4289589
311	17.6351921	6.7751690	361	19.0000000	7.1203674	411	20.2731349	7.4349938
312	17.6635217	6.7824229	362	19.0262976	7.1269360	412	20.2977831	7.4410189
313	17.6918060	6.7896613	363	19.0525589	7.1334925	413	20.3224014	7.4470342
314	17.7200451	6.7968844	364	19.0787840	7.1400370	414	20.3469899	7.4530399
315	17.7482393	6.8040921	365	19.1049732	7.1465695	415	20.3715488	7.4590359
316	17.7763888	6.8112847	366	19.1311265	7.1530901	416	20.3960781	7.4650223
317	17.8044938	6.8184620	367	19.1572441	7.1595988	417	20.4205779	7.4709991
318	17.8325545	6.8256242	368	19.1833261	7.1660957	418	20.4450483	7.4769664
319	17.8605711	6.8327714	369	19.2093727	7.1725809	419	20.4694895	7.4829242
320	17.8885438	6.8399037	370	19.2353841	7.1790544	420	20.4939015	7.4888724
321	17.9164729	6.8470213	371	19.2613603	7.1855162	421	20.5182845	7.4948113
322	17.9443584	6.8541240	372	19.2873015	7.1919663	422	20.5426386	7.5007406
323	17.9722008	6.8612120	373	19.3132079	7.1984050	423	20.5669638	7.5066607
324	18.0000000	6.8682855	374	19.3390796	7.2048322	424	20.5912603	7.5125715
325	18.0277564	6.8753443	375	19.3649167	7.2112479	425	20.6155281	7.5184730
326	18.0554701	6.8823888	376	19.3907194	7.2176522	426	20.6397674	7.5243652
327	18.0831413	6.8894188	377	19.4164878	7.2240450	427	20.6639783	7.5302482
328	18.1107703	6.8964345	378	19.4422221	7.2304268	428	20.6881609	7.5361221
329	18.1383571	6.9034359	379	19.4679223	7.2367972	429	20.7123152	7.5419867
330	18.1659021	6.9104232	380	19.4935887	7.2431565	430	20.7364414	7.5478423
331	18.1934054	6.9173964	381	19.5192213	7.2495045	431	20.7605395	7.5536888
332	18.2208672	6.9243556	382	19.5448203	7.2558415	432	20.7846097	7.5595263
333	18.2482876	6.9313008	383	19.5703858	7.2621675	433	20.8086520	7.5653548
334	18.2756669	6.9382321	384	19.5959179	7.2684824	434	20.8326667	7.5711743
335	18.3030052	6.9451496	385	19.6214169	7.2747864	435	20.8566536	7.5769849
336	18.3303028	6.9520533	386	19.6468827	7.2810794	436	20.8806130	7.5827865
337	18.3575598	6.9589434	387	19.6723156	7.2873617	437	20.9045450	7.5885793
338	18.3847763	6.9658198	388	19.6977156	7.2936330	438	20.9284495	7.5943633
339	18.4119526	6.9726826	389	19.7230829	7.2998936	439	20.9523268	7.6001385
340	18.4390889	6.9795321	390	19.7484177	7.3061436	440	20.9761770	7.6059049
341	18.4661853	6.9863681	391	19.7737199	7.3123828	441	21.0000000	7.6116626
342	18.4932420	6.9931906	392	19.7989899	7.3186114	442	21.0237960	7.6174116
343	18.5202592	7.0000000	393	19.8242276	7.3248295	443	21.0475652	7.6231519
344	18.5472370	7.0067962	394	19.8494332	7.3310369	444	21.0713075	7.6288837
345	18.5741756	7.0135791	395	19.8746069	7.3372339	445	21.0950231	7.6346067
346	18.6010752	7.0203490	396	19.8997487	7.3434205	446	21.1187121	7.6403213
347	18.6279360	7.0271058	397	19.9248588	7.3495966	447	21.1423745	7.6460272
348	18.6547581	7.0338497	398	19.9499373	7.3557624	448	21.1660105	7.6517247
349	18.6815417	7.0405806	399	19.9749844	7.3619178	449	21.1896201	7.6574138
350	18.7082869	7.0472987	400	20.0000000	7.3680630	450	21.2132034	7.6630943

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
451	21.2367606	7.6687665	501	22.3830293	7.9422931	551	23.4733892	8.1981753
452	21.2602916	7.6744303	502	22.4053565	7.9475739	552	23.4946802	8.2031319
453	21.2837967	7.6800857	503	22.4276615	7.9528477	553	23.5159520	8.2080825
454	21.3072758	7.6857328	504	22.4499443	7.9581144	554	23.5372046	8.2130271
455	21.3307290	7.6913717	505	22.4722051	7.9633743	555	23.5584380	8.2179657
456	21.3541565	7.6970023	506	22.4944438	7.9686271	556	23.5796522	8.2228985
457	21.3775583	7.7026246	507	22.5166605	7.9738731	557	23.6008474	8.2278254
458	21.4009346	7.7082388	508	22.5388553	7.9791122	558	23.6220236	8.2327463
459	21.4242853	7.7138448	509	22.5610283	7.9843444	559	23.6431808	8.2376614
460	21.4476106	7.7194426	510	22.5831796	7.9895697	560	23.6643191	8.2425706
461	21.4709106	7.7250325	511	22.6053091	7.9947883	561	23.6854386	8.2474740
462	21.4941853	7.7306141	512	22.6274170	8.0000000	562	23.7065392	8.2523715
463	21.5174348	7.7361877	513	22.6495033	8.0052049	563	23.7276210	8.2572633
464	21.5406592	7.7417532	514	22.6715681	8.0104032	564	23.7486842	8.2621492
465	21.5638587	7.7473109	515	22.6936114	8.0155946	565	23.7697286	8.2670294
466	21.5870331	7.7528606	516	22.7156334	8.0207794	566	23.7907545	8.2719039
467	21.6101828	7.7584023	517	22.7376340	8.0259574	567	23.8117618	8.2767726
468	21.6333077	7.7639361	518	22.7596134	8.0311287	568	23.8327506	8.2816355
469	21.6564078	7.7694620	519	22.7815715	8.0362935	569	23.8537209	8.2864928
470	21.6794834	7.7749801	520	22.8035085	8.0414515	570	23.8746728	8.2913444
471	21.7025344	7.7804904	521	22.8254244	8.0466030	571	23.8956063	8.2961903
472	21.7255610	7.7859928	522	22.8473193	8.0517479	572	23.9165215	8.3010304
473	21.7485632	7.7914875	523	22.8691933	8.0568862	573	23.9374184	8.3058651
474	21.7715411	7.7969745	524	22.8910463	8.0620180	574	23.9582971	8.3106941
475	21.7944947	7.8024538	525	22.9128785	8.0671432	575	23.9791576	8.3155175
476	21.8174242	7.8079254	526	22.9346899	8.0722620	576	24.0000000	8.3203353
477	21.8403297	7.8133892	527	22.9564806	8.0773743	577	24.0208243	8.3251475
478	21.8632111	7.8188456	528	22.9782506	8.0824800	578	24.0416306	8.3299542
479	21.8860686	7.8242942	529	23.0000000	8.0875794	579	24.0624188	8.3347553
480	21.9089023	7.8297353	530	23.0217289	8.0926723	580	24.0831891	8.3395509
481	21.9317122	7.8351688	531	23.0434372	8.0977589	581	24.1039416	8.3443410
482	21.9544984	7.8405949	532	23.0651252	8.1028390	582	24.1246762	8.3491256
483	21.9772610	7.8460134	533	23.0867928	8.1079128	583	24.1453929	8.3539047
484	22.0000000	7.8514244	534	23.1084400	8.1129803	584	24.1660919	8.3586784
485	22.0227155	7.8568281	535	23.1300670	8.1180414	585	24.1867732	8.3634466
486	22.0454077	7.8622242	536	23.1516738	8.1230962	586	24.2074369	8.3682095
487	22.0680765	7.8676130	537	23.1732605	8.1281447	587	24.2280829	8.3729668
488	22.0907220	7.8729944	538	23.1948270	8.1331870	588	24.2487113	8.3777188
489	22.1133444	7.8783684	539	23.2163735	8.1382230	589	24.2693222	8.3824653
490	22.1359436	7.8837352	540	23.2379001	8.1432529	590	24.2899156	8.3872065
491	22.1585198	7.8890946	541	23.2594067	8.1482765	591	24.3104916	8.3919423
492	22.1810730	7.8944468	542	23.2808935	8.1532939	592	24.3310501	8.3966729
493	22.2036033	7.8997917	543	23.3023604	8.1583051	593	24.3515913	8.4030981
494	22.2261108	7.9051294	544	23.3238076	8.1633102	594	24.3721152	8.4061180
495	22.2485955	7.9104599	545	23.3452351	8.1683092	595	24.3926218	8.4108326
496	22.2710575	7.9157832	546	23.3666429	8.1733020	596	24.4131112	8.4155419
497	22.2934968	7.9210994	547	23.3880311	8.1782888	597	24.4335834	8.4202460
498	22.3159136	7.9264085	548	23.4093998	8.1832695	598	24.4540385	8.4249448
499	22.3383079	7.9317104	549	23.4307490	8.1882441	599	24.4744765	8.4296383
500	22.3606798	7.9370053	550	23.4520788	8.1932127	600	24.4948974	8.4343267

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
601	24.5153013	8.4390098	651	25.5147016	8.6668310	701	26.4764046	8.8832661
602	24.5356883	8.4436877	652	25.5342907	8.6712665	702	26.4952826	8.8874882
603	24.5560583	8.4483605	653	25.5538647	8.6756974	703	26.5141472	8.8917063
604	24.5764115	8.4530281	654	25.5734237	8.6801237	704	26.5329983	8.8959204
605	24.5967478	8.4576906	655	25.5929678	8.6845456	705	26.5518361	8.9001304
606	24.6170673	8.4623479	656	25.6124969	8.6889630	706	26.5706605	8.9043366
607	24.6373700	8.4670001	657	25.6320112	8.6933759	707	26.5894716	8.9085387
608	24.6576560	8.4716471	658	25.6515107	8.6977843	708	26.6082694	8.9127369
609	24.6779254	8.4762892	659	25.6709953	8.7021882	709	26.6270539	8.9169311
610	24.6981781	8.4809261	660	25.6904652	8.7065877	710	26.6458252	8.9211214
611	24.7184142	8.4855579	661	25.7099203	8.7109827	711	26.6645833	8.9253078
612	24.7386338	8.4901848	662	25.7293607	8.7153734	712	26.6833281	8.9294902
613	24.7588368	8.4948065	663	25.7487864	8.7197596	713	26.7020598	8.9336687
614	24.7790234	8.4994233	664	25.7681975	8.7241414	714	26.7207784	8.9378433
615	24.7991935	8.5040350	665	25.7875939	8.7285187	715	26.7394839	8.9420140
616	24.8193473	8.5086417	666	25.8069758	8.7328918	716	26.7581763	8.9461809
617	24.8394847	8.5132435	667	25.8263431	8.7372604	717	26.7768557	8.9503438
618	24.8596058	8.5178403	668	25.8456960	8.7416246	718	26.7955220	8.9545029
619	24.8797106	8.5224321	669	25.8650343	8.7459846	719	26.8141754	8.9586581
620	24.8997992	8.5270189	670	25.8843582	8.7503401	720	26.8328157	8.9628095
621	24.9198716	8.5316009	671	25.9036677	8.7546913	721	26.8514432	8.9669570
622	24.9399278	8.5361780	671	25.9229628	8.7590383	722	26.8700577	8.9711007
623	24.9599679	8.5407501	673	25.9422435	8.7633809	723	26.8886593	8.9752406
624	24.9799920	8.5453173	674	25.9615100	8.7677192	724	26.9072481	8.9793766
625	25.0000000	8.5498797	675	25.9807621	8.7720532	725	26.9258240	8.9835089
626	25.0199920	8.5544372	676	26.0000000	8.7763830	726	26.9443872	8.9876373
627	25.0399681	8.5589899	677	26.0192237	8.7807084	727	26.9629375	8.9917620
628	25.0599282	8.5635377	678	26.0384331	8.7850296	728	26.9814751	8.9958829
629	25.0798724	8.5680807	679	26.0576284	8.7893466	729	27.0000000	9.0000000
630	25.0998008	8.5726189	680	26.0768096	8.7936593	730	27.0185122	9.0041134
631	25.1197134	8.5771523	681	26.0959767	8.7979679	731	27.0370117	9.0082229
632	25.1396102	8.5816809	682	26.1151297	8.8022721	732	27.0554985	9.0123288
633	25.1594913	8.5862047	683	26.1342687	8.8065722	733	27.0739727	9.0164309
634	25.1793566	8.5907238	684	26.1533937	8.8108681	734	27.0924344	9.0205293
635	25.1992063	8.5952380	685	26.1725047	8.8151598	735	27.1108834	9.0246239
636	25.2190404	8.5997476	686	26.1916017	8.8194474	736	27.1293199	9.0287149
637	25.2388589	8.6042525	687	26.2106848	8.8237307	737	27.1477439	9.0328021
638	25.2586619	8.6087526	688	26.2297541	8.8280099	738	27.1661554	9.0368857
639	25.2784493	8.6132480	689	26.2488095	8.8322850	739	27.1845544	9.0409655
640	25.2982213	8.6177388	690	26.2678511	8.8365559	740	27.2029410	9.0450419
641	25.3179778	8.6222248	691	26.2868789	8.8408227	741	27.2213152	9.0491142
642	25.3377189	8.6267063	692	26.3058929	8.8450854	742	27.2396769	9.0531831
643	25.3574447	8.6311830	693	26.3248932	8.8493440	743	27.2580263	9.0572482
644	25.3771551	8.6356551	694	26.3438797	8.8535985	744	27.2763634	9.0613098
645	25.3968502	8.6401226	695	26.3628527	8.8578489	745	27.2946881	9.0653677
646	25.4165301	8.6445855	696	26.3818119	8.8620952	746	27.3130006	9.0694220
647	25.4361947	8.6490437	697	26.4007576	8.8663375	747	27.3313007	9.0734726
648	25.4558441	8.6534974	698	26.4196896	8.8705757	748	27.3495887	9.0775197
659	25.4754784	8.6579465	699	26.4386081	8.8748099	749	27.3678644	9.0815631
650	25.4950976	8.6623911	700	26.4575131	8.8790400	750	27.3861279	9.0856030

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
751	27.4043792	9.0896392	801	28.3019434	9.2870440	851	29.1719043	9.4763957
752	27.4226184	9.0936719	802	28.3196045	9.2909072	852	29.1890390	9.4801061
753	27.4408455	9.0977010	803	28.3372546	9.2947671	853	29.2061637	9.4838136
754	27.4590604	9.1017265	804	28.3548938	9.2986239	854	29.2232784	9.4875182
755	27.4772633	9.1057485	805	28.3725219	9.3024775	855	29.2403830	9.4912200
756	27.4954542	9.1097669	806	28.3901391	9.3063278	856	29.2574777	9.4949188
757	27.5136330	9.1137818	807	28.4077454	9.3101750	857	29.2745623	9.4986147
758	27.5317998	9.1177931	808	28.4253408	9.3140190	858	29.2916370	9.5023078
759	27.5499546	9.1218010	809	28.4429253	9.3178599	859	29.3087018	9.5059980
760	27.5680975	9.1258053	810	28.4604989	9.3216975	860	29.3257566	9.5096854
761	27.5862284	9.1298061	811	28.4780617	9.3255320	861	29.3428015	9.5133699
762	27.6043475	9.1338034	812	28.4956137	9.3293634	862	29.3598365	9.5170515
763	27.6224546	9.1377974	813	28.5131549	9.3331916	863	29.3768616	9.5207303
764	27.6405499	9.1417874	814	28.5306852	9.3370167	864	29.3938769	9.5244063
765	27.6586334	9.1457742	815	28.5482048	9.3408386	865	29.4108823	9.5280794
766	27.6767050	9.1497576	816	28.5657137	9.3446575	866	29.4278779	9.5317497
767	27.6947648	9.1537375	817	28.5832119	9.3484731	867	29.4448637	9.5354172
768	27.7128129	9.1577139	818	28.6006993	9.3522857	868	29.4618397	9.5390818
769	27.7308492	9.1616869	819	28.6181760	9.3560952	869	29.4788059	9.5427437
770	27.7488739	9.1656565	820	28.6356421	9.3599016	870	29.4957624	9.5464027
771	27.7668868	9.1696225	821	28.6530976	9.3637049	871	29.5127091	9.5500589
772	27.7848880	9.1735852	822	28.6705424	9.3675051	872	29.5296461	9.5537123
773	27.8028775	9.1775445	823	28.6879766	9.3713022	873	29.5465734	9.5573630
774	27.8208555	9.1815003	824	28.7054002	9.3750963	874	29.5634910	9.5610108
775	27.8388218	9.1854527	825	28.7228132	9.3788873	875	29.5803989	9.5646559
776	27.8567766	9.1894018	826	28.7402157	9.3826752	876	29.5972972	9.5682932
777	27.8747197	9.1933474	827	28.7576077	9.3864600	877	29.6141858	9.5719377
778	27.8926514	9.1972897	828	28.7749891	9.3902419	878	29.6310648	9.5755745
779	27.9105715	9.2012286	829	28.7923601	9.3940206	879	29.6479342	9.5792085
780	27.9284801	9.2051641	830	28.8097206	9.3977964	880	29.6647939	9.5828397
781	27.9463772	9.2090962	831	28.8270706	9.4015691	881	29.6816442	9.5864682
782	27.9642629	9.2130250	832	28.8444102	9.4053387	882	29.6984848	9.5900939
783	27.9821372	9.2169505	833	28.8617394	9.4091054	883	29.7153159	9.5937169
784	28.0000000	9.2208726	834	28.8790582	9.4128690	884	29.7321375	9.5973373
785	28.0178515	9.2247914	835	28.8963666	9.4166297	885	29.7489496	9.6009548
786	28.0356915	9.2287068	836	28.9136646	9.4203873	886	29.7657521	9.6045696
787	28.0535203	9.2326189	837	28.9309523	9.4241420	887	29.7825452	9.6081817
788	28.0713377	9.2365277	838	28.9482297	9.4278936	888	29.7993289	9.6117911
789	28.0891438	9.2404333	839	28.9654967	9.4316423	889	29.8161030	9.6153977
790	28.1069386	9.2443355	840	28.9827535	9.4353880	890	29.8328678	9.6190017
791	28.1247222	9.2482344	841	29.0000000	9.4391307	891	29.8496231	9.6226030
792	28.1424946	9.2521300	842	29.0172363	9.4428704	892	29.8663690	9.6262016
793	28.1602557	9.2560224	843	29.0344623	9.4466072	893	29.8831056	9.6297975
794	28.1780056	9 2599114	844	29.0516781	9.4503410	894	29.8998328	9.6333907
795	28.1957444	9.2637973	845	29.0688837	9.4540719	895	29.9165506	9.6369812
796	28.2134720	9.2676798	846	29.0860791	9.4577999	896	29.9332591	9.6405690
797	28.2311884	9.2715592	847	29.1032644	9.4615249	897	29.9499583	9.6441542
798	28.2488938	9.2754352	848	29.1204396	9.4652470	898	29.9666481	9.6477367
799	28.2665881	9.2793081	849	29.1376046	9.4689661	899	29.9833287	9.6513166
800	28.2842712	9.2831777	850	29.1547595	9.4726824	900	30.0000000	9.6548938

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
901	30.0166620	9.6584684	951	30.8382879	9.8339238	1001	31.6385840	10.0033322
902	30.0333148	9.6620403	952	30.8544972	9.8373695	1002	31.6543836	10.0066622
903	30.0499584	9.6656096	953	30.8706984	9.8408127	1003	31.6701752	10.0099899
904	30.0675928	9.6691762	954	30.8868904	9.8442536	1004	31.6859590	10.0133155
905	30.0832179	9.6727403	955	30.9030743	9.8476920	1005	31.7017349	10.0166389
906	30.0998339	9.6763017	956	30.9192497	9.8511280	1006	31.7175030	10.0199601
907	30.1164407	9.6798604	957	30.9354166	9.8545617	1007	31.7332633	10.0232791
908	30.1330383	9.6834166	958	30.9515751	9.8579929	1008	31.7490157	10.0265958
909	30.1496269	9.6869701	959	30.9677251	9.8614218	1009	31.7647603	10.0299104
910	30.1662063	9.6905211	960	30.9838668	9.8648483	1010	31.7804972	10.0332228
911	30.1827765	9.6940694	961	31.0000000	9.8682724	1011	31.7962262	10.0365330
912	30.1993377	9.6976151	962	31.0161248	9.8716941	1012	31.8119474	10.0398410
913	30.2158899	9.7011583	963	31.0322413	9.8751135	1013	31.8276609	10.0431469
914	30.2324329	9.7046989	964	31.0483494	9.8785305	1014	31.8433666	10.0464506
915	30.2489669	9.7082369	965	31.0644491	9.8819451	1015	31.8590646	10.0497521
916	30.2654919	9.7117723	966	31.0805405	9.8853574	1016	31.8747549	10.0530514
917	30.2820079	9.7153051	967	31.0966236	9.8887673	1017	31.8904374	10.0563485
918	30.2985148	9.7188354	968	31.1126984	9.8921749	1018	31.9061123	10.0596435
919	30.3150128	9.7223631	969	31.1287648	9.8955801	1019	31.9217794	10.0629364
920	30.3315018	9.7258883	970	31.1448230	9.8989830	1020	31.9374388	10.0662271
921	30.3479818	9.7294109	971	31.1608729	9.9023835	1021	31.9530906	10.0695156
922	30.3644529	9.7329309	972	31.1769145	9.9057817	1022	31.9687347	18.0728020
923	30.3809151	9.7364484	973	31.1929479	9.9091776	1023	31.9843712	10.0760863
924	30.3973683	9.7399634	974	31.2089731	9.9125712	1024	32.0000000	10.0793684
925	30.4138127	9.7434758	975	31.2249900	9.9159624	1025	32.0156212	10.0826484
926	30.4302481	9.7469857	976	31.2409987	9.9193513	1026	32.0312348	10.0859262
927	30.4466747	9.7504930	977	31.2569992	9.9227379	1027	32.0468407	10.0892019
928	30.4630924	9.7539979	978	31.2729915	9.9261222	1028	32.0624391	10.0924755
929	30.4795013	9.7575002	979	31.2889757	9.9295042	1029	32.0780298	10.0957469
930	30.4959014	9.7610001	980	31.3049517	9.9328839	1030	32.0936131	10.0990163
931	30.5122926	9.7644974	981	31.3209195	9.9362613	1031	32.1091887	10.1022835
932	30.5286750	9.7679922	982	31.3368792	9.9396363	1032	32.1247568	10.1055487
933	30.5450487	9.7714845	983	31.3528308	9.9430092	1033	32.1403173	10.1088117
934	30.5614136	9.7749743	984	31.3687743	9.9463797	1034	32.1558704	10.1120726
935	30.5777697	9.7784616	985	31.3847097	9.9497479	1035	32.1714159	10.1153314
936	30.5941171	9.7829466	986	31.4006369	9.9531138	1036	32.1869539	10.1185882
937	30.6104557	9.7854288	987	31.4165561	9.9564775	1037	32.2024844	10.1218428
938	30.6267857	9.7889087	988	31.4324673	9.9598389	1038	32.2180074	10.1250953
939	30.6431069	9.7923861	989	31.4483704	9.9631981	1039	32.2335229	10.1283457
940	30.6594194	9.7958611	990	31.4642654	9.9665549	1040	32.2490310	10.1315941
941	30.6757233	9.7993336	991	31.4801525	9.9699095	1041	32.2645316	10.1348403
942	30.6920185	9.8028036	992	31.4960315	9.9732619	1042	32.2800248	10.1380845
943	30.7083051	9.8062711	993	31.5119025	9.9766120	1043	32.2955105	10.1413266
944	30.7245830	9.8097362	994	31.5277655	9.9799599	1044	32.3109888	10.1445667
945	30.7408523	9.8131989	995	31.5436206	9.9833055	1045	32.3264598	10.1478047
946	30.7571130	9.8166591	996	31.5594677	9.9866488	1046	32.3419233	10.1510406
947	30.7733651	9.8201169	997	31.5753068	9.9899900	1047	32.3573794	10.1542744
948	30.7896086	9.8235723	998	31.5911380	9.9933289	1048	32.3728281	10.1575062
949	30.8058436	9.8270252	999	31.6069613	9.9966656	1049	32.3882695	10.1607359
950	30.8220700	9.8304757	1000	31.6227766	10.0000000	1050	32.4037035	10.1639636

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
751	27.4043792	9.0896392	801	28.3019434	9.2870440	851	29.1719043	9.4763957
752	27.4226184	9.0936719	802	28.3196045	9.2909072	852	29.1890390	9.4801061
753	27.4408455	9.0977010	803	28.3372546	9.2947671	853	29.2061637	9.4838136
754	27.4590604	9.1017265	804	28.3548938	9.2986239	854	29.2232784	9.4875182
755	27.4772633	9.1057485	805	28.3725219	9.3024775	855	29.2403830	9.4912200
756	27.4954542	9.1097669	806	28.3901391	9.3063278	856	29.2574777	9.4949188
757	27.5136330	9.1137818	807	28.4077454	9.3101750	857	29.2745623	9.4986147
758	27.5317998	9.1177931	808	28.4253408	9.3140190	858	29.2916370	9.5023078
759	27.5499546	9.1218010	809	28.4429253	9.3178599	859	29.3087018	9.5059980
760	27.5680975	9.1258053	810	28.4604989	9.3216975	860	29.3257566	9.5096854
761	27.5862284	9.1298061	811	28.4780617	9.3255320	861	29.3428015	9.5133699
762	27.6043475	9.1338034	812	28.4956137	9.3293634	862	29.3598365	9.5170515
763	27.6224546	9.1377974	813	28.5131549	9.3331916	863	29.3768616	9.5207303
764	27.6405499	9.1417874	814	28.5306852	9.3370167	864	29.3938769	9.5244063
765	27.6586334	9.1457742	815	28.5482048	9.3408386	865	29.4108823	9.5280794
766	27.6767050	9.1497576	816	28.5657137	9.3446575	866	29.4278779	9.5317497
767	27.6947648	9.1537375	817	28.5832119	9.3484731	867	29.4448637	9.5354172
768	27.7128129	9.1577139	818	28.6006993	9.3522857	868	29.4618397	9.5390818
769	27.7308492	9.1616869	819	28.6181760	9.3560952	869	29.4788059	9.5427437
770	27.7488739	9.1656565	820	28.6356421	9.3599016	870	29.4957624	9.5464027
771	27.7668868	9.1696225	821	28.6530976	9.3637049	871	29.5127091	9.5500589
772	27.7848880	9.1735852	822	28.6705424	9.3675051	872	29.5296461	9.5537123
773	27.8028775	9.1775445	823	28.6879766	9.3713022	873	29.5465734	9.5573630
774	27.8208555	9.1815003	824	28.7054002	9.3750963	874	29.5634910	9.5610108
775	27.8388218	9.1854527	825	28.7228132	9.3788873	875	29.5803989	9.5646559
776	27.8567766	9.1894018	826	28.7402157	9.3826752	876	29.5972972	9.5682932
777	27.8747197	9.1933474	827	28.7576077	9.3864600	877	29.6141858	9.5719377
778	27.8926514	9.1972897	828	28.7749891	9.3902419	878	29.6310648	9.5755745
779	27.9105715	9.2012286	829	28.7923601	9.3940206	879	29.6479342	9.5792085
780	27.9284801	9.2051641	830	28.8097206	9.3977964	880	29.6647939	9.5828397
781	27.9463772	9.2090962	831	28.8270706	9.4015691	881	29.6816442	9.5864682
782	27.9642629	9.2130250	832	28.8444102	9.4053387	882	29.6984848	9.5900939
783	27.9821372	9.2169505	833	28.8617394	9.4091054	883	29.7153159	9.5937169
784	28.0000000	9.2208726	834	28.8790582	9.4128690	884	29.7321375	9.5973373
785	28.0178515	9.2247914	835	28.8963666	9.4166297	885	29.7489496	9.6009548
786	28.0356915	9.2287068	836	28.9136646	9.4203873	886	29.7657521	9.6045696
787	28.0535203	9.2326189	837	28.9309523	9.4241420	887	29.7825452	9.6081817
788	28.0713377	9.2365277	838	28.9482297	9.4278936	888	29.7993289	9.6117911
789	28.0891438	9.2404333	839	28.9654967	9.4316423	889	29.8161030	9.6153977
790	28.1069386	9.2443355	840	28.9827535	9.4353880	890	29.8328678	9.6190017
791	28.1247222	9.2482344	841	29.0000000	9.4391307	891	29.8496231	9.6226030
792	28.1424946	9.2521300	842	29.0172363	9.4428704	892	29.8663690	9.6262016
793	28.1602557	9.2560224	843	29.0344623	9.4466072	893	29.8831056	9.6297975
794	28.1780056	9 2599114	844	29.0516781	9.4503410	894	29.8998328	9.6333907
795	28.1957444	9.2637973	845	29.0688837	9.4540719	895	29.9165506	9.6369812
796	28.2134720	9.2676798	846	29.0860791	9.4577999	896	29.9332591	9.6405690
797	28.2311884	9.2715592	847	29.1032644	9.4615249	897	29.9499583	9.6441542
798	28.2488938	9.2754352	848	29.1204396	9.4652470	898	29.9666481	9.6477367
799	28.2665881	9.2793081	849	29.1376046	9.4689661	899	29.9833287	9.6513166
800	28.2842712	9.2831777	850	29.1547595	9.4726824	900	30.0000000	9.6548938

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
901	30.0166620	9.6584684	951	30.8382879	9.8339238	1001	31.6385840	10.0033322
902	30.0333148	9.6620403	952	30.8544972	9.8373695	1002	31.6543836	10.0066622
903	30.0499584	9.6656096	953	30.8706984	9.8408127	1003	31.6701752	10.0099899
904	30.0675928	9.6691762	954	30.8868904	9.8442536	1004	31.6859590	10.0133155
905	30.0832179	9.6727403	955	30.9030743	9.8476920	1005	31.7017349	10.0166389
906	30.0998339	9.6763017	956	30.9192497	9.8511280	1006	31.7175030	10.0199601
907	30.1164407	9.6798604	957	30.9354166	9.8545617	1007	31.7332633	10.0232791
908	30.1330383	9.6834166	958	30.9515751	9.8579929	1008	31.7490157	10.0265958
909	30.1496269	9.6869701	959	30.9677251	9.8614218	1009	31.7647603	10.0299104
910	30.1662063	9.6905211	960	30.9838668	9.8648483	1010	31.7804972	10.0332228
911	30.1827765	9.6940694	961	31.0000000	9.8682724	1011	31.7962262	10.0365330
912	30.1993377	9.6976151	962	31.0161248	9.8716941	1012	31.8119474	10.0398410
913	30.2158899	9.7011583	963	31.0322413	9.8751135	1013	31.8276609	10.0431469
914	30.2324329	9.7046989	964	31.0483494	9.8785305	1014	31.8433666	10.0464506
915	30.2489669	9.7082369	965	31.0644491	9.8819451	1015	31.8590646	10.0497521
916	30.2654919	9.7117723	966	31.0805405	9.8853574	1016	31.8747549	10.0530514
917	30.2820079	9.7153051	967	31.0966236	9.8887673	1017	31.8904374	10.0563485
918	30.2985148	9.7188354	968	31.1126984	9.8921749	1018	31.9061123	10.0596435
919	30.3150128	9.7223631	969	31.1287648	9.8955801	1019	31.9217794	10.0629364
920	30.3315018	9.7258883	970	31.1448230	9.8989830	1020	31.9374388	10.0662271
921	30.3479818	9.7294109	971	31.1608729	9.9023835	1021	31.9530906	10.0695156
922	30.3644529	9.7329309	972	31.1769145	9.9057817	1022	31.9687347	18.0728020
923	30.3809151	9.7364484	973	31.1929479	9.9091776	1023	31.9843712	10.0760863
924	30.3973683	9.7399634	974	31.2089731	9.9125712	1024	32.0000000	10.0793684
925	30.4138127	9.7434758	975	31.2249900	9.9159624	1025	32.0156212	10.0826484
926	30.4302481	9.7469857	976	31.2409987	9.9193513	1026	32.0312348	10.0859262
927	30.4466747	9.7504930	977	31.2569992	9.9227379	1027	32.0468407	10.0892019
928	30.4630924	9.7539979	978	31.2729915	9.9261222	1028	32.0624391	10.0924755
929	30.4795013	9.7575002	979	31.2889757	9.9295042	1029	32.0780298	10.0957469
930	30.4959014	9.7610001	980	31.3049517	9.9328839	1030	32.0936131	10.0990163
931	30.5122926	9.7644974	981	31.3209195	9.9362613	1031	32.1091887	10.1022835
932	30.5286750	9.7679922	982	31.3368792	9.9396363	1032	32.1247568	10.1055487
933	30.5450487	9.7714845	983	31.3528308	9.9430092	1033	32.1403173	10.1088117
934	30.5614136	9.7749743	984	31.3687743	9.9463797	1034	32.1558704	10.1120726
935	30.5777697	9.7784616	985	31.3847097	9.9497479	1035	32.1714159	10.1153314
936	30.5941171	9.7829466	986	31.4006369	9.9531138	1036	32.1869539	10.1185882
937	30.6104557	9.7854288	987	31.4165561	9.9564775	1037	32.2024844	10.1218428
938	30.6267857	9.7889087	988	31.4324673	9.9598389	1038	32.2180074	10.1250953
939	30.6431069	9.7923861	989	31.4483704	9.9631981	1039	32.2335229	10.1283457
940	30.6594194	9.7958611	990	31.4642654	9.9665549	1040	32.2490310	10.1315941
941	30.6757233	9.7993336	991	31.4801525	9.9699095	1041	32.2645316	10.1348403
942	30.6920185	9.8028036	992	31.4960315	9.9732619	1042	32.2800248	10.1380845
943	30.7083051	9.8062711	993	31.5119025	9.9766120	1043	32.2955105	10.1413266
944	30.7245830	9.8097362	994	31.5277655	9.9799599	1044	32.3109888	10.1445667
945	30.7408523	9.8131989	995	31.5436206	9.9833055	1045	32.3264598	10.1478047
946	30.7571130	9.8166591	996	31.5594677	9.9866488	1046	32.3419233	10.1510406
947	30.7733651	9.8201169	997	31.5753068	9.9899900	1047	32.3573794	10.1542744
948	30.7896086	9.8235723	998	31.5911380	9.9933289	1048	32.3728281	10.1575062
949	30.8058436	9.8270252	999	31.6069613	9.9966656	1049	32.3882695	10.1607359
950	30.8220700	9.8304757	1000	31.6227766	10.0000000	1050	32.4037035	10.1639636

TABLE of Square Roots and Cube Roots.

Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.	Number.	Square Roots.	Cube Roots.
1051	32.4191301	10.1671893	1101	33.1813200	10.3259284	1151	33.9263909	10.4799314
1052	32.4345495	10.1704129	1102	33.1963853	10.3290537	1152	33.9411255	10.4829656
1053	32.4499615	10.1736344	1103	33.2114438	10.3321770	1153	33.9558537	10.4859980
1054	32.4653662	10.1768539	1104	33.2264955	10.3352985	1154	33.9705755	10.4890286
1055	32.4807635	10.1800714	1105	33.2415403	10.3384181	1155	33.9852910	10.4920575
1056	32.4961536	10.1832868	1106	33.2565783	10.3415358	1156	34.0000000	10.4950847
1057	32.5115364	10.1865002	1107	33.2716095	10.3446517	1157	34.0147027	10.4981101
1058	32.5269119	10.1897116	1108	33.2866339	10.3477657	1158	34.0293990	10.5011337
1059	32.5422802	10.1929209	1109	33.3016516	10.3508778	1159	34.0440890	10.5041556
1060	32.5576412	16.1961283	1110	33.3166625	10.3539880	1160	34.0587727	10.5071757
1061	32.5729949	10.1993336	1111	33.3316666	10.3570964	1161	34.0734501	10.5101942
1062	32.5883415	10.2025369	1112	33.3466640	10.3602029	1162	34.0881211	10.5132109
1063	32.6036807	10.2057382	1113	33.3616546	10.3633076	1163	34.1027858	10.5162259
1064	32.6190129	10.2089375	1114	33.3766385	10.3664103	1164	34.1174442	10.5192391
1065	32.6343377	10.2121347	1115	33.3916157	10.3695113	1165	34.1320963	10.5222506
1066	32.6496554	10.2153300	1116	33.4065862	10.3726103	1166	34.1467422	10.5252604
1067	32.6649659	10.2185233	1117	33.4215499	10.3757076	1167	34.1613817	10.5282685
1068	32.6802693	10.2217146	1118	33.4365070	10.3788030	1168	34.1760150	10.5312749
1069	32.6955654	10.2249039	1119	33.4514573	10.3818965	1169	34.1906420	10.5342795
1070	32.7108544	10.2280912	1120	33.4664011	10.3849882	1170	34.2052627	10.5372825
1071	32.7261363	10.2312766	1121	33.4813381	10.3880781	1171	34.2198773	10.5402837
1072	32.7414111	10.2344599	1122	33.4962684	10.3911661	1172	34.2344855	10.5432832
1073	32.7566787	10.2376413	1123	33.5111921	10.3942523	1173	34.2490875	10.5462810
1074	32.7719392	10.2408207	1124	33.5261092	10.3973366	1174	34.2636834	10.5492771
1075	32.7871926	10.2439981	1125	33.5410196	10.4004192	1175	34.2782730	10.5522715
1076	32.8024389	10.2471735	1126	33.5559234	10.4934999	1176	34.2928564	10.5552642
1077	32.8176782	10.2503470	1127	33.5708206	10.4065787	1177	34.3074336	10.5582552
1078	32.8329103	10.2535186	1128	33.5857112	10.4096557	1178	34.3220046	10.5612445
1079	32.8481354	10.2566881	1129	33.6005952	10.4127310	1179	34.3365694	10.5642322
1080	32.8633535	10.2598557	1130	33.6154726	10.4158044	1180	34.3511281	16.5672181
1081	32.8785644	10.2630213	1131	33.6303434	10.4188760	1181	34.3656805	10.5702024
1082	32.8937684	10.2661850	1132	33.6452077	10.4219458	1182	34.3802268	10.5731849
1083	32.9089653	10.2693467	1133	33.6600653	10.4250138	1183	34.3947670	10.5761658
1084	32.9241553	10.2725065	1134	33.6749165	10.4280800	1184	34.4093011	10.5791449
1085	32.9393382	10.2756644	1135	33.6897610	10.4311443	1185	34.4238289	10.5821225
1086	32.9545141	10.2788203	1136	33.7045991	10.4342069	1186	34.4383507	10.5850983
1087	32.9696830	10.2819743	1137	33.7194306	10.4372677	1187	34.4528663	10.5880725
1088	32.9848450	10.2851264	1138	33.7342556	10.4403267	1188	34.4673759	10.5910450
1089	33.0000000	10.2882765	1139	33.7490741	10.4433839	1189	34.4818793	10.5940158
1090	33.0151480	10.2914247	1140	33.7638860	10.4464393	1190	34.4963766	10.5969850
1091	33.0302891	10.2945709	1141	33.7786915	10.4494929	1191	34.5108678	10.5999525
1092	33.0454233	10.2977153	1142	33.7934905	10.4525448	1192	34.5253530	10.6029184
1093	33.0605505	10.3008577	1143	33.8082830	10.4555948	1193	34.5398321	10.6058826
1094	33.0756708	10.3039982	1144	33.8230691	10.4586431	1194	34.5543051	10.6088451
1095	33.0907842	10.3071368	1145	33.8378486	10.4616896	1195	34.5687720	10.6118060
1096	33.1058907	10.3102735	1146	33.8526218	10.4647343	1196	34.5832329	10.6147652
1097	33.1209903	10.3134083	1147	33.8673884	10.4677773	1197	34.5976879	10.6177228
1098	33.1360830	10.3165411	1148	33.8821487	10.4708185	1198	34.6121366	10.6206788
1099	33.1511689	10.3196721	1149	33.8969025	10.4738579	1199	34.6265794	10.6236331
1100	33.1662479	10.3228012	1150	33.9116499	10.4768955	1200	34.6410162	10.6265857

Root, *False*. See False.

Root, *Impossible*, is not only the square root of a negative quantity, but any other root denominated by any even number. Thus $\sqrt[4]{-1}$, $\sqrt[6]{-1}$, $\sqrt[8]{-1}$, or in general $\sqrt[2m]{-1}$, $\sqrt[2m]{-x}$, are all *impossible* roots, or quantities. Some call them imaginary roots or quantities. See False *Root*.

Root, *Real*. See False *Root*.

Root, *Residual*. See Residual.

Roots *of Equations*, *Extraction of the*. See Extraction, Reduction *of Equations*, and Root *of an Equation*, supra.

Roots, *Radices*, in *Grammar*, are the primitive words of a language, whence others are compounded or derived.

Thus the Latin *fluo* is the root of *fluctus*, *fluxio*, *flumen*, *fluvialis*, *influxus*, *refluens*, *fluctifer*, *fluctisonus*, *fluctivagus*, &c. Thus also the Greek θεος is the root of αθεος, ενθεος, ενθουσιασμος, &c.

And thus also, though in a less proper sense, the Danish *rood* is the root of the English word *root*; the Latin *radix* the root of the French *racine*, as *rado* is the root of *radix*; and perhaps ῥαδιος the root of *rado*.

Roots, in the Hebrew language, consist of those letters that are denominated *radical* (which see), and are generally verbs, consisting commonly of three, sometimes of two, and rarely of four letters. Of whatever letters, whether radical or servile, any word consists, it must, at least, contain one of a radical character. The investigation of the radical and a primitive is an object of importance in grammar. In order to facilitate their investigation in the Hebrew, and other Eastern languages, it is necessary to be well acquainted with the division of the letters into *radical* and *servile* (see each term), because these last must be rejected before the root is obtained.

If the root consist of pure radicals, commonly *three* in number, it is easily found, and as easily divested of the serviles which attend it. But, as the servile letters may also constitute roots, it is sometimes a matter of difficulty to distinguish when these letters ought to be considered in their *radical*, and when in their *servile* capacity. This difficulty is increased in the verbs denominated *imperfect*. For, in some of their parts, either by contraction, or commutation, these verbs lose sometimes one, sometimes two, of their radical letters, which must be restored to their place before the root can be exhibited in its true form.

The learner must therefore endeavour, by frequent practice, to acquire a dexterity in discovering the radical letters, in divesting them of their serviles, and in restoring them where they are lost by the abbreviated flexions. This exercise is the more necessary, as, in almost all lexicons, the words are arranged according to the alphabetical order of the roots. These are commonly printed in a larger character, and have below them their derivatives, as children and descendants. By this plan, neither the signification of any verb, nor of any noun derived from it, can be found, till its root be investigated and determined.

The following directions will be found useful in the investigation of radical words.

The chief things to be attended to are, what letters are commonly servile, either in nouns or verbs; in what part of the word they most generally appear; and what is the most probable conjecture to be formed, in order to restore such radicals as are lost by the abbreviated flexions.

The servile letters in nouns are such as form the feminine gender, and the plural terminations, the prefixes, including the signs of the cases, the heëmantic letters, and the possessive pronouns, or affixes.

The servile letters in verbs are the personal prefixes and postfixes, formerly named the *pronominal serviles*, the characteristics of the different forms, and the verbal affixes.

ו and י whether inserted in nouns or verbs, must be rejected in the investigation of the root.

As the serviles generally appear in greatest number at the end of words, the most proper method of discovering the root seems to be this:

Begin from the left hand, remove the serviles as you go along, retain the pure and the supposed radicals, reject the inserted ו and י, restore or commute the radicals lost by abbreviations, and, finally, reject the prefixes.

Directions for finding the Root, and for restoring the deficient Radicals.

I. If, after rejecting the serviles, three pure radicals remain, you may conclude these to be the root.

II. If only two remain, as is the common case in abbreviated roots, prefix to these either נ or י or insert ו betwixt them, or postpone ה or double the second.

The investigation of roots is not peculiar to the Hebrew, but common to all languages, and is of singular advantage, if we would attend to accuracy and propriety of writing.

In such languages as do not admit of the distinction between radical and servile letters, the following may be observed as general rules for reducing words to their first principles. Let that part of the word which remains unvaried be considered as the radical term, and let the changes of termination be disregarded, or cut off. Compound words must be resolved into their component parts, and the prepositions excluded. In those words which seem reducible to Hebrew roots consisting entirely of consonants, the intermediate vowels employed for their enunciation, are not to be considered as essential, or as constituting a part of the root. See Wilson's Elements of Hebrew Grammar. Masclef Gram. Heb. vol. i. c. 21. p. 214, &c. Robertson's Gram. Heb. Appendix, iii.

The Greek and Hebrew tongues are learnt by roots. Of dictionaries, some are in alphabetical order, others are disposed by roots, as Scapula, Faber's Thesaurus, and the first edition of the Dictionary of the French Academy. In the edition of 1718, this last is thrown into the usual alphabetical order.

ROOTS, in *Geography*, a town of Virginia, in the Mattapony; four miles N.E. of West Point.

Roots, a township of Portage county, in the Ohio, containing 216 inhabitants.

ROOTWELT, in *Husbandry*, a term applied to the hattocks of grain, when the butt-ends of the sheaves are turned up towards the wind and sun, in order to dry them. The practice is common in bad rainy harvests. See Harvest, and Harvesting *Grain*.

ROPALON, in *Botany*, a name given by some authors to the *nymphæa*, or water-lily, and also to the *faba Ægyptia* of the river Nile.

ROPE, an assemblage of several twists or strings of hemp, twisted together by means of a wheel; of various uses, as in binding, staying, drawing, suspending, &c.; or, all cordage, in general, above one inch in circumference, mostly made of hemp spun into yarns or threads of a certain length; and a number of these yarns or threads, according to the size of the rope, are twisted together, and called a strand. Three of these strands twisted or laid together, is called a hawser-laid rope, and nine of them a cable-laid rope. See Rope-*Making*.

When the rope is made very thick, it is called a *cable*; and when very ſmall, a *cord*.

Though it be difficult to give a certain account of the forces required to bend ropes of different diameters, in making them go round bodies of different bigneſſes, yet to make no allowance for the loſs of motion ſuſtained thereby, would be as prejudicial to the practice of mechanics, as it would be to overlook the friction of the parts of engines. The difficulty of aſcertaining this force ariſes from the different materials of which they are made, their different ſtiffneſs according as they are more or leſs twiſted; and ſometimes from the temperature of the air, as to moiſture and dryneſs.

Dr. Deſaguliers has computed the forces required to bend ropes of different diameters, ſtretched by different weights, round rollers of different bigneſſes. The reſult of his experiment is expreſſed in the following table.

Diameters of the ropes of three ſtrands, expreſſed in tenth parts of an inch.	Weights ſtretching the ropes, expreſſed in lb. avoirdupois.	Reſiſtance about a roller of half an inch diameter, in oz. avoirdupois.	Reſiſtance about a roller of one inch in diameter, in oz. avoirdupois.	Reſiſtance about a roller one and a half inch diameter, in oz. avoirdupois.
	lb.	oz.	oz.	oz.
0.5	60	225	112½	75
0.2	60	90	45	30
0.1	60	45	22½	15
0.5	40	150	75	50
0.2	40	60	30	20
0.1	40	30	15	10
0.5	20	75	37½	25
0.2	20	30	15	10
0.1	20	15	7½	*

On the whole, it has been found by experiments, that the difficulty of bending a rope round a roller decreaſes directly as the diameter of the roller increaſes, or is, inverſely, as the diameter of the roller. See Deſaguliers, Experim. Phil. vol. i. p. 233, &c. See alſo CORDAGE.

A TABLE, ſhewing how many fathoms, feet, and inches of a rope of any ſize, under fourteen inches, makes a hundred weight, with the uſe of the table.

Inches.	Fathoms.	Feet.	Inches.	Inches.	Fathoms.	Feet.	Inches.	Inches.	Fathoms.	Feet.	Inches.	Inches.	Fathoms.	Feet.	Inches.
1	486	0	0	4½	24	0	0	8	7	3	6	11½	3	4	1
1¼	313	13	0	4¾	21	3	0	8¼	7	0	8	11¾	3	3	3
1½	216	0	0	5	19	3	0	8½	6	4	3	12	3	2	3
1¾	159	3	0	5¼	17	4	0	8¾	6	2	1	12¼	3	2	1
2	124	3	0	5½	16	1	0	9	6	0	0	12½	3	2	0
2¼	96	2	0	5¾	14	4	6	9¼	5	4	0	12¾	2	7	8
2½	77	3	0	6	13	3	0	9½	5	2	0	13	2	5	3
2¾	65	4	0	6¼	12	2	0	9¾	5	0	6	13¼	2	4	9
3	54	0	0	6½	11	3	0	10	4	5	0	13½	2	4	0
3¼	45	5	2	6¾	10	4	0	10¼	4	4	1	13¾	2	3	6
3½	39	3	0	7	9	5	6	10½	4	2	2	14	2	2	1
3¾	34	3	9	7¼	9	1	6	10¾	4	1	8				
4	30	1	6	7½	8	4	0	11	4	0	3				
4¼	26	5	3	7¾	8	3	6	11¼	3	5	7				

Suppoſe I want to know how much of eight-inch and quarter rope will make a hundred weight? Find 8¼ under inches, and againſt it, in the ſixth column, you find 7 0 8, which ſhews in a rope of 8¼, there will be ſeven fathoms eight inches required to make one hundred weight.

A TABLE, ſhewing the weight of any cable or rope of 120 fathoms in length, and for every half inch from three inches to twenty-four in circumference.

Inches.	Cwts.	Qrs.	Inches.	Cwts.	Qrs.	Inches.	Cwts.	Qrs.	Inches.	Cwts.	Qrs.	Inches.	Cwts.	Qrs.
3	2	1	7½	14	0	12	36	0	16½	68	0	21	110	1
3½	4	0	8	16	0	12½	39	0	17	72	1	21½	115	2
4	4	1	8½	18	0	13	42	1	17½	76	2	22	121	0
4½	5	0	9	20	1	13½	45	7	18	81	0	22½	126	2
5	5	1	9½	22	2	14	49	0	18½	85	2	23	132	1
5½	7	0	10	25	0	14½	52	2	19	90	1	23½	138	0
6	9	0	10½	27	2	15	56	1	19½	95	0	24	144	0
6½	10	2	11	30	1	15½	60	0	20	100	0			
7	10	1	11½	33	0	16	64	0	20½	105	0			

The greateſt conſumption of rope is uſed for the purpoſes of navigation in rigging of ſhips: where, though ropes include the whole cordage, there are ſeveral particularly denominated, and which have particular names given to them; as follow. 1. Awning-ropes are the ridge and ſide-ropes. The ridge-rope reeves through the trucks ſeized along the middle of the awning; the ſide-ropes reeve through the trucks ſeized along the ſide of the awning. By theſe ropes the awnings are ſpread between the maſts. 2. Bell-rope, nine or ten feet in length, which ſplices round a thimble in the eye of the bell-crank. In the middle of the rope is a diamond-knot, and at the end a double wall-knot crowned. 3. Boat-rope, or painter, that by which the boat is towed at the ſtern; it ſplices with a thimble to a ring-bolt inſide the ſtem. 4. Bolt-rope, the rope ſewed to the edges of the ſails, as the head-rope, foot-rope, and leech-rope. 5. Breaſt-rope, that faſtened along the laniard of the ſhrouds, for ſafety, when heaving the lead in the chains. 6. Bucket-rope, that which is faſtened to the bucket for hauling up water. 7. Buoy-rope, the one faſtened to the buoy and crown of the anchor. 8. Davit-rope, the laſhing which ſecures the davit to the ſhrouds when out of uſe. 9. Entering-ropes have their upper end thruſt through the eye in the iron-ſtantions at the gangways, and are walled and crowned; and diamond-knots are made at every nine inches aſunder in the whole length. 10. Grapnel-rope, that which is bent to the grapnel, by which the boats ride. 11. Guiſt-rope, that faſtened to an eye-bolt in the ſhip's ſide, and to the outer end of a boom projecting from the ſhip's ſide, by guys, to keep the boats clear from rubbing againſt the ſides. 12. Heel-rope, that which hauls out the bowſprit of cutters, and the jib and ſtudding-ſail boom. 13. Man-ropes are for the ſecurity of the men going out upon the bowſprit. 14. Parral-ropes are to connect the ribs and trucks of the parral together. 15. Paſſing-ropes lead round the ſhip through the eyes in the quarter waiſt and forecaſtle-ſtantions, have one end ſtopped through the eye of the gangway-ſtantion, with a wall-knot crowned, and are ſet forward through an eye-bolt in the knight-head with a laniard, having a thimble turned into the end. 16. Ring-ropes are occaſionally made faſt to the ring or ſtopper-bolts in the deck, and by croſs turns round the cable, to confine it more ſecurely in ſtormy weather. 17. Slip-rope is to trice the bight of the cable into the heads;

heads; a ſlip-rope is alſo uſed in caſting off a veſſel, till got into the tide's way, &c. 18. Swab-rope is made faſt to the eye of the ſwab, to raiſe it out of the water. 19. Tiller-ropes are the ropes by which the tiller is worked by means of the ſteering-wheel. 20. Top-rope is the rope that is reeved through the ſheave-hole in the heel of the topmaſt, to raiſe it by its tackle to the maſt-head. 21. Yard-ropes are only temporarily uſed to heave the yards on board.

Ropes are diſtinguiſhed by being either *cable-laid* or *hawſer-laid:* the former are compoſed of nine ſtrands, *viz.* three great ſtrands, each of which is compoſed of three ſmaller ſtrands, and each containing an equal number of threads: and a rope, cable-laid, eight inches in circumference, has 333 threads, equally divided, and laid into nine ſtrands: the latter is made with three ſtrands, each of which contains a certain number of rope-yarns, in proportion to the ſize of the rope required. A rope hawſer-laid, eight inches in circumference, has 414 threads, equally divided, and laid into three ſtrands. Thirty fathoms of yarn make eighteen fathoms of rope cable-laid, and ſo in proportion. Thirty fathoms of yarn make twenty fathoms of rope hawſer-laid, and ſo in proportion. Ropes of from one to two and a half inches in circumference are hawſer-laid; of three inches to ten inches, either hawſer-laid or cable-laid; and from ten inches to any greater dimenſion, always cable-laid.

Twice-laid cordage is made of caſt rigging, as ſhrouds, ſtays, mooring and other cables, which, if not much worn, will make good ropes for netting ſhips' ſides, worming and woolding for cables, ſpun-yarn for ſeizing, worming for large ſtays, ſeizing for ſtrops of blocks, ſmall cable-laid ropes for warping ſhips, ratlines, ſcaffolding-ropes for dock yards, &c.

When the yarn of this old ſtuff is overhauled, a little thin tar ſhould be poured on it, which will make it pliable and lie better. The yarn unfit for knotting will pick into oakum for caulking.

To open a cable, for making it into ſmall ropes, hang the ſtrands upon three hooks in the tackle-board, ſtretch it out tight upon the hooks in the ſledge, and heave till they are untwiſted; then draw out the yarn.

The proceſs of making ſmall ropes is ſimilar to making large ones, except the twiſting and cloſing, which are done by a back-frame wheel or a table-wheel. See the next article.

Rope-*Making*, the art of preparing hemp, and ſpinning it into yarns or threads, and twiſting thoſe threads into ſtrands, and laying thoſe ſtrands into cordage of the largeſt ſize, as the ſmalleſt kind is called *cord* or *twine* ſpinning.

Before we proceed further, it may be neceſſary to inform our readers of the different ſorts of hemp proper to be made uſe of in the manufacturing of cordage. Of all the hemps yet produced at our Engliſh markets, the Ruſſian hemp has proved to be the beſt; it is grown in the ſouthernmoſt parts of Ruſſia, and ſhipped for England from the ports of St. Peterſburgh and Riga. The beſt ſort is Riga rhine hemp: the next in quality is termed Peterſburgh clean hemp. Theſe two are conſidered the beſt ſorts of hemp to be uſed in making the ſtrongeſt cordage.

The firſt proceſs in the art of rope-making is, *Hatchelling the Hemp.*

Hatchelling the hemp, is the combing or clearing the ends, which elſe, in ſpinning, would run in with the long hemp, and ſo preparing it ready for the ſpinner; in the proceſs of which, care and particular attention muſt be paid by the hatchellers that they do not uſe too great a quantity of oil, as in ſuch caſe it will prevent the yarn from imbibing its proper proportion of tar, and thereby prove a ſerious injury.

N. B. A ſmall quantity of train-oil, ſay one pint to every hundred weight, ſprinkled or daubed with a wad on the hemp, facilitates the hatcheller's buſineſs exceedingly, and is very neceſſary when the hemp is ſomewhat too dry, as the ſpinners are better able to perform their buſineſs when it has received ſuch aſſiſtance.

The ſecond and principal proceſs to be attended to in the manufacturing of cordage, is *Spinning the Yarn.*

In ſpinning, particular attention muſt be paid by the ſpinner that the yarn be ſpun even, ſolid, and round; to accompliſh which, he muſt ſpin with a ſtrong even grip of the hand, taking care not to make his yarn larger in one place than in another, nor make a practice of ſpinning too much in a hurry; and the ſpinning-wheel muſt be kept turning a conſtant regular pace, otherwiſe the yarn ſo ſpun will loſe its principal ſupport, which is its proper turn, or twiſt, and will be little ſtronger than a parcel of ſtraight hemp laid together, which would break in warping or ſtraining up. The following regulations muſt be attended to in ſpinning. Every ſpinner is to ſpin out of the beſt hemp ſix threads, one hundred and ſixty fathoms long, for a quarter of a day's work; but he is to ſpin out of the hemp which compoſe the bands by which the bales of hemp are bound together, no more than four threads, one hundred and ſixty fathoms long, for one quarter of a day's work. To every twelve ſpinners there are allowed two hatchellers, one wheel-turner, and one wheel-tender: the wheel-tender's buſineſs is to ſplice the threads, and wind them on winches. The latter mentioned perſons are paid in the ſame proportions as the ſpinners, that is, according to what work is done upon the wheel, only with this difference, the ſpinners are paid ſeven-pence *per* quarter for their work, the hatchellers, wheel-turner, and wheel-tender, only ſixpence.

Each thread of the under-mentioned ſizes of yarn to the ſpinning mark, (*viz.* 160 fathoms,) ſhould weigh as follows:

	lbs.	oz.	drs.		lbs.	oz.	drs.
16	4	0	0	21	3	0	4
17	3	12	4	22	2	14	9
18	3	8	14	23	2	12	8
19	3	5	14	24	2	10	10
20	3	3	3	25	2	8	15

The third proceſs to be attended to in the manufacturing of cordage, is *Warping the Yarn.*

Warping the yarn, is the ſtretching the yarns, previouſly to their being tarred, all to one given length, which, in full length rope grounds, is two hundred fathoms, and putting a ſlight turn or twiſt into it. The uſual method is to warp the yarn either in whole or half hawls, which is done by putting the number of threads you mean to draw down at once in a bite, into a block with one ſheave, (the one end of the bite of yarn being faſt at the upper end,) which being drawn down and fixed over the end of a hook made faſt to a poſt at one hundred fathoms diſtance from the warping poſt, forms, when opened, a length of two hundred fathoms, as above-mentioned. The number of half bites, or blocks of yarn, contained in a whole or half hawl, is to be governed, in a great meaſure, by the ſize of the yarn to be warped,—as, for inſtance, 16 to 19-thread yarn is warped three hundred and thirty-ſix threads in a hawl, 20 to 25-thread yarn is warped four hundred threads in a hawl. In winding the yarns on the winches after they are ſpun, it is moſt uſual to wind them on in companies of four in a company; but as that method can-

not always be purſued, it frequently happens that whole or half hawls of yarn are obliged to be warped in half bites of an odd number.

The following rules and regulations reſpecting the warping of yarn muſt be particularly attended to.

In a hawl of yarn containing three hundred and thirty-ſix threads, there ſhould be warped as under-mentioned.

½ Bites.	Threads.			
37	3	of	9	threads in a ½ bite.
33	6		10	ditto.
30	6		11	ditto.
28	0		12	ditto.
25	11		13	ditto.
24	0		14	ditto.
22	6		15	ditto.
21	0		16	ditto.
19	13		17	ditto.
18	12		18	ditto.
17	13		19	ditto.
16	16		20	ditto.

In a hawl of yarn containing four hundred threads, there ſhould be warped as under-mentioned.

½ Bites.	Threads.			
44	4	of	9	threads in a ½ bite.
40	0		10	ditto.
36	4		11	ditto.
33	9		12	ditto.
30	11		13	ditto.
28	8		14	ditto.
26	10		15	ditto.
25	0		16	ditto.
23	9		17	ditto.
22	4		18	ditto.
21	1		19	ditto.
20	0		20	ditto.

When the yarn is warped in half hawls, it is to be carefully obſerved that only half the number of yarns, or threads, above-mentioned, are to be warped, and care ſhould be taken to warp the number of threads as near as poſſible.

It requires three men to warp a hawl of yarn, who are employed as follows: *viz.* two men to warp (or draw the yarns to their proper diſtance), and one man to ſet up (that is, to tighten the yarns, and bring each yarn to its proper bearing): each man is allowed twelve threads (or two quarters of a day's work) for his labour.

To take the hawl of yarn up after it is warped, and carry the ſame into the tar-houſe, requires ten men, who are each paid one thread (*viz.* one penny) for their labour.

The fourth proceſs to be attended to in the manufacturing of cordage, is *Tarring the Yarn.*

Tarring the yarn is a proceſs which ſhould be particularly attended to, being extremely careful that the tar is not boiling too faſt nor too ſlow; if too faſt, the tar will not ſtay in the yarn, if not hot enough, the tar will not ſufficiently penetrate the yarn; therefore a ſtrict medium muſt be carefully obſerved by the kettle-heater, as well as to keep the horſe, or men, which turn the capſtan round, going at a gentle, ſteady pace, thereby giving the yarn a proper time to imbibe its neceſſary proportion of tar, but at the ſame time not ſuffering it to be kept in the boiling tar too long, which is apt to make the yarn very tender, therefore ſhould be very carefully avoided; and ſhould the capſtan be ſtopped by accident, the ſtop that keeps the yarn down muſt be inſtantly raiſed, and the yarn taken out. Particular attention ſhould alſo be paid in paying (or coiling) the yarn into the kettle, that too long a length be not payed in at once; if it is ſo done, the yarn will, of courſe, touch the bottom of the kettle, which it ſhould, by no means, be ſuffered to do, as in ſuch caſe it will imbibe the dregs and ſettlements of the tar appertaining to the bottom of the kettle, and make the yarn in ſuch places black, or very much diſcoloured, and have a very unpleaſing appearance in the rope when made. Yarn for cables requires more tar than for hawſer-laid ropes. For ſtanding and running rigging the leſs tar the better, provided the thread is well covered. It ſhould be always remembered that the yarn, when tarred, ſhould be overſet (or removed) the ſame day, as this piece of buſineſs, being omitted, will be likely to prove of a ſerious conſequence in heating and tendering the yarn, which at all times muſt be carefully avoided. In overſetting the yarn it ſhould always be remembered that the yarn be well ſhook and opened for two or three days, as in ſo doing it admits the air, ſeparates and hardens the yarns, and contributes very much to the ſtrength of the cordage. The hawls or half hawls of yarn, when tarred, ſhould always be weighed and tallied.

Tarring yarn requires three men, who are employed as follows: *viz.* one to heat the kettle, one to pay (or coil) the yarn in the kettle, and one to haul off and overſet the yarn. They are, in general, paid in proportion to the work the ſpinners perform, which is called going by the wheel.

The fifth and laſt proceſs to be attended to, is *Laying the Cordage.*

In laying cables, and all ſorts of ropes in general, the great art lies in making each yarn to bear alike. For this purpoſe it was, particularly in the larger ſized cables, that the patent machines have been introduced. Particular attention muſt be paid to this point, as therein conſiſts the grand principle of making a ſtrong rope. For all ſorts of ropes which are to be immerged in the water, the utmoſt care muſt be taken to give the ſtrands their proper hardneſs in their firſt proceſs, according to the remarks laid down before, which will prevent the water from penetrating the ſtrands, and thereby preſerve the inſide yarns of the cable; as, if this proceſs is not regularly attended to, the inſide yarns will be always wet, and very ſoon decay. It frequently happens that when the yarn is tarred ſomewhat too deep, that many a cable is ſpoiled, though not intentionally; the fear in the perſon who has the direction in making the cable, of turning a very dark coloured rope out of hand, prevents the regular make being given the cordage, as in preſſing the yarn to their proper hardneſs, the tar will ſpring out, very much diſcolour the rope, and thereby give it a very unpleaſing appearance, eſpecially when the ſun is ſhining very hot upon the yarn; to prevent which, in a great meaſure, care ſhould be taken, in the ſummer months, to lay cables, and all ſorts of cordage in general, either early in the morning, before the ſun has much power on the yarn, which is alſo apt to tender it, or late in the evening, after the ſun has ſet, or gone off the ground, or in heavy weather (by no means rainy); in which caſe your cordage will have a bright pleaſing appearance, as the ſmall fibres of the hemp will all yield to the top, and lay ſmooth, which otherwiſe would look rough, and appear as if the cordage was made of inferior hemp, though in fact it was not ſo, as all ſorts of hemp have ſmall fibres appertaining to them, and which it is paſt the art of man to prevent the ſun from drawing up, and thereby making the rope look rough and unſeemly.

N. B. The above remarks reſpecting taking advantage of the time for laying the cordage are only to be obſerved in uncovered grounds.

In

In *laying cordage*, the yarn for twifting into ftrands is hung on the hooks in the tackle-board, at the upper end of the ground, and upon hooks in the breaft-board of the fledge, at the lower end, which are turned by men at both ends until the ftrands are hard; and are kept up from the ground by the ftake-heads.

Before the turn is put in, the yarn fhould be ftretched to its full extent by means of the tackle fixed from the fledge to the capftern, at twenty yards afunder, at the lower end of the ground; and when ftretched to two hundred fathoms, the prefs is put upon the fledge and drag, before the tackle-fall is caft off; for if the yarn be not properly ftretched before the tackle-fall is caft off, the rope will not be of its fize, nor well made.

The ftrands fhould have a good hardening before the top is put in to lay the rope, and the layer fhould fee that the heavers at the upper end keep the fame hardnefs that the ftrands had before the top fet off, nor fhould he begin to lay the rope until the fledge or wheel is moved by the power of the twift from the upper end.

When twifted fufficiently hard, the ftrands are hung on one hook in the breaft-board of the fledge, but remain feparate on the three hooks at the other end. The top is placed in at the fledge, and the rope twifted by turning the hooks at both ends one way, and, as the rope clofes, the top moves towards the upper end.

When the top is put in, fome of the weight fhould be taken off the fledge or drag, for if laid with as much weight as is ufed in the hardening, it would be too ftiff, but, by removing a part of the weight, the ftrands will couch better.

The ftrength of the men at the hooks being greatly inadequate to the force required for twifting of cables, woolders are ufed, according to the fize of the cable, at equal diftances along the whole length.

Cables fhould be rounded by the lower hook after they are laid, to throw the turn well up. They are generally thought to wear beft when flack-laid; but fome think when fhort-laid.

Cablets ufed for tow-lines or hawfers, require the ftrands to be laid fhorter than cable-ftrands, but not fo fhort-laid in clofing; for being ufed in water, they would become ftiff, hard, unhandy to coil away, and liable to break in cold weather.

In all cable-laid ropes, the proportion of the circumference is to the length of the ftrand in one round, as 11 is to 15; that is, if the circumference be $14\frac{1}{2}$ inches, the length of the ftrand in one circumference is $19\frac{7}{8}$ inches. In all hawfer-laid rope, the proportion is as 12 to 16; that is, if the circumference be 7 inches, the length of the ftrand in one circumference is near $9\frac{3}{5}$.

The ftrength of ropes depends on the hardening or well manufacturing, and not on the bare ftrength of the hemp; for it ftrengthens through every ftage; *viz.* when firft fpun into yarn it is little better than hemp extended; when twifted into ftrands, it fhortens and ftrengthens as above, and increafes in the fame manner when laid into rope.

Where the diameter and circumference of one rope to another is as two to one, that is, where one rope is twice as big as another, the fquare of the diameter is as four to one; which fhews, that one rope has four times as much yarn in it as the other, and confequently is four times as ftrong, according to the different magnitudes.

Cable-laid ropes fhorten as five to three, and hawfer-laid ropes as three to two; confequently the length of the yarn and ftrength will be accordingly; that is, the ftrength will be in the yarn, after it is laid in the rope, as much as if the rope-maker, in fpinning, had allowed the fame quantity of hemp in two feet as he did in three feet, fo that the ftrength communicated by the procefs is two-thirds.

A rope is the fame fize when laid as the yarns were before twifted; fo that what the yarns are leffened by twifting it is made up by fhortening; from which it is inferred, that the yarns are always of an equal bignefs, fince the hemp is the fame at one time as at another, and not any way diminifhed.

Were the ftrands fingle, without being twifted one about another, the ftrength would then be only in proportion as the area of each particular ftrand is in itfelf; but if the ftrands could poffibly be twifted fo as to be directly perpendicular to the bafe, the ftrength would then be found, by multiplying the diameter of the ftrands and the diameter of the whole rope one into the other, and the half of the product would be the ftrength of the faid ftrands; but more particularly take the area of the fingle ftrand and area of the whole cable, and add them together, and the half of that will fhew the ftrength of each ftrand when they are well twifted together.

But as it may be obferved the ftrands lie at a certain angle between a perpendicular and the bafe, fo that, as the angle of incidence is to radius, fo is the relative to the abfolute ftrength.

Refpecting the *Banding of Cordage*.—In the calculations fpecifying the weights of the different lengths of cordage, fuch weights are to be confidered as the neat weights of the rope without bandage.

N. B. To every hundred weight of cordage the manufacturer is allowed to put on four pounds weight of bands; thofe bands are compofed of the fhakings, flyings, and ftrings with which the hemp is tied together, formed into an inferior kind of cordage; but it is to be obferved thofe are all weighed to the rope-makers as good hemp, and paid for accordingly, therefore if he was not allowed to apply the refufe to fuch purpofe, he muft either put a higher price on his cordage, or be a very confiderable lofer. At the fame time it fhould be confidered, that as it is neceffary that every coil of rope fhould be bound together for the convenience of carriage, ftowage, &c. this kind of bandage anfwers fuch purpofe in every degree, as well as if the coils were bound with bands made from the beft hemp.

Table I.

These sizes of Yarn are warped 336 Threads, and from 19 are warped 400 Threads in a Hawl.

		16	17	18	19	20	21	22	23	24	25
A	Weight of one thread 200 fathoms long.	lb. oz. dr. 5 0 0	lb. oz. dr. 4 11 5	lb. oz. dr. 4 7 2	lb. oz. dr. 4 3 6	lb. oz. dr. 4 0 0	lb. oz. dr. 3 12 5	lb. oz. dr. 3 10 3	lb. oz. dr. 3 7 10	lb. oz. dr. 3 5 5	lb. oz. dr. 3 3 3
B	One-tarred thread 200 fathoms long should weigh from	6 3 0 to 6 4 0	5 13 3 to 5 14 2	5 8 0 to 5 8 14	5 3 6 to 5 4 3	4 15 3 to 5 0 0	4 11 5 to 4 12 3	4 8 0 to 4 8 11	4 4 14 to 4 5 9	4 2 0 to 4 2 10	3 15 6 to 4 0 0
C	Ten fathoms of each size of B should weigh from	0 4 $15\frac{1}{4}$ to 0 5 0	0 4 $10\frac{1}{2}$ to 0 4 $11\frac{1}{4}$	0 4 $6\frac{1}{4}$ to 0 4 $6\frac{3}{4}$	0 4 $2\frac{3}{4}$ to 0 4 $3\frac{1}{4}$	0 3 $15\frac{1}{4}$ to 0 4 0	0 3 $12\frac{1}{4}$ to 0 3 13	0 3 $9\frac{1}{2}$ to 0 3 $10\frac{1}{4}$	0 3 7 to 0 3 $7\frac{3}{4}$	0 3 $4\frac{3}{4}$ to 0 3 $5\frac{1}{4}$	0 3 $2\frac{3}{4}$ to 0 3 $3\frac{1}{4}$
D	Weight of each hawl before tarred.	C. qr. lb. 15 0 0	C. qr. lb. 14 0 13	C. qr. lb. 13 1 9	C. qr. lb. 12 2 14	C. qr. lb. 14 0 4	C. qr. lb. 13 2 11	C. qr. lb. 12 3 13	C. qr. lb. 12 1 19	C. qr. lb. 11 3 17	C. qr. lb. 11 1 20
E	Weight of each hawl when tarred from	18 2 7 to 18 3 0	17 1 25 to 17 2 16	16 2 0 to 16 2 18	15 2 15 to 15 3 4	17 2 20 to 17 3 12	16 3 9 to 17 0 0	15 3 19 to 16 0 9	15 1 14 to 15 2 3	14 2 25 to 14 3 14	14 0 16 to 14 1 4

N. B. The calculations of B and C will be found extremely useful, provided the yarn be spun and tarred regular, as by weighing one single yarn, or even ten fathoms, the size of the yarn may be ascertained, without being at the trouble of weighing the hawls.

Table II.

Shewing the Number of Threads to work *per* Hook for three-strand cable-laid Cordage of 6, 12, 18, and 24 Inches in Circumference, of the undermentioned Sizes of Yarn, with the Girt of each Strand, and Weight of each Cable: also the Number of Men required to lay both Strands and Cable, with the Allowance to each Man for his Labour.

The N° of Threads here mentioned weigh 99 lb. to 100 lb.		Sizes of Yarn.										Weight of each Cable 120 Fathoms long.	Men for Strands.	Threads *per* Strand.	Men for Cables.	Threads *per* Cable.
		16	17	18	19	20	21	22	23	24	25					
Sizes in Inches.	Girt of Strands.	Threads *per* Hook.														
												C. qr. lb.				
6	$3\frac{12}{18}$	18	19	20	21	22	23	24	25	27	28	9 0 0	7	6	15	6
12	$6\frac{1}{4}\frac{6}{18}$	72	76	80	85	89	94	98	103	107	112	36 0 0	17	6	37	8
18	$9\frac{1}{2}\frac{1}{2}$	162	171	181	191	201	211	221	231	242	252	81 0 0	31	8	73	12
24	$12\frac{1}{2}\frac{12}{18}$	288	304	322	340	358	376	394	412	430	448	144 0 0	42	*10	108	18

* Six threads are called a quarter of a day's work, for which each workman is paid 7*d.*, and so on in proportion for a greater or less number.

Remarks and Directions how to apply Tables I. and II.

Example.—Suppose a cable of 12 inches in circumference is wanted to be made, the hawls of yarn out of which, upon examining the weights, are found to weigh 16 cwt. 2 qr. 10 lb. *per* hawl of 336 threads. A reference is to be made to Table I. line E, and the weight, being between 16 cwt. 2 qr. 0 lb. and 16 cwt. 2 qr. 18 lb. will be found to answer to 18-thread yarn. Then look down the 18-thread column, Table II., and upon the line of 12, (the size in the margin,) is found 80 threads *per* hook, which is the number of threads to be laid up *per* hook for the cable to be made of the weight *per* hawl of yarn of 336 threads above specified.

Again, if the hawls of yarn should be tarred of such a weight (say for example) requires to be worked between a 17 and an 18-thread yarn, in such case take the number of threads *per* hook to be worked for the size of the cable demanded, as should be worked both for 17 and 18-thread yarn; add them together, and take half the number of threads so added, to work *per* hook for the cable; but if there should happen in dividing to be an odd thread remaining, you must observe to which side the weight of your hawl of yarn is most inclining, and throw the thread in dispute to the heaviest side. The same rules must be observed in consulting all the following tables.

Remarks.—In laying three-strand cable-laid cordage, if you are in doubt respecting the size of your yarn, you must girt the yarn you purpose laying in one strand, and that should be half the size of your cable.

In hardening the strands in the laying of cable-laid cordage,

cordage, you muſt work with (in addition to your ſledge) one preſs-barrel to every 20 threads contained in your ſtrand; but in laying the ſtrand, hardening, and laying the cable, you muſt have only one preſs-barrel to every 40 threads contained in your ſtrand or cable. The above is to be conſidered as a ſtanding rule in covered rope-grounds, but in open grounds, the preſs muſt be varied according to the ſtate of the bottom of the ground, which, after a ſhower of rain, or in damp weather, will be naturally ſoft, and occaſion the ſledge to draw exceedingly heavy, and of courſe want the leſs weight of preſs.

N. B. The weight of a preſs-barrel ſhould be from $3\frac{1}{2}$ to 4 cwt.

Table III.

Shewing the different ſhrinking Proportions of the Yarns and Strands in each Proceſs in making the undermentioned Lengths of Cable.

	Length in fathoms of cable.	Length of yarns required to be warped.		In hardening the ſtrands, the yarn will ſhrink 1-5th part of the whole length warped, and is called the ſtrand's hardening mark.		In laying the ſtrands, the ſtrand will ſhrink 1-10th part of the whole length warped, and is called the ſtrand's going diſtance.		In hardening the cable-ſtrands previous to laying the cable, the ſtrands will ſhrink 1-30th part of the whole length warped, and is called the cable's hardening mark.			In laying the cable it will ſhrink 1-15th part of the whole length warped, which brings it to the length required.
The Sledge ſhould move up to the following Diſtances from the Tackle-Poſts.											
	fms.	fms.	ft.	fms.	ft.	fms.	ft.	fms.	ft.	in.	fms.
$\frac{1}{3}$ Cable	40	66	4	53	2	46	4	44	2	8	40
$\frac{1}{2}$	60	100	0	80	0	70	0	66	4	0	60
$\frac{2}{3}$	80	133	2	106	4	93	2	88	5	4	80
Whole	120	200	0	160	0	140	0	133	2	0	120

Table IV.

Shewing the Weights of three-ſtrand cable-laid Cordage.

	fms.	3-Inch Cable.			6-Inch Cable.			9-Inch Cable.			12-Inch Cable.			15-Inch Cable.			18-Inch Cable.			21-Inch Cable.			24-Inch Cable.		
		C.	qr.	lb. oz.	C.	qr.	lb. oz.	C.	qr.	lb. oz.	C.	qr.	lb. oz.	C.	qr.	lb. oz.	C.	qr.	lb. oz.	C.	qr.	lb. oz.	C.	qr.	lb. oz.
$\frac{1}{3}$ Cable	40	0	3	0 0	3	0	0 0	6	3	0 0	12	0	0 0	18	3	0 0	27	0	0 0	36	3	0 0	48	0	0 0
$\frac{1}{2}$	60	1	0	14 0	4	2	0 0	10	0	14 0	18	0	0 0	28	0	14 0	40	2	0 0	55	0	14 0	72	0	0 0
$\frac{2}{3}$	80	1	2	0 0	6	0	0 0	13	2	0 0	24	0	0 0	37	2	0 0	54	0	0 0	73	2	0 0	96	0	0 0
Whole	120	2	1	0 0	9	0	0 0	20	1	0 0	36	0	0 0	56	1	0 0	81	0	0 0	110	1	0 0	144	0	0 0

It is neceſſary to be underſtood, that in rope-making (according to the nature of the rope), weight will give ſize, and ſize will give weight, if properly made.

Rule.—To calculate very nearly the weight of any ſized rope from 3 to 24 inches in circumference, 120 fathoms long, and leſſer lengths in proportion; as may be readily proved by the above table, *viz.* multiply the ſize of the rope by itſelf, and one-fourth of that product is the weight of a hundred of 112 pounds.

Example.—Suppoſe the rope 12 inches in circumference; 12 × 12 :: 144, the fourth of which is 36 hundred weight, or 3732 pounds, the weight of 120 fathoms of rope 12 inches in circumference. Again, 40 fathoms is the third of 120 fathoms; and the third of 36 cwt. is 12 cwt. the weight of 40 fathoms of 12-inch cable, as above.

Directions how to apply the following Tables.

In which is conſidered the four moſt principal ſorts of yarns made uſe of in cable-laid cordage, *viz.* 16, 18, 20, and 25-thread yarn, and in hawſer-laid cordage, to the three principal ſorts of yarn made uſe of, *viz.* 18, 20, and 25-thread yarn, as it is very ſeldom any other ſize yarn is made for either cable or hawſer-laid rope, except very particularly ordered to the contrary. The particulars of every rope of the ſizes mentioned in the tables are fully explained to the length of twenty fathoms, which will be found quite a ſufficient guide for a rope of any length required:

As for Example.—Suppoſe I want a taper cable-laid rope to be made out of 16-thread yarn, 60 fathoms long, and 6 inches in circumference, to be tapered $\frac{3}{4}$ds the length, and $\frac{1}{4}$ds the ſize of the rope. I refer to Table V., and find under the figure 6, (the ſize demanded,) that it muſt be worked 5 threads *per* hook in the ſhank, the length of yarn to be warped for which, for 20 fathoms (I find in the margin) requires to be 33 fathoms 2 feet, three times which is 100 fathoms, the length of yarn required to be warped for the ſhank of a rope of 60 fathoms long. I then obſerve, in the next column on the right in the margin, the length of yarn required in the head for 20 fathoms is 11 fathoms 0 feet 8 inches, three times which is 33 fathoms 2 feet, the length of yarn required in the head to the firſt taper for a rope of 60 fathoms. Next refer to the number of tapers to be worked, which, upon looking under the figure 6, (the ſize demanded,) I find to be 9, the diſtance between them I find (upon caſting my eye down the column) to be 14 feet $7\frac{2}{3}$ inches for 20 fathoms, three times which is 44 feet $5\frac{1}{3}$ inches, the diſtance to be obſerved between the tapers for a rope of 60 fathoms, being the length demanded. The ſame rule is be obſerved, either adding or multiplying, according as required in all the tables of a ſimilar deſcription.

Table

Table V.

Shewing the Number of Threads to work *per* Hook, both in the Shank and Tapers, in making three-ſtrand taper cable-laid Cordage of the following Sizes, and the Lengths thereto prefixed, with the Lengths of Yarn required to be warped for the ſame, and the Diſtance to be obſerved between the Tapers; for 16, 18, 20, and 25-thread Yarn.

To Taper two-thirds the Length, and two-thirds the Size of the Rope

	Thread Yarn.	Inches.													
Sizes demanded - -		$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7	$7\frac{1}{2}$	8	$8\frac{1}{2}$	9	$9\frac{1}{2}$	10
Threads *per* hook at the head	16	6	8	10	12	15	18	21	24	28	32	36	40	45	50
	18	7	9	11	14	16	20	23	27	31	36	40	45	50	55
	20	8	9	12	15	18	22	26	30	34	40	45	50	56	62
	25	10	12	16	19	23	28	33	38	43	50	56	63	70	78
Number of threads to be worked in the ſhank - -	16	2	3	4	4	5	6	7	8	10	11	12	14	15	17
	18	3	3	4	5	6	7	8	9	11	12	14	15	17	19
	20	3	3	4	5	6	8	9	10	12	14	15	17	19	22
	25	4	5	6	7	8	10	11	13	15	17	19	21	24	26
Number of threads to be worked in the tapers - -	16	4	5	6	8	10	12	14	16	18	21	24	26	30	33
	18	4	6	7	9	10	13	15	18	20	24	26	30	33	36
	20	5	6	8	10	12	14	17	20	22	26	30	33	37	40
	25	6	7	10	12	15	18	22	25	28	33	37	42	46	52

Fathoms demanded.	Lengths of Yarn in Shank or whole Parts.	Lengths of Yarn in the Head to the firſt Taper.	Lengths of Yarn to Taper.		Diſtance between the Tapers.													
	fms. ft.	fms. ft. in.	fms. ft. in.		ft. in.													
5	8 2	2 4 8	5 3 4	16	8 4	6 8	5 $6\frac{2}{3}$	4 2	3 4	2 $9\frac{1}{3}$	2 $4\frac{4}{7}$	2 1	1 $10\frac{2}{9}$	1 $7\frac{1}{21}$	1 $4\frac{2}{3}$	1 $3\frac{5}{13}$	1 $1\frac{1}{3}$	1 $0\frac{4}{33}$
10	16 4	5 3 4	11 0 8		16 8	13 4	11 $1\frac{1}{3}$	8 4	6 8	5 $6\frac{2}{3}$	4 $9\frac{1}{7}$	4 2	3 $8\frac{2}{9}$	3 $2\frac{2}{21}$	2 $9\frac{1}{3}$	2 $6\frac{10}{13}$	2 $2\frac{2}{3}$	2 $0\frac{8}{33}$
15	25 0	8 2 0	16 4 0		25 0	20 0	16 8	12 6	10 0	8 4	7 $1\frac{5}{7}$	6 3	5 $6\frac{6}{9}$	4 $9\frac{3}{21}$	4 2	3 $10\frac{2}{13}$	3 4	3 $0\frac{12}{33}$
20	33 2	11 0 8	22 1 4		33 4	26 8	22 $2\frac{2}{3}$	16 8	13 4	11 $1\frac{1}{3}$	9 $6\frac{2}{7}$	8 4	7 $4\frac{8}{9}$	6 $4\frac{4}{21}$	6 $2\frac{2}{3}$	5 $1\frac{7}{13}$	4 $5\frac{1}{3}$	4 $0\frac{16}{33}$
5	8 2	2 4 8	5 3 4	18	8 4	5 $6\frac{2}{3}$	4 $9\frac{1}{7}$	3 $8\frac{4}{9}$	3 4	2 $6\frac{10}{13}$	2 $2\frac{2}{3}$	1 $10\frac{2}{9}$	1 8	1 $4\frac{2}{3}$	1 $3\frac{5}{13}$	1 $1\frac{1}{3}$	1 $0\frac{4}{33}$	0 $11\frac{1}{9}$
10	16 4	5 3 4	11 0 8		16 8	11 $1\frac{1}{3}$	9 $6\frac{2}{7}$	7 $4\frac{8}{9}$	6 8	5 $1\frac{7}{13}$	4 $5\frac{1}{3}$	3 $8\frac{4}{9}$	3 4	2 $9\frac{1}{3}$	2 $6\frac{10}{13}$	2 $2\frac{2}{3}$	2 $0\frac{8}{33}$	1 $10\frac{2}{9}$
15	25 0	8 2 0	16 4 0		25 0	16 8	14 $3\frac{3}{7}$	11 $1\frac{1}{9}$	10 0	7 $8\frac{4}{13}$	6 8	5 $6\frac{6}{9}$	5 0	4 2	3 $10\frac{2}{13}$	3 4	3 $0\frac{12}{33}$	2 $9\frac{2}{9}$
20	33 2	11 0 8	22 1 4		33 4	22 $2\frac{2}{3}$	19 $0\frac{4}{7}$	14 $9\frac{7}{9}$	13 4	10 $3\frac{1}{13}$	8 $10\frac{2}{3}$	7 $5\frac{8}{9}$	6 8	5 $6\frac{2}{3}$	5 $1\frac{7}{13}$	4 $5\frac{1}{3}$	4 $0\frac{16}{33}$	3 $8\frac{4}{9}$
5	8 2	2 4 8	5 3 4	20	6 8	5 $6\frac{2}{3}$	4 2	3 4	2 $9\frac{1}{3}$	2 $4\frac{4}{7}$	1 $11\frac{9}{17}$	1 8	1 $6\frac{2}{11}$	1 $3\frac{5}{13}$	1 $1\frac{1}{3}$	1 $0\frac{4}{33}$	0 $10\frac{30}{37}$	0 10
10	16 4	5 3 4	11 0 8		13 4	11 $1\frac{1}{3}$	8 4	6 8	5 $6\frac{2}{3}$	4 $9\frac{1}{7}$	3 $11\frac{1}{17}$	3 4	3 $0\frac{4}{11}$	2 $6\frac{10}{13}$	2 $2\frac{2}{3}$	2 $0\frac{8}{33}$	1 $9\frac{23}{37}$	1 8
15	25 0	8 2 0	16 4 0		20 0	16 8	12 6	10 0	8 4	7 $1\frac{5}{7}$	5 $10\frac{10}{17}$	5 0	4 $6\frac{6}{11}$	3 $10\frac{2}{13}$	3 4	3 $0\frac{12}{33}$	2 $8\frac{10}{37}$	2 6
20	33 2	11 0 8	22 1 4		26 8	22 $2\frac{2}{3}$	16 8	13 4	11 $1\frac{1}{3}$	9 $6\frac{2}{7}$	7 $10\frac{2}{17}$	6 8	6 $0\frac{8}{11}$	5 $1\frac{7}{13}$	4 $5\frac{1}{3}$	4 $0\frac{16}{33}$	3 $7\frac{9}{37}$	3 4
5	8 2	2 4 8	5 3 4	25	5 $6\frac{2}{3}$	4 $9\frac{1}{7}$	3 4	2 $9\frac{1}{3}$	2 $2\frac{2}{3}$	1 $10\frac{2}{9}$	1 $6\frac{2}{11}$	1 4	1 $2\frac{2}{7}$	1 $0\frac{4}{33}$	0 $10\frac{30}{37}$	0 $9\frac{11}{34}$	0 $8\frac{16}{23}$	0 $8\frac{2}{11}$
10	16 4	5 3 4	11 0 8		11 $1\frac{1}{3}$	9 $6\frac{2}{7}$	6 8	5 $6\frac{2}{3}$	4 $5\frac{1}{3}$	3 $8\frac{4}{9}$	3 $0\frac{4}{11}$	2 8	2 $4\frac{4}{7}$	2 $0\frac{8}{33}$	1 $9\frac{23}{37}$	1 $7\frac{1}{34}$	1 $5\frac{9}{23}$	1 $4\frac{3}{11}$
15	25 0	8 2 0	16 4 0		16 8	14 $3\frac{3}{7}$	10 0	8 4	6 8	5 $6\frac{6}{9}$	4 $6\frac{6}{11}$	4 0	3 $6\frac{6}{7}$	3 $0\frac{12}{33}$	2 $8\frac{10}{37}$	2 $4\frac{12}{34}$	2 $2\frac{2}{23}$	2 $0\frac{6}{11}$
20	33 2	11 0 8	22 1 4		22 $2\frac{2}{3}$	19 $0\frac{4}{7}$	13 4	11 $1\frac{1}{3}$	8 $10\frac{2}{3}$	7 $5\frac{8}{9}$	6 $0\frac{8}{11}$	5 4	4 $9\frac{1}{7}$	4 $0\frac{16}{33}$	3 $7\frac{9}{37}$	3 $2\frac{2}{34}$	2 $10\frac{18}{23}$	2 $8\frac{8}{11}$

TABLE V.—*continued.*

To Taper half the Length and half the Size of the Rope.

	Thread Yarn.	Inches.													
Sizes demanded - -		$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7	$7\frac{1}{2}$	8	$8\frac{1}{2}$	9	$9\frac{1}{2}$	10
Threads *per* hook at the head	16	6	8	10	12	15	18	21	24	28	32	36	40	45	50
	18	7	9	11	14	16	20	23	27	31	36	40	45	50	55
	20	8	9	12	15	18	22	26	30	34	40	45	50	56	62
	25	10	12	16	19	23	28	33	38	43	50	56	63	70	78
Number of threads to be worked in the shank - -	16	3	4	5	6	8	9	11	12	14	16	18	20	23	25
	18	4	5	6	7	8	10	12	14	16	18	20	23	25	28
	20	4	4	6	8	9	11	13	15	17	20	23	25	28	32
	25	5	6	8	10	12	14	17	19	22	25	28	31	35	39
Number of threads to be worked in the tapers - -	16	3	4	5	6	7	9	10	12	14	16	18	20	22	25
	18	3	4	5	7	8	10	11	13	15	18	20	22	25	27
	20	4	5	6	7	9	11	13	15	17	20	22	25	28	30
	25	5	6	8	9	11	14	16	19	21	25	28	32	35	39

Fathoms demanded.	Lengths of Yarn in Shank or whole Parts.	Lengths of Yarn in the Head to the first Taper.	Lengths of Yarn to Taper.		Distance between the Tapers.														
	fms. ft.	ft.	ft.		ft. in.														
5	8 2	25	25	16	8 4	6 3	5 0	4 2	3 $6\frac{6}{7}$	2 $9\frac{1}{3}$	2 6	2 1	1 $9\frac{3}{7}$	1 $6\frac{3}{4}$	1 $4\frac{2}{3}$	1 3	1 $1\frac{7}{17}$	1 0
10	16 4	50	50		16 8	12 6	10 0	8 4	7 $1\frac{5}{7}$	5 $6\frac{2}{3}$	5 0	4 2	3 $6\frac{6}{7}$	3 $1\frac{1}{3}$	2 $9\frac{1}{3}$	2 6	2 $3\frac{3}{17}$	2 0
15	25 0	75	75		25 0	18 9	15 0	12 6	10 $8\frac{4}{7}$	8 4	7 6	6 3	5 $4\frac{2}{7}$	4 $8\frac{1}{4}$	4 2	3 9	3 $4\frac{10}{17}$	3 0
20	33 2	100	100		33 4	25 0	20 0	16 8	14 $3\frac{3}{7}$	11 $1\frac{1}{3}$	10 0	8 4	7 $1\frac{5}{7}$	6 3	5 $6\frac{2}{3}$	5 0	4 $6\frac{6}{17}$	4 0
5	8 2	25	25	18	8 4	6 3	5 0	3 $6\frac{6}{7}$	3 $1\frac{1}{3}$	2 6	2 $3\frac{3}{17}$	1 $11\frac{1}{13}$	1 8	1 $4\frac{2}{3}$	1 3	1 $1\frac{7}{17}$	1 0	0 $11\frac{1}{9}$
10	16 4	50	50		16 8	12 6	10 0	7 $1\frac{5}{7}$	6 3	5 0	4 $6\frac{6}{17}$	3 $10\frac{2}{13}$	3 4	2 $9\frac{1}{3}$	2 6	2 $3\frac{3}{17}$	2 0	1 $10\frac{2}{7}$
15	25 0	75	75		25 0	18 9	15 0	10 $8\frac{4}{7}$	9 $4\frac{1}{3}$	7 6	6 $9\frac{10}{17}$	5 $9\frac{3}{13}$	5 0	4 2	3 9	3 $4\frac{10}{17}$	3 0	2 $9\frac{2}{3}$
20	33 2	100	100		33 4	25 0	20 0	14 $3\frac{3}{7}$	12 6	10 0	9 $1\frac{1}{17}$	7 $8\frac{4}{13}$	6 8	5 $6\frac{2}{3}$	5 0	4 $6\frac{6}{17}$	4 0	3 $8\frac{4}{9}$
5	8 2	25	25	20	6 3	5 0	4 2	3 $6\frac{6}{7}$	2 $9\frac{1}{3}$	2 $3\frac{3}{17}$	1 $11\frac{1}{13}$	1 8	1 $5\frac{11}{17}$	1 3	1 $1\frac{7}{17}$	1 0	0 $10\frac{5}{7}$	0 10
10	16 4	50	50		12 6	10 0	8 4	7 $1\frac{5}{7}$	5 $6\frac{2}{3}$	4 $6\frac{6}{17}$	3 $10\frac{6}{13}$	3 4	2 $11\frac{8}{17}$	2 6	2 $3\frac{3}{17}$	2 0	1 $9\frac{3}{7}$	1 8
15	25 0	75	75		18 9	15 0	12 6	10 $8\frac{4}{7}$	8 4	6 $9\frac{10}{17}$	5 $9\frac{3}{13}$	5 0	4 $4\frac{10}{17}$	3 9	3 $4\frac{10}{17}$	3 0	2 $8\frac{1}{7}$	2 6
20	33 2	100	100		25 0	20 0	16 8	14 $3\frac{3}{7}$	11 $1\frac{1}{3}$	9 $1\frac{1}{17}$	7 $8\frac{4}{13}$	6 8	5 $10\frac{10}{17}$	5 0	4 $6\frac{6}{17}$	4 0	3 $6\frac{6}{7}$	3 4
5	8 2	25	25	25	5 0	4 2	3 $1\frac{1}{3}$	2 $9\frac{1}{3}$	2 $3\frac{3}{17}$	1 $9\frac{3}{7}$	1 $6\frac{3}{4}$	1 $3\frac{16}{19}$	1 $2\frac{2}{7}$	1 0	0 $10\frac{6}{7}$	0 $9\frac{3}{7}$	0 $8\frac{4}{7}$	0 $7\frac{3}{17}$
10	16 4	50	50		10 0	8 4	6 3	5 $6\frac{2}{3}$	4 $6\frac{6}{17}$	3 $6\frac{6}{7}$	3 $1\frac{1}{3}$	2 $7\frac{11}{19}$	2 $4\frac{4}{7}$	2 0	1 $9\frac{3}{7}$	1 $6\frac{6}{8}$	1 $5\frac{1}{7}$	1 $3\frac{6}{17}$
15	25 0	75	75		15 0	12 6	9 $4\frac{1}{3}$	8 4	6 $9\frac{10}{17}$	5 $4\frac{2}{7}$	4 $8\frac{1}{4}$	3 $11\frac{7}{19}$	3 $6\frac{6}{7}$	3 0	2 $8\frac{1}{7}$	2 $4\frac{1}{16}$	2 $1\frac{4}{7}$	1 $11\frac{1}{17}$
20	33 2	100	100		20 0	16 8	12 6	11 $1\frac{1}{3}$	9 $1\frac{1}{17}$	7 $1\frac{5}{7}$	6 3	5 $3\frac{5}{19}$	4 $9\frac{1}{7}$	4 0	3 $6\frac{6}{7}$	3 $1\frac{4}{8}$	2 $10\frac{2}{7}$	2 $6\frac{10}{17}$

Table VI.

Shewing the Number of Threads to work *per* Hook and Heart for cable-laid Stays, four Strands and a Heart, of 5, 10, 15, and 19 Inches in Circumference, of the undermentioned Sizes of Yarn, with the Girt of each Strand prefixed against each Size.

Number of Threads asunder to weigh from 99 to 100lb.		16	17	18	19	20	21	22	23	24	25
Size in Inches.	Girt of each Strand.	Threads *per* Hook and Heart.									
5	2 $\frac{8}{9}$	9	9	10	11	11	12	12	13	13	14
10	$4\frac{1}{4}$ $\frac{7}{9}$	35	37	39	41	43	46	48	50	52	55
15	$6\frac{1}{2}$ $\frac{6}{9}$	79	84	89	94	99	104	109	114	119	124
19	$8\frac{1}{4}$ $\frac{7}{9}$	127	135	143	151	159	167	175	183	191	199

The ſhrinking proportions of cable-laid ſtays are exactly the ſame as in three-ſtrand cable-laid cordage, except in the cloſing the ſtay, which being compoſed of four ſtrands, lie much cloſer in the rope than three ſtrands, and having the heart of the ſtay to encompaſs, occaſions the ſtrands to ſhorten in a much greater proportion than in three-ſtrand cable-laid cordage. The ſtay, in cloſing, will ſhorten $\frac{2}{11}$ parts of the length of yarn firſt warped.

Table VII.

Shewing the Weight of cable-laid Stays, four Strands and a Heart, from 5 to 19 Inches in Circumference, and from 5 to 30 Fathoms in Length.

Fathoms in Length.	5-Inch Stay.				7-Inch Stay.				9-Inch Stay.				11-Inch Stay.				13-Inch Stay.				15-Inch Stay.				17-Inch Stay.				19-Inch Stay.			
	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.	C.	qr.	lb.	oz.
5	0	1	3	9	0	2	4	5	0	3	16	10	1	1	9	11	1	3	17	2	2	2	2	3	3	0	25	9	4	0	7	10
10	0	2	7	2	1	0	8	10	1	3	5	4	2	2	19	6	3	3	6	4	5	0	4	6	6	1	23	2	8	0	15	4
15	0	3	10	11	1	2	12	15	2	2	21	14	4	0	1	1	5	2	23	6	7	2	6	9	9	2	20	11	12	0	22	14
20	1	0	14	4	2	0	17	4	3	2	10	8	5	1	10	12	7	2	12	8	10	0	8	12	12	3	18	4	16	1	2	8
25	1	1	17	13	2	2	21	9	4	1	27	2	6	2	20	7	9	2	1	10	12	2	10	15	16	0	15	13	20	1	10	2
30	1	2	21	6	3	0	25	14	5	1	15	12	8	0	2	2	11	1	18	12	15	0	13	2	19	1	13	6	24	1	17	12

Table VIII.

Shewing the Number of Threads to work *per* Hook for four-ſtrand cable-laid Cordage without a Heart, from 5 to 24 Inches in Circumference, of the Sizes of Yarn undermentioned, with the Weight of each Cable prefixed.

No. of Threads weighing from 99 to 100lb.	16	17	18	19	20	21	22	23	24	25	Weight of each Cable 120 Fathoms long.		
Size in Inches.	Threads *per* Hook.										C.	qr.	lb.
5	9	10	10	11	12	12	13	13	14	15	6	2	10
10	38	40	42	45	47	50	52	54	57	59	25	3	6
15	85	91	96	101	107	112	118	123	128	134	58	3	0
20	152	162	171	181	190	200	209	219	228	238	104	1	9
24	219	233	247	260	274	288	301	315	329	343	150	1	2

Table IX.

Shewing the Length of Yarn required to be warped, and the different ſhrinking Proportions in making the undermentioned Lengths of four-ſtrand cable-laid Cordage.

Fathoms demanded.	Lengths of Yarn warped.			Strand's Hardening Mark.			Strand's Going Diſtance.			Cable's Hardening Mark.			Cable's Length.
	fms.	ft.	in.	fms.	ft.	in.	fms.	ft.	in.	fms.	ft.	in.	
10	17	0	6	13	4	0	11	5	9	11	2	4	10
20	34	1	0	27	2	0	23	5	6	22	4	8	20
40	68	2	0	54	4	0	47	5	0	45	3	4	40
60	102	3	0	82	0	0	71	4	6	68	2	0	60
80	136	4	0	109	2	0	95	4	0	91	0	8	80
120	205	0	0	164	0	0	143	3	0	136	4	0	120

N.B. The ſhrinking proportions of four-ſtrand cable-laid cordage is exactly the ſame as three-ſtrand, except in cloſing the cable, which conſiſting of four ſtrands, lie much cloſer in the rope than three ſtrands, but not having a heart to encompaſs it, does not diminiſh in length ſo much as cable-laid ſtays. The cable in cloſing will ſhorten $\frac{10}{124}$ parts of the length of yarn firſt warped.

It being rather unuſual to lay cables with a greater number of ſtrands than four, the above tables are not laid down for a greater proportion,—but to know how to find the number of threads to work *per* hook for a greater number may at ſome time be neceſſary, therefore the following method muſt be purſued to lay a cable in as many ſtrands as may be thought expedient. Suppoſe a five-ſtrand cable-laid rope is wanted to be made, you firſt ſquare the ſize of the rope propoſed to be made, and multiply that product by the ſize yarn you mean to make your cable from, that product divide by 52, and the quotient will be the number of threads to work *per* hook for a five-ſtrand cable-laid rope. If for a ſix-ſtrand, proceed as before, and divide by 62; for a ſeven-ſtrand, divide by 72; for an eight-ſtrand, divide by 82; and ſo on, adding 10 to your diviſor for every ſtrand you mean to increaſe in number in your cable.

Table X.

Shewing the Prime Coſt to the Manufacturer in each Proceſs, in making the undermentioned Sizes of three-ſtrand cable-laid Cordage, with the Weight of Hemp and Tar required for each Rope.

Size.	Hatchelling, Wheel-turning, and Tending.			Expence at 5*d.* *per* Quarter			Spinning.			Expence at 7*d.* *per* Quarter.			Warping, Taking-up, and Tarring, at 9*s.* *per* Hawl.			Laying at 7*d.* *per* Quarter.			Total Expence of Manufacturing into Cordage.			Weight of Hemp required for each Rope.			Weight of Tar required for each Rope.		
In.	qr.	thds.		*L.*	*s.*	*d.*	qr.	thds.		*L.*	*s.*	*d.*	*L.*	*s.*	*d.*	*L.*	*s.*	*d.*	*L.*	*s.*	*d.*	C.	qr.	lb.	C.	qr.	lb.
5	7	3		0	3	9	22	3		0	13	1	0	2	$10\frac{1}{2}$	0	15	5	1	15	$1\frac{1}{2}$	5	0	0	1	1	0
10	31	$1\frac{1}{2}$		0	15	$7\frac{1}{2}$	93	$4\frac{1}{2}$		2	14	$7\frac{1}{2}$	0	12	1	2	6	1	6	8	5	20	0	0	5	0	0
15	70	$3\frac{3}{4}$		1	15	$3\frac{3}{4}$	211	$5\frac{1}{4}$		6	3	$6\frac{1}{4}$	1	7	3	5	17	10	15	3	11	45	0	0	11	1	0
20	125	0		3	2	6	375	0		10	18	9	2	8	2	11	18	3	28	7	5	80	0	0	20	0	0
24	180	0		4	10	0	540	0		15	15	0	3	9	5	15	11	6	39	5	11	115	0	23	28	3	5

The above table is calculated according to the uſual mode of rope-making, and is termed by the trade working by the ſquare, which is performed in the following manner: Suppoſe a cable 15 inches in circumference, the ſquare of 15 is 225, the half of which is $112\frac{1}{2}$; that is, 113 threads *per* hook muſt be laid up for a 15-inch cable, proceeding in the ſame manner for any ſize demanded, which mode of working anſwers to ſixteen-thread yarn in all ſizes of three-ſtrand cable-laid cordage.

Where the diameter and circumference of one rope to another is as 2 to 1, that is, where one rope is twice as big as another, the ſquare of the diameter is as 4 to 1, which ſhews that one rope has four times as much yarn in it as the other, and conſequently is four times as ſtrong, according to the different magnitudes.

Table XI.

Shewing the Number of Threads *per* Hook to work for three-ſtrand hawſer-laid Cordage, of 3, 6, 9, and 12 Inches in Circumference, of the Sizes of Yarn undermentioned, with the Weight of each Rope, and the Number of Men required to lay the ſame, with the Allowance to each Man for his Labour.

N° of Threads 99 to 100lb. Weight.	16	17	18	19	20	21	22	23	24	25	Weight of each Rope 133.2 long.	Men for Rope.	Threads *per* Rope.
Size in Inches.	Threads *per* Hook.										C. qr. lb.		
3	16	17	18	19	20	21	22	23	24	25	2 2 17	8 0	6
6	64	68	72	76	80	84	88	92	96	100	10 2 12	22 0	12
9	144	153	162	171	180	189	198	207	216	225	23 1 13	37 0	15
12	256	272	288	304	320	336	352	368	384	400	42 1 20	45 0	15

Remarks.—In hardening the ſtrands, and in laying hawſer-laid cordage, it muſt be worked with (in addition to the weight of the ſledge) one preſs-barrel for every twenty threads contained in the rope. This is to be conſidered as a ſtanding rule in covered rope-grounds, but in open grounds the preſs muſt be varied according to the ſtate of the ground, as mentioned in cable-laid cordage.

In laying three-ſtrand hawſer-laid cordage, if there is any doubt reſpecting the ſize of the yarn, you muſt girt the yarn you propoſe laying in two of your readys (or ſtrands), and that ſhould be juſt the ſize of the rope.

Table XII.

Shewing the Length of Yarn required to be warped, and the different ſhrinking Proportions of the Yarn in each Proceſs, in making the undermentioned Lengths of hawſer-laid Rope, and alſo the Weight.

	Fathoms of Rope in Length.	Length of Yarn to be warped.	The Sledge ſhould move to the following Marks from the Tackle-Poſts.		¾-Inch.	1½-Inch.	2-Inch.	4-Inch.	6-Inch.	8-Inch.	10-Inch.	12-Inch.
			Rope's Hardening Mark.	Rope's Length.	Weight.	Weight.	Weight.	Weight.	Weight.	Weight.	Weight.	Weight.
	fms. ft.	fms.	fms.	fms. ft.	qr. lb. oz.	qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.
	10 0	15	12	10 0	0 2 7½	0 4 15	0 0 9 14¼	0 1 11 9½	0 3 5 1½	1 1 18 6¼	2 0 23 8	3 0 20 6
	20 0	30	24	20 0	0 4 15	0 9 4	0 0 19 12½	0 2 23 3	1 2 10 3	2 3 8 12½	4 1 19 0	6 1 12 12
	40 0	60	48	40 0	0 9 14	0 19 12	0 1 11 9	1 1 18 6	3 0 20 6	5 2 17 9	8 3 10 0	12 2 25 8
Half Coil	66 4	100	80	66 4	0 16 8	1 5 0	0 2 10 0	2 1 12 0	5 1 6 0	9 1 20 0	14 2 26 0	21 0 24 0
	80 0	120	96	80 0	0 19 12	1 11 8	0 2 23 2	2 3 8 12	6 1 12 12	11 1 7 2	17 2 20 0	25 1 23 0
	100 0	150	120	100 0	0 24 11	1 21 6	0 3 14 14½	3 2 3 15	7 3 22 15	14 0 15 14½	22 0 11 0	31 3 7 12
	120 0	180	144	120 0	1 1 10	2 3 4	1 0 6 11	4 0 26 2	9 2 5 2	16 3 24 11	26 2 2 0	38 0 20 8
Whole Coil	133 2	200	160	133 2	1 5 0	2 10 0	1 0 20 0	4 2 24 0	10 2 12 0	18 3 12 0	29 1 24 0	42 1 20 0

Remarks.—In hardening the ſtrands the yarn will ſhrink one-fifth of the whole length, which is called the rope's hardening mark.

In laying the rope the ſtrands will ſhrink one-ſixth of the remaining diſtance, which brings the rope to the length required.

Table

Table XIII.

Shewing the exact Coſt to the Manufacturer in each different Proceſs as undermentioned, in making the following Sizes of three-ſtrand hawſer-laid Cordage, with the proper Proportions of Hemp and Tar neceſſary for each Rope.

Size in Inches.	Hatchelling, Wheel turning, and Tending.	Expence at 6*d.* *per* Quarter.	Spinning.	Expence at 7*d.* *per* Quarter.	Warping, Taking-up, and Tarring Expence at 9*s.* *per* Hawl.	Laying Expence at 7*d.* *per* Quarter.	Total Expence of manufacturing into Cordage.	Weight of Hemp required for each Rope.	Weight of Tar required for each Rope.
	qr. thds.	*L.* *s.* *d.*	qr. thds	*L.* *s.* *d.*	*L.* *s.* *d.*	*L.* *s.* *d.*	*L.* *s.* *d.*	Cwt. qrs. lbs.	Cwt. qrs. lbs.
2	1 4	0 0 10	5 0	0 2 11	0 0 7½	0 1 9	0 6 1	0 3 22	0 0 26
4	6 4	0 3 4	20 0	0 11 8	0 2 7	0 7 0	1 4 7	3 3 23	0 3 21
6	15 0	0 7 6	45 0	1 6 3	0 5 8	1 5 8	3 5 1	8 1 27	2 0 13
8	26 4	0 13 4	80 0	2 6 8	0 10 3	1 15 0	5 5 3	15 0 10	3 3 2
10	41 4	1 0 10	125 0	3 12 11	0 16 1	3 5 7	8 15 5	23 2 10	5 3 14
12	60 0	1 10 0	180 0	5 5 0	1 3 2	3 5 7	11 3 9	33 3 22	8 1 26

The foregoing table is grounded (as termed by the trade) upon the principle of the ſquare, but the method of working upon this principle differs between cable and hawſer-laid cordage. The mode purſued for making hawſer-laid cordage is as follows: Suppoſe it is wanted to make a three-ſtrand hawſer-laid rope, ſix inches in circumference; the ſquare of 6 is 36, and twice 36 is 72, which is the number of threads to work *per* hook for a ſix-inch three-ſtrand hawſer-laid rope. The ſame method muſt be purſued, according to this way of working, for any other ſize, and anſwers to eighteen-thread yarn in all three-ſtrand hawſer-laid cordage. See Table XI.

Table XIV.

Shewing the Weight of Yarn (of the four moſt general Sorts madeuſe of) capable of being ſpun by each of the following Number of Spinners, at eight Quarters, (or 48 Threads) *per* day, in 1 Day, 1 Week of 6 Days, 1 Month of 24 Days, and 1 Year of 13 Months; with the Yield of Cordage at the Year's End prefixed againſt each Number of Spinner's Work.

	Numb. of Spinners for	Weight of Yarn *per* Day.	Weight of Yarn *per* Week.	Weight of Yarn *per* Month.	Weight of Yarn *per* Year.	Yield of Cordage.
		Cwt. qrs. lbs.	Cwt. qrs. lbs.	Tons. cwt. qrs. lbs.	Tons. cwt. qrs. lbs.	Tons. cwt. qrs. lbs.
16-thread Yarn.	2	3 1 20	20 2 8	4 2 1 4	53 9 2 24	[illegible]
	4	6 3 12	41 0 16	8 4 2 8	106 19 1 20	[illegible]
	6	10 1 4	61 2 24	12 6 3 12	[illegible]	[illegible]
	8	13 2 24	82 1 4	16 9 0 16	213 18 3 12	[illegible]
	10	17 0 16	102 3 12	20 11 1 20	[illegible]	[illegible]
	12	20 2 8	123 1 20	24 13 2 24	[illegible]	[illegible]
18-thread Yarn.	2	3 0 0	18 0 0	3 12 0 0	19 15 0 0	[illegible]
	4	6 0 0	36 0 0	7 4 0 0	[illegible] 12 0 0	[illegible]
	6	9 0 0	54 0 0	10 16 0 0	[illegible] 8 0 0	[illegible]
	8	12 0 0	72 0 0	14 8 0 0	187 4 0 0	[illegible]
	10	15 0 0	90 0 0	18 0 0 0	[illegible] 0 0 0	242 10 0 0
	12	17 0 0	108 0 0	21 12 0 0	[illegible] 16 0 0	281 0 0 0
20-thread Yarn.	2	2 [illegible] 4	16 2 24	3 [illegible] 3 12	[illegible] 0 0 16	[illegible] 2 1 20
	4	3 2 8	[illegible] 1 20	6 7 2 24	86 18 1 4	[illegible] 0 [illegible] 12
	6	8 1 12	50 0 16	9 11 2 8	[illegible] 7 1 [illegible]	[illegible] 3 1 4
	8	11 0 16	66 3 12	12 15 1 20	171 [illegible] 2 8	[illegible] 1 2 21
	10	13 3 20	83 2 8	15 19 1 4	237 [illegible] 2 24	[illegible] 4 0 16
	12	16 2 24	100 1 4	19 3 0 16	[illegible] 14 3 12	[illegible] 6 2 8
25-thread Yarn.	2	2 0 22	13 0 20	2 12 2 24	[illegible] 5 1 4	[illegible] 16 2 12
	4	4 1 16	26 1 12	5 [illegible] 1 20	[illegible] 19 2 8	[illegible] 13 0 24
	6	6 2 10	40 2 4	7 18 0 16	[illegible] 15 3 12	[illegible] 8
	8	8 3 4	53 2 24	10 10 3 [illegible]	[illegible] 1 0 16	[illegible] 1 20
	10	10 3 26	65 3 16	13 [illegible] 2 [illegible]	[illegible] 1 [illegible]	[illegible] 0 4
	12	13 0 20	79 0 8	15 16 1 [illegible]	[illegible] 11 2 [illegible]	[illegible] 2 16

N.B. By the above table may be found how much yarn can be ſpun by any number of ſpinners in any given time whatever.

Table XV.

Shewing the Number of Threads to work *per* Hook, both in the Shank and Tapers, in making three-ſtrand taper hawſer-laid Cordage of the Sizes undermentioned, and the Lengths thereunto prefixed, with the Lengths of Yarn required to be warped for the ſame, and the Diſtance to be obſerved between the Tapers; grounded upon 18, 20, and 25-thread Yarn, and tapered two-thirds the Length, and two-thirds the Size of the Rope.

	Thread Yarn.	Inches.																
Sizes demanded - - -		2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7	$7\frac{1}{2}$	8	$8\frac{1}{2}$	9	$9\frac{1}{2}$	10
Threads *per* hook at the head -	18	8	12	18	24	32	40	50	60	72	84	98	112	128	144	162	180	200
	20	9	14	20	27	35	45	55	67	80	93	108	125	142	160	180	200	222
	25	11	17	25	34	44	56	69	84	100	117	136	156	177	200	225	250	277
Number of threads to be worked in the ſhank - - - -	18	3	4	6	8	11	14	17	20	24	28	33	38	43	48	54	60	67
	20	3	5	7	9	12	15	19	23	27	31	36	42	48	54	60	67	74
	25	4	6	9	12	15	19	28	28	34	39	46	52	59	67	75	84	93
Number of threads to be worked in the tapers - - -	18	5	8	12	16	21	26	33	40	48	56	65	74	85	96	108	120	133
	20	6	9	13	18	23	30	36	44	53	62	72	83	94	106	120	133	148
	25	7	11	16	22	29	37	46	56	66	78	90	104	118	133	150	166	184

Fathoms demanded.	Lengths of Yarn in Shank or whole Parts.	Lengths of Yarn in the Head to the firſt Taper.	Lengths of Yarn to Taper.		Diſtance between the Tapers.																
	fms. ft.	fms. ft.	fms.		ft. in.																
5	7 3	2 3	5	18	6 0	3 9	2 6	1 $10\frac{1}{2}$	1 $4\frac{3}{7}$	1 $1\frac{11}{13}$	0 $10\frac{10}{33}$	0 9	0 $7\frac{1}{2}$	0 $6\frac{3}{7}$	0 $5\frac{34}{67}$	0 $4\frac{32}{37}$	0 $4\frac{20}{65}$	0 $3\frac{1}{4}$	0 $3\frac{1}{3}$	0 3	0 $2\frac{94}{133}$
10	15 0	5 0	10		12 0	7 6	5 0	3 9	2 $8\frac{6}{7}$	2 $3\frac{9}{13}$	1 $9\frac{27}{31}$	1 6	1 3	1 $0\frac{6}{7}$	0 $11\frac{5}{65}$	0 $9\frac{27}{37}$	0 $8\frac{45}{65}$	0 $7\frac{1}{2}$	0 $6\frac{2}{3}$	0 6	0 $5\frac{55}{133}$
15	22 3	7 3	15		18 0	11 3	7 6	5 $7\frac{1}{2}$	4 $1\frac{2}{7}$	3 $5\frac{7}{13}$	2 $8\frac{24}{33}$	2 3	1 $10\frac{1}{2}$	1 $7\frac{2}{7}$	1 $4\frac{40}{65}$	1 $2\frac{22}{37}$	1 $0\frac{60}{65}$	0 $11\frac{1}{4}$	0 10	0 9	0 $8\frac{16}{133}$
20	30 0	10 0	20		24 0	15 0	10 0	7 6	5 $5\frac{5}{7}$	4 $7\frac{5}{13}$	3 $7\frac{21}{33}$	3 0	2 6	2 $1\frac{5}{7}$	1 $10\frac{10}{65}$	1 $7\frac{17}{37}$	1 $4\frac{80}{65}$	1 3	1 $1\frac{1}{3}$	1 0	0 $10\frac{110}{133}$
5	7 3	2 3	5	20	5 0	3 4	2 $3\frac{9}{13}$	1 8	1 $3\frac{15}{23}$	1 0	0 10	0 $8\frac{2}{11}$	0 $6\frac{42}{53}$	0 $5\frac{25}{31}$	0 5	0 $4\frac{28}{83}$	0 $3\frac{29}{47}$	0 $3\frac{21}{53}$	0 3	0 $2\frac{94}{133}$	0 $2\frac{16}{37}$
10	15 0	5 0	10		10 0	6 8	4 $7\frac{5}{13}$	3 4	2 $7\frac{7}{23}$	2 0	1 8	1 $4\frac{4}{11}$	1 $3\frac{11}{53}$	0 $11\frac{12}{31}$	0 10	0 $8\frac{56}{83}$	0 $7\frac{21}{47}$	0 $6\frac{42}{53}$	0 6	0 $5\frac{55}{133}$	0 $4\frac{32}{37}$
15	22 3	7 3	15		15 0	10 0	6 $11\frac{1}{13}$	5 0	3 $10\frac{22}{23}$	3 0	2 6	2 $0\frac{6}{11}$	1 $8\frac{29}{53}$	1 $5\frac{13}{31}$	1 3	1 $1\frac{1}{83}$	0 $11\frac{23}{47}$	0 $10\frac{10}{53}$	0 9	0 $8\frac{76}{133}$	0 $7\frac{13}{37}$
20	30 0	10 0	20		20 0	13 4	9 $2\frac{10}{13}$	6 8	5 $2\frac{14}{23}$	4 0	3 4	2 $8\frac{8}{11}$	2 $3\frac{2}{53}$	1 $11\frac{7}{31}$	1 8	1 $5\frac{29}{83}$	1 $3\frac{15}{47}$	1 $1\frac{31}{53}$	1 0	0 $10\frac{110}{133}$	0 $9\frac{27}{37}$
5	7 3	2 3	5	25	4 $3\frac{3}{7}$	2 $8\frac{8}{11}$	1 $10\frac{1}{2}$	1 $4\frac{4}{11}$	1 $0\frac{12}{29}$	0 $9\frac{27}{37}$	0 $7\frac{12}{23}$	0 $6\frac{3}{7}$	0 $5\frac{5}{11}$	0 $4\frac{8}{13}$	0 4	0 $3\frac{6}{17}$	0 $3\frac{3}{59}$	0 $2\frac{94}{133}$	0 $2\frac{10}{25}$	0 $2\frac{14}{33}$	0 $1\frac{22}{43}$
10	15 0	5 0	10		8 $6\frac{6}{7}$	5 $5\frac{5}{11}$	3 9	2 $8\frac{8}{11}$	2 $0\frac{24}{29}$	1 $7\frac{17}{37}$	1 $3\frac{15}{23}$	1 $0\frac{6}{7}$	0 $10\frac{10}{11}$	0 $9\frac{3}{13}$	0 8	0 $6\frac{12}{23}$	0 $6\frac{6}{59}$	0 $5\frac{55}{133}$	0 $4\frac{20}{25}$	0 $4\frac{28}{33}$	0 $3\frac{21}{23}$
15	22 3	7 3	15		12 $10\frac{2}{7}$	8 $2\frac{2}{11}$	5 $7\frac{1}{2}$	4 $1\frac{1}{11}$	3 $1\frac{7}{29}$	2 $5\frac{7}{37}$	1 $11\frac{11}{23}$	1 $7\frac{2}{7}$	1 $4\frac{4}{11}$	1 $1\frac{11}{13}$	1 0	0 $10\frac{25}{13}$	0 $9\frac{9}{59}$	0 $8\frac{16}{133}$	0 $7\frac{5}{25}$	0 $6\frac{62}{83}$	0 $5\frac{9}{23}$
20	30 0	10 0	20		17 $1\frac{5}{7}$	10 $10\frac{10}{11}$	7 6	5 $5\frac{5}{11}$	4 $1\frac{10}{29}$	3 $2\frac{34}{37}$	2 $7\frac{7}{23}$	2 $1\frac{5}{7}$	1 $9\frac{9}{11}$	1 $6\frac{6}{13}$	1 4	1 $1\frac{14}{23}$	1 $0\frac{12}{59}$	0 $10\frac{110}{133}$	0 $9\frac{16}{25}$	0 $8\frac{56}{83}$	0 $7\frac{19}{23}$

TABLE XV.—*continued.*

Tapered half the Length and half the Size of the Rope.

	Thread Yarn.	Inches.																
Sizes demanded - - -	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7	$7\frac{1}{2}$	8	$8\frac{1}{2}$	9	$9\frac{1}{2}$	10
Threads *per* hook at the head -	18	8	12	18	24	32	40	50	60	72	84	98	112	128	144	162	180	200
	20	9	14	20	27	35	45	55	67	80	93	108	125	142	160	180	200	222
	25	11	17	25	34	44	56	69	84	100	117	136	156	177	200	225	250	277
Number of threads to be worked in the shank - - -	18	4	6	9	12	16	20	25	30	36	42	49	56	64	72	81	90	100
	20	5	7	10	14	18	23	28	34	40	47	54	63	71	80	90	100	111
	25	6	9	13	17	22	28	35	42	50	59	68	78	89	100	113	125	139
Number of threads to be worked in the tapers - - -	18	4	6	9	12	16	20	25	30	36	42	49	56	64	72	81	90	100
	20	4	7	11	13	17	22	27	33	40	46	54	62	71	80	90	100	111
	25	5	8	12	17	22	28	34	42	50	58	68	78	88	100	112	125	138

Fathoms demanded.	Lengths of Yarn in Shank or whole Parts.	Lengths of Yarn in the Head to the firſt Taper.	Lengths of Yarn to Taper.		Diſtance between the Tapers.																		
	fms. ft.	fms. ft. in.	fms. ft. in.		ft. in.																		
5	7 3	3 4 6	3 4 6	18	5 $7\frac{1}{2}$	3 9	2 6	1 $10\frac{1}{2}$	1 $4\frac{7}{8}$	1 $1\frac{5}{10}$	0 $10\frac{20}{25}$	0 $8\frac{1}{3}$	0 $7\frac{1}{2}$	0 $6\frac{3}{7}$	0 $5\frac{25}{37}$	0 $4\frac{23}{28}$	0 $4\frac{7}{32}$	0 $3\frac{3}{4}$	0 $3\frac{27}{61}$	0 3	0 $2\frac{15}{50}$
10	15 0	7 3 0	7 3 0		11 3	7 6	5 0	3 9	2 $9\frac{6}{8}$	2 3	1 $9\frac{15}{25}$	1 $4\frac{2}{3}$	1 3	1 $0\frac{1}{2}$	0 $11\frac{1}{37}$	0 $9\frac{13}{28}$	0 $8\frac{11}{32}$	0 $7\frac{1}{2}$	0 $6\frac{4}{7}$	0 6	0 $5\frac{7}{50}$
15	22 3	11 1 6	11 1 6		16 $10\frac{1}{2}$	11 3	7 6	5 $7\frac{1}{2}$	4 $2\frac{1}{8}$	3 $4\frac{5}{10}$	2 $8\frac{15}{25}$	2 1	1 $10\frac{1}{2}$	1 $7\frac{2}{7}$	1 $4\frac{5}{37}$	1 $2\frac{1}{28}$	1 $0\frac{27}{32}$	0 $11\frac{1}{4}$	0 10	0 9	0 $8\frac{1}{50}$
20	30 0	15 0 0	15 0 0		22 6	15 0	10 0	7 6	5 $7\frac{3}{8}$	4 6	3 $7\frac{5}{25}$	2 $9\frac{1}{3}$	2 6	2 $1\frac{5}{7}$	1 $10\frac{2}{37}$	1 $7\frac{8}{28}$	1 $4\frac{28}{32}$	1 3	1 $1\frac{27}{61}$	1 0	0 $10\frac{41}{50}$
5	7 3	3 4 6	3 4 6	20	5 $7\frac{1}{2}$	3 $2\frac{1}{2}$	2 3	1 $8\frac{10}{11}$	1 $3\frac{15}{17}$	1 $0\frac{3}{11}$	0 10	0 $8\frac{2}{11}$	0 $6\frac{15}{20}$	0 $5\frac{20}{23}$	0 5	0 $4\frac{11}{17}$	0 $3\frac{17}{37}$	0 $3\frac{15}{40}$	0 3	0 $2\frac{15}{50}$	0 $2\frac{15}{37}$
10	15 0	7 3 0	7 3 0		11 3	6 $5\frac{1}{2}$	4 6	3 $5\frac{7}{13}$	2 $7\frac{17}{17}$	2 $0\frac{6}{11}$	1 8	1 $4\frac{4}{11}$	1 $1\frac{10}{23}$	0 $11\frac{17}{23}$	0 10	0 $8\frac{22}{37}$	0 $7\frac{11}{37}$	0 6	0 5	0 6	0 $4\frac{2}{37}$
15	22 3	11 1 6	11 1 6		16 $10\frac{1}{2}$	9 7	6 9	5 $2\frac{4}{13}$	3 $11\frac{11}{17}$	3 $0\frac{6}{11}$	2 6	2 $0\frac{6}{11}$	1 $7\frac{5}{23}$	1 $5\frac{14}{23}$	1 3	1 $1\frac{4}{31}$	0 $11\frac{5}{37}$	0 $10\frac{1}{40}$	0 9	0 $8\frac{1}{50}$	0 $7\frac{11}{37}$
20	30 0	15 0 0	15 0 0		22 6	12 $10\frac{2}{7}$	9 0	6 $11\frac{1}{13}$	5 $3\frac{9}{17}$	4 $1\frac{1}{11}$	3 4	2 $8\frac{8}{11}$	2 2	1 $11\frac{11}{23}$	1 8	1 $5\frac{11}{31}$	1 $3\frac{15}{37}$	1 $1\frac{29}{40}$	1 0	0 $10\frac{49}{50}$	0 $9\frac{22}{37}$
5	7 3	3 4 6	3 4 6	25	4 6	2 $9\frac{1}{3}$	1 $10\frac{1}{2}$	1 $3\frac{15}{17}$	1 $0\frac{3}{11}$	0 $9\frac{2}{13}$	0 $7\frac{15}{17}$	0 $6\frac{3}{7}$	0 $5\frac{10}{41}$	0 $4\frac{17}{27}$	0 $3\frac{11}{13}$	0 $3\frac{5}{13}$	0 $3\frac{5}{13}$	0 $2\frac{1}{35}$	0 $2\frac{21}{35}$	0 $1\frac{33}{37}$
10	15 0	7 3 0	7 3 0		9 0	5 $7\frac{1}{2}$	3 9	2 $7\frac{11}{17}$	2 $0\frac{6}{11}$	1 $7\frac{1}{13}$	1 $3\frac{15}{17}$	1 $0\frac{2}{7}$	0 $10\frac{1}{41}$	0 $9\frac{6}{27}$	0 $7\frac{12}{13}$	0 $6\frac{2}{13}$	0 $6\frac{4}{13}$	0 $5\frac{40}{35}$	0 $4\frac{35}{35}$	0 $4\frac{1}{35}$	0 $3\frac{31}{37}$
15	22 3	11 1 6	11 1 6		13 6	8 $5\frac{1}{2}$	5 $7\frac{1}{2}$	3 $11\frac{11}{17}$	3 $0\frac{6}{11}$	2 $4\frac{11}{13}$	1 $11\frac{11}{17}$	1 $7\frac{2}{7}$	1 $4\frac{1}{27}$	1 $1\frac{5}{27}$	0 $11\frac{1}{13}$	0 $10\frac{1}{17}$	0 $9\frac{4}{13}$	0 $8\frac{5}{13}$	0 $7\frac{19}{35}$	0 $6\frac{29}{35}$	0 $5\frac{29}{35}$
20	30 0	15 0 0	15 0 0		18 0	11 3	7 6	5 $3\frac{1}{17}$	4 $1\frac{1}{11}$	3 $2\frac{8}{13}$	2 $7\frac{11}{17}$	2 $1\frac{2}{7}$	1 $9\frac{15}{27}$	1 $6\frac{15}{27}$	1 $3\frac{2}{13}$	1 $1\frac{11}{17}$	1 $0\frac{12}{43}$	0 $10\frac{19}{35}$	0 $9\frac{6}{35}$	0 $8\frac{1}{35}$	0 $7\frac{17}{35}$

Suppoſe you want to make a rope either cable or hawſer-laid, to be tapered one-third the length, and one-third the ſize; you muſt refer to Table V. or XIV. for making taper-cable, or hawſer-laid cordage, two-thirds the length and two-thirds the ſize, which you muſt work almoſt wholly the reverſe way, by working the number of threads there mentioned to be worked in the tapers in the ſhank, and the number of threads in the ſhank muſt be worked in the tapers: the length of yarn there mentioned to be tapered muſt be the length in the head to the firſt taper, and the length there mentioned in the head muſt be the length of the yarn to be tapered: the length of yarn requeſted to be warped for the ſhank will be the ſame as there mentioned, and the diſtance between the tapers will, in almoſt all caſes, be the ſame as there nominated; but if at any time there ſhould be a difference, and you are at a loſs to find the diſtance between the tapers you muſt divide the length of yarn to be tapered by the number of threads you have to taper, and that will give the exact diſtance between them.

TABLE XVI.

Shewing the Number of Threads to work *per* Hook for four-ſtrand hawſer-laid Cordage, from 2 to 12 Inches in Circumference, of the Sizes of Yarn as undermentioned: the Ropes to be laid without Hearts, the Yarns compriſing which being equally divided in the Strands.

No. of Threads here mentioned to weigh 99 to 100lb.	16	17	18	19	20	21	22	23	24	25
Size in Inches.	Threads *per* Hook.									
2	5	6	6	6	7	7	7	8	8	8
4	22	23	24	25	26	27	29	30	32	33
6	48	51	54	57	60	63	66	69	72	75
8	84	90	96	101	107	112	117	122	128	133
10	133	142	150	158	167	175	183	192	200	208
12	192	204	216	228	240	252	264	276	288	300

TABLE XVII.

Shewing the Length of Yarn requeſted to be warped for the undermentioned Lengths of four-ſtrand hawſer-laid Cordage, with the Hardening Mark prefixed againſt each reſpective Length.

Fathoms demanded.	Length of Yarn required.			Hardening Mark.		
	fms.	ft.	in.	fms.	ft.	in.
10	15	2	6	12	2	0
20	30	5	0	24	4	0
40	61	4	0	49	2	0
60	92	3	0	74	0	0
80	123	2	0	98	4	0
100	154	1	0	123	2	0
120	185	0	0	148	0	0
130	200	2	6	160	2	0

Remarks.—It is very ſeldom that hawſer-laid cordage is compoſed of more than four ſtrands, but for the ſake of experiment, or otherwiſe, it might be demanded to contain a greater number: as ſuch, the following rule, carefully attended to, will inform our readers how to lay a hawſer-laid rope in as many ſtrands as may be conſidered expedient.

Suppoſe you want a five-ſtrand hawſer-laid rope, you muſt ſquare the ſize of the rope propoſed to be made; that product multiply by the ſize yarn you propoſe making your rope from; the product of which, divided by 15, will give the number of threads to work *per* hook for a five-ſtrand hawſer-laid rope. If you want to make a ſix-ſtrand hawſer-laid-rope, you muſt proceed as above, and divide by 18; if a ſeven-ſtrand, divide by 21; if an eight-ſtrand, by 24; and ſo on, adding 3 to your diviſor for every ſtrand you mean to increaſe in the rope.

The ſhrinking proportion in making four-ſtrand hawſer-laid cordage, in the firſt proceſs, is exactly the ſame as in three-ſtrand; the only difference is in cloſing the rope, which, being compoſed of four ſtrands, occaſions the rope to lay more round and cloſe than in three-ſtrand cordage, which makes the ſhrinkage be in a much greater proportion. The rope, in cloſing, will ſhorten $\frac{3}{16}$th parts of the remaining length of yarn, after the rope is hard, inſtead of $\frac{1}{6}$th, as in three-ſtrand hawſer-laid cordage.

The weight of each coil of four-ſtrand hawſer-laid cordage may be nearly aſcertained, by referring to the table of the weight of three-ſtrand (Table XII.), there being as near the number of threads in each ſize rope as can poſſibly be laid, for each ſtrand to have an equal number. But it ſhould be remembered, that a coil of four-ſtrand hawſer-laid rope, made out of 200 fathoms of yarn, will be only 130 fathoms long, inſtead of 133.2, as in three-ſtrand hawſer-laid cordage.

Table XVIII.

Shewing the ſhrinking Proportions of the Yarn, in making the undermentioned Lengths of Bolt-Rope; alſo its Weight (untarred), from 1 to 8 Inches in Circumference.

	Length in Fathoms of Rope demanded.	Length of Yarn required in Fathoms.	The Sledge ſhould move to the following Marks from the Tackle-Poſt, and is called the Rope's Hardening-Mark.	1-Inch.	2-Inch.	3-Inch.	4-Inch.	5-Inch.	6-Inch.	7-Inch.	8-Inch.
				Weight.	Weight.	Weight.	Weight.	Weight.	Weight.	Weight.	Weight.
			Fms. feet.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.	C. qr. lb. oz.
	10	14	11 4	0 0 2 8¼	0 0 7 11	0 0 16 12¾	0 1 1 5¾	0 1 18 2½	0 2 11 2	0 3 6 10	1 0 7 2½
	20	28	23 2	0 0 5 0½	0 0 15 6	0 1 5 9¾	0 2 2 11½	0 3 8 5	1 0 22 4	1 2 13 4	2 0 14 5
	40	56	46 4	0 0 10 1	0 1 2 12	0 2 11 1½	1 0 5 7	1 2 16 10	2 1 16 8	3 0 26 8	4 1 0 10
	60	84	70 0	0 0 15 1½	0 1 18 2	0 3 16 10	1 2 8 2½	2 1 24 15	3 2 10 12	4 3 11 12	6 1 14 5
	80	112	93 2	0 0 20 2	0 2 5 8	1 0 22 3	2 0 10 14	3 1 5 4	4 3 5 0	6 1 25 0	8 2 1 4
	100	140	116 4	0 0 25 2½	0 2 20 14	1 1 27 11½	2 2 13 9½	4 0 13 9	5 3 27 4	8 0 10 4	10 2 15 9
	120	168	140 0	0 1 2 3	0 3 8 4	1 3 5 4	3 0 16 5	4 3 21 14	7 0 21 8	9 2 23 8	12 3 1 14
Coil	143	200	166 4	0 1 8 0	0 3 26 0	2 0 16 0	3 3 0 0	5 3 16 0	8 2 8 0	11 2 8 0	15 0 24 0

Remarks.—In hardening the ſtrands, the yarn will ſhrink one-ſixth part of the whole length, which is called the rope's hardening mark.

In laying the rope, the ſtrands will ſhrink one-ſeventh part of the remaining diſtance, which brings the rope to the length required.

N. B. Bolt-rope is uſually made of 20 or 25-thread yarn, and generally delivered from the rope-maker white; the proceſs of tarring it being uſually performed by the ſail-maker, and is called ſtoving it, it being done in a ſtove or oven calculated for the purpoſe. In laying up your work, you muſt work with the ſame number of threads as in common hawſer-laid cordage. Bolt-rope, for exportation, is ſometimes lightly tarred; in which caſe, in calculating the weight, you muſt add one-ſixth to the weights hereunto annexed.

Table XIX.

Shewing the Number of Threads to work *per* Hook for three-ſtrand hawſer-laid white Cordage, from 1 to 12 Inches in Circumference, of the undermentioned Sizes of Yarn, with the Weight of each Rope prefixed.

No. of Threads here mentioned to weigh 88 lbs.	16	17	18	19	20	21	22	23	24	25	Weight of each Rope 133.2 Fathoms long.
Size in Inches.	Threads *per* Hook.										C. qr. lb.
1	3	3	3	3	3	3	3	4	4	4	0 1 12
2	8	8	9	9	10	10	10	11	12	12	1 0 8
3	18	19	20	21	22	23	24	25	26	27	2 1 12
4	32	33	35	37	39	41	42	44	46	48	4 0 20
6	72	76	80	84	88	92	96	100	104	108	9 1 20
8	128	135	142	149	156	163	170	177	185	192	16 2 24
10	200	211	222	233	244	255	266	277	289	300	26 0 16
12	288	304	320	336	352	368	384	400	416	432	37 2 24

N. B. Eſpecial care ſhould be taken relative to making white cordage for tackle-falls, crane-ropes, &c. that the hemp be of the very beſt quality; and that the ſame be topped, *viz.* all the ſhort hemp taken out by the hatcheller; and that the ſpinner do ſpin his yarn for the ſame exceeding ſmart and even, by no means lighter than the weight ſpecified under the article *ſpinning the yarn:* if he does, his rope will not anſwer the ſize required to be made.

TABLE XX.

Shewing the Number of Threads to work *per* Hook for four-ſtrand hawſer-laid white Cordage, without Hearts, from 2 to 12 Inches in Circumference, of the Sizes of Yarn as undermentioned.

No. of Threads here mentioned to weigh 88 lbs.	16	17	18	19	20	21	22	23	24	25
Size in Inches.	Threads *per* Hook.									
2	6	6	7	7	7	8	8	8	9	9
3	13	14	15	15	16	17	18	19	19	20
4	24	25	26	27	29	30	32	33	35	36
5	37	39	41	43	45	47	49	51	54	56
6	54	57	60	63	66	69	72	75	78	81
8	96	101	107	112	117	122	128	133	139	144
10	150	158	167	175	183	192	200	208	217	225
12	216	228	240	252	264	276	288	300	312	324

N. B. The weight of the above ropes may be found by conſulting Table XVII. for three-ſtrand hawſer-laid white cordage; the number of threads in each rope of a ſize being of an equal number, as near as poſſible.

Cordage made by Contract for the Uſe of His Majeſty's Navy.—The under-mentioned ſhews the number of threads to work *per* hook; the loweſt weight, allowance in weight, bandage, and higheſt weight; the cordage is to be received and allowed for by the receiving officers of his majeſty's reſpective dock-yards, under the honourable commiſſioners of his majeſty's navy, to rope-makers who have made cordage (upon the uſual principle) by contract, in coils, hawſers, cablets, and cables, with the length of yarn to be warped for the ſame, and length of cordage when made, as ordered by the honourable navy-board.

N. B. The higheſt weight a hawl of yarn for each ſort of cordage ſhould weigh (and by no means more,) is here noted.

TABLE XXI. Cablets.

Size.	Threads *per* Hook.	Loweſt Weight.			Allowance in Weight.			Bandage.			Higheſt Weight.		
		C.	qr.	lb.	C.	qr.	lb.	C.	qr.	lb.	C.	qr.	lb.
2	3	1	1	4	0	0	4	0	0	4	1	1	12
2½	4	1	3	0	0	0	5	0	0	5	1	3	10
3	6	2	2	1	0	0	7	0	0	8	2	2	16
3½	8	3	1	2	0	0	10	0	0	11	3	1	23
4	10	4	0	18	0	0	12	0	0	13	4	1	15
4½	12	5	0	23	0	0	15	0	0	16	5	1	26
5	15	6	2	1	0	0	18	0	0	20	6	3	11
5½	18	7	3	7	0	0	22	0	0	24	8	0	25
6	21	9	0	12	0	0	26	0	1	0	9	2	10
6½	24	10	1	19	0	1	1	0	1	4	10	3	24
7	28	12	0	18	0	1	6	0	1	9	12	3	5
7½	32	13	3	16	0	1	11	0	1	14	14	2	13
8	37	16	0	6	0	1	17	0	1	21	16	3	16
8½	42	18	0	27	0	1	23	0	2	0	19	0	22
9	47	20	1	17	0	2	1	0	2	7	21	1	25
9½	52	22	2	9	0	2	7	0	2	13	23	3	1

It is to be obſerved, that the above ſizes in Tab. XX., viz. 2 to 9½ inches, are termed, in the navy contracts, cablets, the yarn for which ſhould be warped 200 fathoms long, and the cablets, when complete, to be 120 fathoms. A hawl of yarn containing 336 threads, ſhould weigh from 16 cwt. 0 qr. 8 lb. to 16 cwt. 1 qr. 25 lb., and no more, allowing one-ſixth part of ſuch weight for tar, which is the allowance made by the honourable navy-board, and no more.

TABLE XXII. Cables.

Size.	Threads *per* Hook.	Loweſt Weight.			Allowance in Weight.			Higheſt Weight.		
		C.	qr.	lb.	C.	qr.	lb.	C.	qr.	lb.
10	58	21	0	23	0	2	3	21	2	26
10½	64	23	1	17	0	2	9	23	3	26
11	70	25	2	10	0	2	15	26	0	25
11½	76	27	3	4	0	2	22	28	1	26
12	83	30	1	10	0	3	1	31	0	11
12½	90	32	3	17	0	3	8	33	2	25
13	98	35	3	9	0	3	16	36	2	25
13½	106	38	3	1	0	3	25	39	2	26
14	114	41	2	20	1	0	5	42	2	25
14½	122	44	2	12	1	0	12	45	2	24
15	130	47	2	3	1	0	21	48	2	24
15½	139	50	3	7	1	1	2	52	0	9
16	148	54	0	13	1	1	11	55	1	24
16½	157	57	1	16	1	1	20	58	3	8

Cablets from 4 to 9½ inches will not be rejected, if they are half an inch in girt above the dimenſions ordered.

The yarn for the above cables (Tab. XXII.) are warped 166 fms. 4 ft. long, and the cables, when complete, to be 100 fathoms long. A hawl of yarn containing 336 threads, 166 fms. 4 ft. long, ſhould weigh from 13 cwt. 2 qr. 6 lb. to 13 cwt. 3 qr. 16 lb., and no more, tarred with the ſame proportion of tar as the yarn for the cablets before-mentioned.

Cables

Cables 10 inches and upwards, are allowed three-fourths of an inch in girt more than the dimenſions given.

In proportions of cordage wherein the cables contained in them do not exceed 13½ inches in circumference, a proportion of 1½ cwt. of ſpun-yarn is allowed to be ſent to every ton of cordage; but if the cables are 14 inches in circumference and upwards, then 3 cwt. for every ton is allowed, in order to work up the toppings (or hemp) which ſhould be taken out of the hemp agreeable to contract, previous to its being ſpun into cable-yarn (in particular), as it frequently happens that the great number of lives of ſome of his majeſty's moſt valuable ſubjects are at ſtake upon the dependance of a ſingle cable.

The cables made in the uſual mode, by contract, have of late never exceeded 16½ inches in circumference, (Tab. XXII. extends no further): for all the higher ſizes are made by patent machines, by which much manual labour is ſpared, and the yarns and ſtrands laid much cloſer and more even, and bear the ſtrain more equally.

Size.	Threads *per* Hook.	Loweſt Weight.			Allowance in Weight.			Bandage.			Higheſt Weight.		
		C.	qr.	lb.	C.	qr.	lb.	C.	qr.	lb.	C.	qr.	lb.
¾	2	0	1	4	0	0	1	0	0	1	0	1	6
1	3	0	1	20	0	0	1	0	0	1	0	1	22
1½	6	0	3	13	0	0	2	0	0	2	0	3	17
2	9	1	1	6	0	0	4	0	0	4	1	1	14
2½	14	2	0	5	0	0	6	0	0	6	2	0	17
3	20	2	3	20	0	0	8	0	0	9	3	0	9
3½	26	3	3	7	0	0	11	0	0	11	4	0	1
4	35	5	0	14	0	0	14	0	0	16	5	1	16
4½	44	6	1	22	0	0	18	0	0	20	6	3	4
5	54	7	3	19	0	0	22	0	0	24	8	1	9
5½	65	9	2	2	0	0	27	0	1	1	10	0	2
6	77	11	1	3	0	1	4	0	1	7	11	3	14
6½	91	13	1	11	0	1	9	0	1	13	14	0	5

The ſizes of cordage hereunto annexed, from ¾ to 3½ inches in circumference, are termed, in the navy, contract coils; all above, *viz.* 4 to 6½ inch, are called hawſers. The yarn for both coils and hawſers ſhould be warped 195 fathoms long, and the ropes, when completed, are to be 130 fathoms long. A hawl of yarn, conſiſting of 336 threads, 195 fathoms long, ſhould weigh from 16 cwt. 1 qr. 7 lb. to 16 cwt. 2 qr. 24 lb. and no more, tarred in the ſame proportion as cablets and cables.

All cordage delivered into his majeſty's dock-yards undergo a trial, which is, by proving one ſtrand out of each rope, each thread (or yarn) of which having a weight, weighing one-third of an cwt. made faſt to it, which it ſhould lift; but if a certain number of yarns (according to the ſize of each rope) ſhould break in the trial, the rope is rejected, otherwiſe it is received.

Particular attention ſhould be paid not to ſend any kind of cordage into his majeſty's dock-yards above its higheſt weight, allowed according to contract, as, in ſuch caſe, all above that weight will be a loſs to the manufacturer; the receiving officer not being authoriſed to allow any more than is ſpecified in the contract.

N. B. It is to be obſerved, that, in making cordage by contract for the uſe of his majeſty's navy, his majeſty finds his own hemp, the contractor tar and labour at a certain price *per* ton. All cables and cordage to be tarred with good Stockholm tar, without mixture of any other, except about one-third part, which may be of Ruſſia tar.

A white thread, twiſted the contrary way, (ſometimes called the rogue's yarn,) is to be laid in all the ſtrands of the cables and large cordage; and a twine in the ſmall cordage for the king's mark, ſo as to be ſeen on the outſide of the ſtrands.

In any of the ſtrands, there is to be no greater number of threads at the ends of the cables or cordage than in the middle.

The only parliamentary regulations, relative to the manufacture of cordage, are contained in the following act; "An act for more effectually preventing deceits in the manufacturing of cordage for ſhipping; and to prevent the illicit importation of foreign-made cordage." 25 Geo. III. c. 56.

In July 1799, a patent was granted to W. Chapman and E. W. Chapman, of Newcaſtle-upon-Tyne, for their improved method of making cords and ropes, twined and untwined, from the ſpinning of the yarn incluſive, to the finiſhing of the rope or cordage. This invention appears, by the ſpecification, to include material improvements in the ſpinning of rope-yarn, and in the manufacturing of cordage. Rope-yarns are at preſent ſpun by men, at an expence of from half a crown to five ſhillings *per* day, according to the ſituation of the place, whether in the out-ports, or on the river Thames. Or it is wholly ſpun by machinery.

In the practice of the firſt method rope-walks are neceſſary, and the fibres of the hemp are drawn into the yarn of different lengths proportionate in a given degree to their poſition in the outſide or inſide of the yarn; accordingly, when this yarn is ſtrained, and its diameter collapſes, the inſide fibres of hemp bear the greateſt ſtrain, and thus they break progreſſively from the inſide.

In the ſpinning by a mill the fibres are all brought forward in a poſition parallel to each other, previouſly to their receiving their twiſt. They are conſequently all of one length; and, when twiſted, the outſide fibres are moſt ſhortened by forming the ſame number of ſpirals round a greater axis than the interior, and thus they muſt conſequently break the firſt, on the ſame principle that the outſide yarns of ſtrands of ropes manufactured in the old method break before the interior yarns; and, conſequently, with leſs ſtrain than ropes of the improved principle, where the ſtrands, (or immediate component parts of the rope) have been formed in ſuch a manner as that all the yarns ſhall bear equally at the time of the rope's breaking.

Nevertheleſs, yarns ſpun by a mill have been found ſtronger than common yarns, on account of the great evenneſs with which they are ſpun; the manual labour in manufacturing is much leſs than in the common method: but, on the other hand, there is the expence of machinery, and the greater waſte of hemp in preparing it for being drawn out in the progreſſive ſtages of its advance to the ſpindle.

The method invented by Meſſrs. Chapman differs from both the preceding, in having, by an eaſy and ſimple contrivance, the fibres of the hemp laid in the yarn in ſuch a manner as the yarns themſelves are laid in the ſtrands of the rope manufactured on the new principle.

Their machinery conſiſts only of a ſpindle, divided into two parts, the upper containing apparatus to draw forward the hemp from the ſpinner with twiſt ſufficient to combine the fibres; which enables them to employ women, children, and invalids, and alſo to appropriate the rope-ground ſolely to the purpoſe of laying ropes.

The part we have deſcribed is only an improvement on the

the methods of ſpinning, granted to Mr. William Chapman on the 8th day of November, 1798.

The remaining parts of their invention conſiſt chiefly in the giving, from a ſtationary power, internal motion to a locomotive machine, *viz.* to the roper's ſledge, on which the ſtrands and the rope itſelf are twiſted, by which contrivance they are enabled to apply a water-wheel, or ſteam-engine, to the whole proceſs of making ropes of all kinds whatever.

Mr. Joſeph Huddart of Iſlington obtained a patent in Auguſt of the ſame year for an improved method of regiſtering or forming the ſtrands in the machinery for the manufacture of cordage. Having previouſly taken out a patent for this purpoſe, he contrived to effect it by the following means:

1. By keeping the yarns ſeparate from each other, and drawing them from bobbins, which revolve, to keep up the twiſt whilſt the ſtrand is forming.

2. By paſſing them through a regiſter, which divides them by circular ſhells of holes; the number in each ſhell being agreeable to the diſtance from the centre of the ſtrand, and the angle which the yarns make with a line parallel to it, and which gives them a proper poſition to enter.

3. A cylindrical tube, which compreſſes the ſtrand, and maintains a cylindrical figure to its ſurface.

4. A gauge to determine the angle which the yarns in the outſide ſhell make with a line parallel to the centre of the ſtrand when regiſtering; and, according to the angle made by the yarns in this ſhell, the length of all the yarns in the ſtrand will be determined.

5. By hardening up the ſtrand, and thereby increaſing the angle in the outſide ſhell, which compenſates for the ſtretching of the yarns, and the compreſſion of the ſtrand.

The patent which Mr. Huddart took out in Auguſt relates to the invention of a machine that may be worked by men, or any other power, and by means of which the regiſtering may be commodiouſly and effectually carried on. But figures are neceſſary for deſcribing intelligibly his peculiar contrivance. Mr. Huddart, in the following year, took out a patent for improvements in the method of turning cordage in the manufacture of it. But our limits forbid our enlarging on this article. The ſpecifications of the patents for regiſtering, as well as faſtening, may be conſulted by thoſe who are concerned in this manufacture.

Rope *Walk*, or *Rope-houſe Ground*, is the place where ropes are manufactured. This ſhould be 400 yards long, and about 10 broad. At the upper end are fixed the ſpinning-wheels, over which is the hatchelling-loft, alſo the back-frame wheels, tackle-boards, and poſts, winches for winding the yarn on as it is ſpun, and reels on which to reel the ropes. On each ſide are ſtake-poſts; in the middle is fixed the warping-poſt, and at the lower end, the capſtern and reaching-poſt. Back-frame wheels for ſmall, and ſledges and drags for large ropes, are uſed towards the lower end; the back-frame wheel, for laying cordage from a ſix-thread ratline to a two-inch rope, is about four or five feet in diameter, and is hung between two uprights, fixed by tenons on a truck, and ſupported by a knee of wood. Over its top is a ſemicircular frame, called the head, to contain three whirls (that turns on the braſſes) with iron ſpindles, ſecured by a haſp and pin. They are worked by means of a leather band encircling the whirls and the wheel. Three of the whirls are turned when hardening the ſtrands, and one only when cloſing the rope, the ſtrands being hung together upon it. The truck, on which the back-frame wheel is fixed, runs on four wheels, and is made of three-inch oak plank, about nine feet long and thirteen inches broad at one end, and eleven inches broad at the other. The capſtern, about eight feet high, and fourteen inches in diameter, is turned either by men or horſes; its uſe is to draw the yarn, when tarring, out of the copper, through the nipper, to be coiled away in the yarn-houſe, and there properly hardened before it is uſed; otherwiſe it will kink, *i. e.* twiſt or curl, by being twiſted too hard in cloſing. Another capſtern, or crab, is fixed at the lower end of the walk, for ſtretching the yarn to its fulleſt extent, before it is worked into ſtrands, by means of the tackle-fall, led from the *ſledge* to the capſtern; theſe being about eighteen yards diſtant from each other. The crank-wheel, which is uſed for ſpinning of lines, box-cord, &c. is fixed on an iron ſpindle or axis, with a handle by which to turn it. It hangs between two poſts, and in its upper part, above the wheel, is let in a ſemicircular board to receive three ſets of whirl-bolts, with wheels upon them, on which the ſpinners hang their threads: at the front ſide of the wheel is a ſhort poſt, ſupported by a knee of oak, on which the ſpindle reſts. The *drags* reſemble the hinder part of the ſledge, to which they are faſtened by ropes, and they are lined with a board on the upper ſide: their weight ſerves as a preſs, when the rope requires more than the ſledge can carry properly to ſtretch the ſtrands, and prevent their kinking. The *hatchel* ſerves to clear the ends of the hemp, by drawing it through, having forty ſharp-pointed iron-teeth, ſimilar to the hatchel in the *clearer*, which has finer teeth. Iron-jacks are ſometimes uſed inſtead of the table-wheel or back-frame wheel, and differ from the latter by having an iron-wheel with cogs, which work in the whirls, that have likewiſe iron-cogs. The *loper*, which is uſed to lay lines, has two iron ſwivel-hooks (running round in a braſs or iron box) at each end, for the line to hang on and work, by the power of the fore-turn, from the wheel at the upper end. The *nipper* is formed of two ſteel-plates, with a ſemi-oval hole in each, which, by the motion of the upper plate, enlarges or contracts as the tarring of the yarn requires. It is thus fixed: a poſt is placed between the kettle and the capſtern, with a mortiſe cut eighteen inches long from the kettle's ſurface, and five inches wide. The under plate is turned up on each ſide, to form two grooves, and is let into the front ſide of the poſt from the lower part of the mortiſe. The upper plate has a dove-tail on the back, that ſlides up and down in a groove into the grooves of the lower plate; and by a ſtaff, made faſt to its front, it is raiſed or lowered, and regulated by a weight ſuſpended at the other end, ſo that the yarn receives no more tar than is required, and that which is ſqueezed out drops into a trough, and returns into the kettle. *Preſs-barrels* are old tar-barrels filled with clay, and laid on the ſledge or drag to add weight when the rope is cloſing. The *reaching-poſt* is a poſt in the ground at the lower end of the walk; uſed in ſtretching the yarn by means of a tackle, one of the blocks of which is hooked to a ſtrap round the poſt, the other block to a pendant at the ſledge, being about eighteen yards diſtant from each other. *Sledges* are frames made of ſtrong oak, clamped with iron in different parts; the two ſides are the length of the ſledge, made of oak, and tied in with oak bars at each end; near the front are two uprights, let into the ſides, and ſupported by two ſlanting pieces from the upper end. A breaſt-board is faſtened with iron pins to the uprights, and contains holes for the hooks to paſs through, on which the hooks are hung; which, being turned by men, is twiſted into rope, and ſo cloſed or finiſhed. Theſe ſledges are loaded as the occaſion of making the rope requires. The *ſpinning-wheel* is hung between two poſts fixed

fixed in the ground; over its top is a ſemicircular frame, called the head, which contains twelve whirls, if it be for twelve ſpinners to ſpin at the ſame time; theſe whirls turn on iron ſpindles, with hooks to their front ends to hang the hemp on, and are worked by means of a leather band encircling the wheels and whirls. The tools and terms appropriate to rope-making are deſcribed in their proper places.

Rope-*Yarn*, the yarn of any rope untwiſted. It commonly conſiſts of cable-ends which are worn out; and are called *junks of the cables*. It ſerves for many purpoſes among the ſailors.

Rope-yarn properly denotes the ſmalleſt and ſimpleſt part of any rope, being one of the threads of which a ſtrand is compoſed; ſo that the ſize of the latter, and of the rope into which it is twiſted, are determined by the number of rope-yarns.

Ropes, *Standing*, in a *Ship*, the ſhrouds and ſtays are ſo called, becauſe they are not removed, unleſs to be eaſed or ſet taught. See Shrouds, and Stays.

Ropes, *Staple*, ropes made of hemp, not inferior to clean Peterſburgh.

Rope-*Bands*, braided cordage, uſed to faſten the heads of ſails to their reſpective yards. See Robbins.

Rope-*Deck*. See Deck.

Rope, in *Agriculture*, a thick ſort of cord formed of hemp, or other material; much uſed by farmers. See Cordage.

A very uſeful ſort of rope for traces, and other ſimilar purpoſes, has lately been formed of the coarſe wool of ſheep.

Rope, *Cart*, that ſort of rope uſed in loading hay, ſtraw, or other bulky loads, by the farmer. Theſe ropes ſhould always be ſtrong, and formed of the beſt materials, whatever the nature of them may be.

Rope is alſo a word ſignifying to tedder, as a horſe, or other animal. It is a very injudicious practice, and one which ſhould by no means be generally followed by farmers.

Rope, *Cord*, or *Strap*, in the *Manege*, is any of theſe tied round a pillar, to which the horſe is faſtened, when they begin to quicken, and ſupple, to teach him to fly from the chambrier, and not gallop faſtly or incompactly.

In thoſe maneges where there is no pillar, a man ſtands in the centre of the ground, and holds the end of the rope.

Ropes, *Drag*, in the *Artillery*, are thoſe by which the ſoldiers pull the guns backwards and forwards both in their exerciſe, and in an engagement. They are of various lengths and dimenſions, as they are uſed for guns or howitzers of different weights.

Ropes, *Foot*. See Foot-*Ropes*.

Ropes *of two Pillars*, are the ropes or reins of a caveſon, uſed to a horſe that works between two pillars. See Pillar.

Rope-*Dancer*. See Dancer, and Nuſance.

Rope *of Sand*, a phraſe familiarly uſed to denote diſunion, or want of adheſion and continuity. In this ſenſe it is applicable to a variety of caſes, and in military language to the diſagreement that ſubſiſts between the colonel and the captains of a regiment.

Rope *Machine for raiſing Water*, in *Hydraulics*.—If a vertical grooved wheel, fixed in a frame, be ſituated within the water at the bottom of a well, and another ſimilar wheel, having a handle affixed to its axis, be ſituated in another frame at the upper part of the well; alſo an endleſs rope (*viz.* a rope whoſe two extremities are ſpliced into each other) be paſſed round both wheels; then, on turning the handle, the wheels and the rope will be cauſed to move, *viz.* the rope will aſcend on one ſide, and will deſcend on the other, paſſing ſucceſſively through the water of the well; but the aſcending part will carry up a quantity of water adhering to its ſurface; and this water differs in quantity, according to the ſize of the rope, the depth of the well, and the quickneſs of the motion; *viz.* with a larger rope, in a leſs deep well and quickeſt motion, a greater quantity of water will be raiſed, than otherwiſe.

In order to intercept the water at the top of the well, the upper wheel is incloſed in a pretty large box, in the bottom of which there are two holes, through which the aſcending and deſcending parts of the rope paſs. To theſe holes are affixed two ſhort tubes, which prevent the exit of the water which falls to the bottom of the box. There is alſo a lateral ſpout on the ſide of the box, cloſe to the bottom, for the water to come out of; and on the broad ſides of the box there are two holes for the axis of the wheel. The 9th and 10th figures of *Plate* XIV. *Hydraulics*, exhibit a ſection and a front view of a machine of this ſort, which was put up in the year 1782, on the caſtle hill at Windſor, where the depth of the well is 95 feet. A ſimilar machine was alſo placed on the round tower of Windſor caſtle, which draws the water from the depth of 178 feet.

The ſame letters refer to the like parts in both figures.

The wheel, H, at the bottom of the well is of lignum vitæ, one foot in diameter. Its axis is of ſteel, and turns with its extremities in ſockets of bell-metal.

The frame, I I, is of iron.

The wheel, E E, at the top of the well is of iron; but its rim, with the groove which receives the rope, are of lead. The diameter of this wheel is three feet.

The axis, *d d*, is of ſteel, and its extremities turn in bell-metal ſockets, which are fixed in two upright poſts, A, A, that ſupport the machine. T is the handle affixed to the axis, which handle deſcribes a circle of 28 inches in diameter; *b b* is the wooden box, lined with lead, which incloſes the wheel E. F, F, are the holes at the bottom of the box through which the rope paſſes. Their diameter is about two inches.

On the ſame axis, *d d*, another wheel, C C, of about four feet in diameter, is fixed. This wheel is of wood, loaded on the edge with lead, and it ſerves as a fly to facilitate the motion.

The rope is of horſe-hair, and meaſures half an inch in diameter.

With this identical machine, ſeveral experiments were tried, the reſult of which is as follows:

When the machine was worked ſlowly, *viz.* ſo as to make about 30 revolutions of the handle in one minute, then very little water came up adhering to the rope; and of this water a very ſmall portion was ſeparated from the rope within the box, ſo as to come out of the ſpout Z, in the ſide of the box.

When the revolutions of the handle were about 50 in a minute, then a conſiderable quantity of water came up adhering to the rope; and on turning the wheel E E round, the greateſt part of that water, having acquired a conſiderable velocity, flew off in a tangent from the rope, and formed a jet within the box. This water, falling to the bottom of the box, came out of the ſpout Z.

It was found, that the utmoſt exertion of an ordinary working man could not make more than 60 revolutions of the handle in a minute; in which caſe the rope moved at the rate of about 16 feet *per* ſecond. With this velocity the quantity of water that came out of the ſpout, Z, was about ſix gallons *per* minute: but it would have been impoſſible

poſſible for the man to have worked at that rate for more than three or four minutes.

This machine may evidently be placed aſlant, *viz.* ſo as to convey the water from one place to another, which is not quite perpendicularly over the former. The ſame conſtruction, and almoſt the ſame expence, will adapt the machine to wells of different depths, though the effects will not be always the ſame.

More than one rope, or a broad band inſtead of a rope, might be adapted to this machine, for which purpoſe, the wheels muſt have more than one (or a broad) groove, &c.

The greateſt diſadvantage of this machine is, that the rope does not laſt long. Its being always wet deſtroys it very ſoon. In putting on the rope, care muſt be had to ſoke it well in water before it be ſpliced; otherwiſe it will either be too tight, or it will break. A hair rope has been found to laſt longer than one of hemp. See Cavallo's Elem. of Nat. and Exp. Philoſophy, vol. ii.

ROPI, in *Geography*, a town of South America, in the juriſdiction of Guamanga.

ROPITZ. See Repitz.

ROPOUREA, in *Botany*. See Camax.

ROPPEN, in *Geography*, a town of the Tyroleſe; 4 miles S.W. of Stambs.

ROQUE, John de la, in *Biography*, a writer of voyages and travels, was the ſon of a merchant at Marſeilles. He ſtudied in his native city, and afterwards travelled into the Eaſt, but in what capacity is not known. In 1689 he viſited Syria, mount Lebanon, and other countries in the Eaſt. In 1715 he was a reſident in Paris, and was there aſſociated with his brother in publiſhing the "Mercure de France." He died in 1745, in his 84th year. The following is a liſt of his principal publications: "Voyage de l'Arabie Heureuſe par l'Ocean oriental et le detroit de la Mer Rouge, fait par les François, &c. avec un Memoire concernant l'Arbre du Caffe," 1716. "Voyage de la Paleſtine, fait par l'Ordre de Louis XIV." 1717: to this is annexed a tranſlation of Abulfeda's Deſcription of Arabia. "Voyage de Syrie et du Mont Liban, &c. avec un Abrègé de la Vie de M. M. de Chaſtenil," 2 vols. He was a member of the Royal Academy of Belles Lettres at Marſeilles.

Roque, *La*, in *Geography*, a town of France, in the department of the Var; 6 miles S.W. of Brignoles.

Roque, *Cape*, a cape on the coaſt of Braſil. S. lat. 5°. W. long. 35° 40′.

ROQUEBROUE, La, a town of France, in the department of the Cantal, and chief place of a canton, in the diſtrict of Aurillac; 12 miles W. of Aurillac. The place contains 1277, and the canton 9812 inhabitants, on a territory of 310 kiliometres, in 15 communes.

ROQUEBRUSSANNE, La, a town of France, in the department of the Var, and chief place of a canton, in the diſtrict of Brignoles. The place contains 1436, and the canton 5220 inhabitants, on a territory of 187½ kiliometres, in 8 communes.

ROQUECOR, a town of France, in the department of the Lot and Garonne; 7 miles N.E. of Agen.

ROQUE-COURBE, a town of France, in the department of the Tarn, and chief place of a canton, in the diſtrict of Caſtres; 4 miles N.N.E. of Caſtres. The place contains 1294, and the canton 3829 inhabitants, on a territory of 132½ kiliometres, in 6 communes.

ROQUEFEUIL, a town of France, in the department of the Aude; 15 miles S.W. of Alet.

ROQUEFORT, a town of France, in the department of the Aude, and chief place of a canton, in the diſtrict of Limoux; 7 miles S. of Quellan. The place contains 567, and the canton 4920 inhabitants, on a territory of 322½ kiliometres, in 13 communes.—Alſo, a town of France, in the department of the Landes, and chief place of a canton, in the diſtrict of Mont-de-Marſan; 12 miles N.E. of Mont-de-Marſan. The place contains 1077, and the canton 8380 inhabitants, on a territory of 565 kiliometres, in 14 communes.

ROQUELAURE, a town of France, in the department of the Gers; 3 miles from Auche.

ROQUE-LIMBAUT, La. See Roquetaimbaut.

ROQUEMADOUR, a town of France, in the department of the Dordogne; 12 miles S.E. of Sarlat.

ROQUEMAURE, a town of France, in the department of the Gard, and chief place of a canton, in the diſtrict of Uzés, on the W. ſide of the Rhone; 6 miles N. of Avignon.

ROQUE-D'OLMES, a town of France, in the department of the Arriège; 7 miles S. of Mirepoix.

ROQUEPIC, an iſland in the Indian ſea, covered with cocoa and other trees, flowers, and odoriferous plants. N. lat. 9° 56′. E. long 95° 14′.

ROQUES, Peter, in *Biography*, a French Proteſtant divine in the 18th century, was born at Caune, in Upper Languedoc, in 1685. Having been educated for the miniſtry, he was choſen, at the age of 25, paſtor of the French Proteſtant church at Baſil, in connection with which he ſpent the remainder of his life. He died in 1748, at the age of 63. He was author of many works, which bore teſtimony to his learning, and the excellence of his judgment: of theſe, the principal are, "A Picture of the Behaviour of a Chriſtian;" "The Evangelical Paſtor;" "Elements of the Hiſtorical, Dogmatic, and Moral Truths contained in the Sacred Scriptures." He was the author of numerous papers inſerted in the "Journal Helvetique," and "Bibliotheque Germanique."

ROQUESTARON, in *Geography*, a town of France, in the department of the Maritime Alps, in the diſtrict of Puget-Theniers. The place contains 344, and the canton 2224 inhabitants, on a territory of 217½ kiliometres, in 7 communes.

ROQUET, in *Zoology*, the name of a ſpecies of American lizard, of ſmall ſize, and of a reddiſh-brown colour, variegated with black and yellow ſpots. Its fore-legs are remarkably long for a creature of this kind; its eyes are particularly vivid and ſparkling, and its head is carried continually erect; and the creature is almoſt always in motion, hopping about like a bird, and it uſually carries its tail bent into a ſemicircle over the back. It is far from being ſhy or timorous, and is delighted at the ſight of men; when tired with play or with running, it will open its mouth and pant, and loll out its tongue as the dogs do.

ROQUETAIMBAUT, in *Geography*, a town of France, in the department of the Lot and Garonne, and chief place of a canton, in the diſtrict of Agen; ſeven miles N.E. of Agen. The place contains 1294, and the canton 5494 inhabitants, on a territory of 87½ kiliometres, in 10 communes.

ROQUETAS, a town of Spain, in the province of Grenada, on the coaſt of the Mediterranean; 10 miles S.W. of Almeria.

ROQUEVAIRE, a town of France, in the department of the Mouths of the Rhone, and chief place of a canton, in the diſtrict of Marſeilles; 12 miles E.N.E. of Marſeilles. The place contains 3182, and the canton 17,926 inhabitants, on a territory of 275 kiliometres, in 10 communes.

ROQUILLE,

ROQUILLE, a meafure of capacity in the Weft Indies; thus, the Englifh gallon is divided into two pots, four pintes, eight chopines, fixteen roquilles, thirty-two muces, or fixty-four demi-muces.

ROQUITE, in *Geography*, a river of Africa, which runs into the Atlantic; 70 miles S.E. of cape Bajador.

ROR, a town of Bavaria; four miles S.W. of Abenfperg.

RORAAS, a town of Norway, in the province of Drontheim; near which is a large copper mine, difcovered in the year 1644; 68 miles S.S.E. of Drontheim. This mine is in the fouthern flope of the chain of Dofra, in a rock of what the Germans call horn-fchiffer, or horn-blende flate. The veins are from fix inches to fix ells in thicknefs; and the ore of a pale yellow. The mines of Roraas are very productive, and a fource of confiderable revenue.

RORARIUS, Jerome, in *Biography*, who flourifhed about the middle of the 16th century, was a native of Pordenonè, in Italy, and in the courfe of time he became nuncio from pope Clement VII. at the court of Ferdinand, king of Hungary. He was author of a curious work, entitled "Quod animalia Bruta Ratione utantur melius Homine," in which he undertakes to fhew, not only that beafts are rational creatures, but alfo that they make a better ufe of their reafon than man. This work, after lying concealed in the obfcure receffes of libraries 100 years, was publifhed by M. Naude at Paris in 1645. Bayle.

RORBACH, in *Geography*, a town of Auftria; 18 miles W. of Freyftatt.—Alfo, a town of France, in the department of the Mofelle, and chief place of a canton, in the diftrict of Sarreguemines; fix miles W. of Bitche. The place contains 655, and the canton 10,280 inhabitants, on a territory of 187½ kiliometres, in 20 communes.—Alfo, a town of Germany, in the principality of Culmbach; feven miles S.S.E. of Gemunden.

RORE, in *Biography*. See Cipriano.

RORENTZBERG, in *Geography*, a mountain of Germany, on the Brifgau; two miles S. of Triberg.

RORHAW, a town of Auftria; eight miles W.S.W. of Hainburg.

RORICHE, a river of Brandenburg, which runs into the Oder; three miles N.W. of Königfberg.

RORIDULA, in *Botany*, from *roridus*, moift with dew, in allufion to the glandular moifture which clothes its herbage, like that of *Drofera*, the Sun-dew.—Linn. Gen. 567. Schreb. 157. Willd. Sp. Pl. v. 1. 1184. Mart. Mill. Dict. v. 4. Juff. 426. Lamarck Illuftr. t. 141. Gærtn. t. 62.—Clafs and order, *Pentandria Monogynia*. Nat. Ord. uncertain, Juff.

Gen. Ch. *Cal.* Perianth inferior, of five lanceolate, equal, permanent leaves. *Cor.* Petals five, ovate-oblong, equal, larger than the calyx. *Stam.* Filaments five, awl-fhaped, half the length of the corolla; anthers inferted a little above their bafe, oblong, of two parallel, nearly cylindrical lobes, opening obliquely at the top, and feparated almoft half way down; their bafe pouch-like, projecting downwards, termed by Linnæus the nectary. *Pift.* Germen fuperior, oblong; ftyle thread-fhaped, the length of the ftamens; ftigma abrupt, flightly three-lobed. *Peric.* Capfule oblong, triangular, of three cells and three valves, the partitions contrary to the valves. *Seeds* folitary, oval, angular at one fide, minutely dotted in rows.

Eff. Ch. Corolla of five petals. Calyx of five leaves. Anthers with a pouch at the bafe. Capfule of three valves and three cells. Seeds folitary.

Obf. Linnæus defcribes numerous feeds, but Gærtner and Juffieu found them folitary in each cell. There is no reafon to fuppofe thefe writers did not examine the very identical fpecies.

1. R. *dentata*. Linn. Gen. Pl. 567. Syft. Veg. ed. 14. 244. Willd. n. 1. (R. mufcicapa; Gærtn. v. 1. 298. Ireon verticillata; Burm. Prodr. Cap. 6.) Native of bogs at the Cape of Good Hope, but apparently either in fome remote tract, or not of frequent occurrence. The *ftem* is fhrubby, branched, round, fmooth, purplifh. *Leaves* numerous, crowded about the ends of the lateral fhoots, linear-lanceolate, pointed, about two inches long, finely downy, deeply pinnatifid, or pectinate; their fegments awl-fhaped, fringed with glandular-tipped briftles. *Flower-ftalks* firft terminal, then lateral, folitary, racemofe, woolly, longer than the leaves, each bearing about four large and handfome *flowers*. *Bracteas* and *calyx* fringed like the leaves. The *petals* feem to be white, or blufh-coloured. This is a very fine and fingular plant, with which it is pity we are not acquainted in a recent ftate. May it not be allied to Juffieu's *Tiliaceæ*?

RORIFEROUS Duct, *q. d. dew dropping-pipe*; a name given by fome to the thoracic duct; from its flow manner of conveying, and, as it were, diftilling, the chyle into the common ftream of blood.

RORIPA, or Rorippa, in *Botany*, Scop. Carn. ed. 1. 520. Adanfon Fam. v. 2. 417, a name which Scopoli fays he borrowed from Gefner, and by which he defignated a genus, which he feparated from *Sifymbrium*, on account of its coloured calyx, four converging glands, and fhort pods. The fame author, in his fecond edition of *Flora Carniolica*, reduces this genus, as moft others have done, to Sisymbrium; fee that article.

RORNBACH, in *Geography*, a town of the bifhopric of Paffau; two miles N. of Paffau.

RORSBACH, a town of the Helvetian republic, belonging to the abbey of St. Gall; fix miles N.E. of St. Gall.

RORSHEIM, a town of Weftphalia, in the principality of Halberftadt; fix miles N.E. of Ofterwick.

ROS, Dew. See Dew.

Ros *Solis*, in *Botany*, Sun Dew, a plant fo called from the clear drops of vifcid moifture, ftanding on the briftles which clothe its foliage; moft abundant and confpicuous in hot bright weather. See Drosera.

Ros *Vitrioli*, among *Chemifts*, is fometimes ufed for the firft phlegm diftilled from vitriol in balneo Mariæ.

Ros *fur Coueffnon*, in *Geography*, a town of France, in the department of the Ille and Vilaine; feven miles E.N.E. of Dol.

ROSA, in *Botany*, an ancient and popular name, derived, with moft probability, from the Celtic, *rôs* or *rhos*; whence comes alfo its Greek fynonym, ῥόδον; and the name of the fame flower in various modern languages, Rofe, Rofa, &c. De Theis remarks, that the Celtic *rhodd*, or *rhudd*, red, is the primary root of thefe words, the rofe colour being almoft fynonimous with rednefs. Hence alfo came *Rhus*, *Rubia*, *Rubus*, and the Greek name of the Pomegranate, ῥοα, or ῥοδια, ftill in ufe. All thefe words have a manifeft reference to a red colour, in fome part of each of the plants. —Linn. Gen. 254. Schreb. 341. Willd. Sp. Pl. v. 2. 1063. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 537. Prodr. Fl. Græc. Sibth. v. 1. 347. Ait. Hort. Kew. v. 3. 257. Purfh 344. Juff. 335. Lamarck Illuftr. t. 440. Gærtn. t. 73.—Clafs and order, *Icofandria Polygynia*. Nat. Ord. *Senticofæ*, Linn. *Rofaceæ*, Juff.

Gen. Ch. *Cal.* Perianth of one leaf; tube fwelling, ovate or globofe, contracted at the top; limb fpreading, in five deep,

deep, converging, long, narrow-lanceolate ſegments, two of which are uſually fringed, at both edges, with unequal leafy appendages, the third at one edge only, the two remaining having both edges naked; in ſome ſpecies all are ſimple and naked. *Cor.* Petals five, inverſely heart-ſhaped, the length of the calyx, and inſerted into its neck. *Stam.* Filaments very numerous, capillary, ſhort, inſerted into the neck of the calyx; anthers roundiſh-triangular. *Piſt.* Germens numerous, in the cavity of the calyx; ſtyles as many, villous, very ſhort, inſerted laterally into each germen, and cloſely compreſſed by the neck of the calyx; ſtigmas obtuſe. *Peric.* none, except a ſpurious berry, formed of the turbinate tube of the calyx become ſoft and coloured, of one cell, contracted and cloſed at the neck, crowned with the faded hardened ſegments of the limb. *Seeds* numerous, oblong, hard, angular, hiſpid, lining the interior ſurface of the calyx.

Eſſ. Ch. Petals five. Calyx urceolate, five-cleft, fleſhy, contracted at the neck. Seeds numerous, hiſpid, lining the inſide of the calyx.

No genus more natural than this, in habit, or technical characters, can poſſibly be found. The Roſe is alſo the moſt favourite of plants in all countries of the globe, the type of beauty and love, beſtowing its name to enrich other flowers, which derive from thence their chief celebrity, and taking unqueſtioned precedence in all matters of ornament or taſte. But thorns are proverbially the accompaniments of roſes; nor can any one be more ſenſible of this, than the botaniſt, who attempts to extricate and define the ſpecies of this beautiful family. Cultivated plants in general are known to ſport in luxuriant varieties, often tranſient indeed, but ſufficiently durable to cauſe much perplexity to the accurate obſerver. No wonder therefore that roſes, ſo abundant in every garden, ſhould aſſume various aſpects from difference of ſoil and treatment; though leſs perhaps, than moſt other tribes, from croſs impregnation. The habit of this genus is invariably ſhrubby, and almoſt univerſally prickly; the branches round; leaves alternate, pinnate with an odd leaflet, ſerrated, frequently prickly or glandular; one ſpecies only being known to have ſimple leaves, or, in other words, to want the lateral leaflets. Stipulas almoſt always united to the baſe of the common footſtalk. Flowers terminal, ſtalked, uſually red, variouſly and deliciouſly fragrant; ſometimes white; very rarely yellow, and in that caſe either inodorous or fœtid. Fruit harmleſs, but ſeldom pleaſant. Seeds ſlow in germination.

The generality of writers on Roſes have come under the deſcription of floriſts rather than botaniſts, and their figures have been executed accordingly. Linnæus found the determination of ſpecies very difficult. Ehrhart paid conſiderable attention to the ſubject, and in his *Beiträge* has thrown much light upon it, by which Willdenow has profited. The garden Roſes are well arranged in the new edition of Aiton's Hortus Kewenſis, where we ſhall find but little to improve or correct; and they are elegantly diſplayed in Miſs Lawrance's ample collection of figures, publiſhed in 1799, except that we could have wiſhed for much more delicacy, and diſcrimination of tints, in their various foliage. Several new Britiſh ones have been firſt deſcribed, by the writer of the preſent article, in *Engliſh Botany*, where Mr. Sowerby has, as uſual, been happy in his repreſentations of their diſtinctive habits and characters.

The ſpecies are diſtributed by Linnæus, and all his followers, into two ſections, diſtinguiſhed by the ſhape of the tube of the calyx, inaccurately termed by him the germen. Of this error Willdenow takes notice, without correcting it, not being at that time aware of the meaſure adopted in our *Flora Britannica*, where, by ſubſtituting *fruit* for *germen*, every inconvenience and inaccuracy is avoided. Mr. Dryander and Mr. Aiton in *Hort. Kew.*, while they follow, as we ſhall here do, Willdenow's general and particular diſtribution of the ſpecies, have, in the point juſt mentioned, corrected his phraſeology. Our new ſpecies, chiefly ſupplied by Engliſh Botany, and Purſh's Flora of North America, will be inſerted, as nearly as poſſible, according to their affinities. Perhaps ſome of the old ones might have been better placed; but except any glaring impropriety preſented itſelf, more inconvenience than benefit would ariſe from diſturbing an arrangement ſo generally received, and which Linnæus firſt formed in his *Syſtema Naturæ*, ed. 12. We have only brought *canina* and its allies nearer together than they are placed in the above-mentioned books.

Section 1. *Fruit nearly globoſe.*

1. R. *berberifolia.* Barberry-leaved Roſe. "Pallas in Nov. Act. Petrop. v. 10. 379. t. 10. f. 5." Willd. n. 1. Ait. n. 1. (R. ſimplicifolia; Saliſ. Hort. 359. Parad. t. 101. Poiret in Lamarck Dict. v. 6. 276.)—Fruit globoſe, prickly, as well as the flower-ſtalk. Leaves ſimple, nearly ſeſſile, with ſtipulary recurved prickles. Found by Michaux and Olivier in the north of Perſia. Seeds ſent by the former to ſir J. Banks were raiſed at Kew about the year 1790, but the plants did not long ſurvive. This ſpecies is extremely remarkable for its ſimple *leaves*, which are obovate, glaucous, coarſely ſerrated, about an inch long, ſmooth, on ſhort ſtalks, without *ſtipulas*, but having in their ſtead a pair of recurved taper prickles, ſpreading from the baſe of each footſtalk. The *branches* are alſo beſet with ſhorter prickles. *Flowers* ſolitary, on ſhort, terminal, prickly, downy ſtalks. *Petals* yellow, crimſon at the baſe. *Fruit* globular, very prickly, crowned with the ſimple narrow ſegments of the *calyx*. We wiſh the name *ſimplicifolia* had been retained, as much the beſt; and if Juſſieu had actually given it as a name, in his Gen. Pl. 452, it might, by the right of priority, have ſuperſeded Pallas's appellation.

2. R. *lutea.* Yellow Sweet-briar. Mill. Dict. ed. 8. n. 11. Willd. n. 2. Ait. n. 2. Curt. Lond. t. 363. Lawr. Roſ. t. 12. Lob. Ic. v. 2. 209. Ger. Em. 1267. (R. lutea ſimplex; Bauh. Pin. 483. R. Eglanteria; Linn. Sp. Pl. 703. R. chlorophylla unicolor; Ehrh. Beitr. v. 2. 70. Arb. 156. R. fœtida; Herm. Roſ. 18. Allion. Ped. v. 2. 138.)

β. bicolor. Auſtrian Roſe, or Copper Sweet-briar; Jacq. Hort. Vind. v. 1. t. 1. Curt. Mag. t. 1077. Lawr. Roſ. t. 6. (R. ſylveſtris auſtriaca, flore phœniceo; Hort. Angl. 66. t. 18.)—Fruit globoſe, ſmooth, as well as the flower-ſtalk. Calyx and leaf-ſtalks minutely prickly. Prickles of the branches ſtraight. Leaflets obovate, doubly ſerrated, rather glutinous, ſmooth.—Native of Germany and Italy; but not, as Willdenow reports, of England. It is however frequent here in old country gardens, in a pure air, flowering in June. Gerarde cultivated this ſpecies, and even raiſed it from ſeed, in order to refute a vulgar error, of its being ſome common roſe, turned yellow by grafting on a broom-ſtock. The beautiful red or copper-coloured variety, β, is more difficult of cultivation, eſpecially with reſpect to air. The *ſtem* is buſhy, four or five feet high. *Leaves* deciduous, of five or ſeven obovate, ſtrongly ſerrated, deep green, ſhining leaflets, rather viſcid to the touch, and exhaling a moſt ſweet and peculiar aromatic odour, more grateful to us than that of the Common Sweet-briar. *Flowers* copious, large, uſually of an uniform golden yellow, with the ſmell of bugs; but in the variety β the upper ſide of the *petals* is of a tawny red, and the diſagreeable

agreeable odour is less. We have, under the article EGLANTERIA, given the history of Linnæus's mistake, in confounding the present species, first with the Common Sweetbriar, and then with the Double Oriental Yellow Rose, (see hereafter *R. sulphurea* and *R. rubiginosa*); as well as our reasons for following the Hort. Kew., Willdenow, &c. in these names. The *fruit* of *R. lutea* has never been seen or heard of by us, in a state of maturity.

3. R. *sulphurea*. Double Yellow Rose. Ait. Hort. Kew. ed. 1. n. 2. ed. 2. n. 3. Willd. n. 3. Lawr. Ros. t. 77. (R. glaucophylla; Ehrh. Beitr. v. 2. 69. R. hemisphærica; Herm. Ros. 18. R. lutea multiplex; Ger. Em. 1267. Hort. Angl. 66. t. 18. R. lutea maxima, flore pleno; Hort. Eyst. vern. ord. 6. t. 2. f. 4. R. flava, pleno flore; Clus. Cur. Post. 6.)—Fruit globose, somewhat prickly. Flower-stalks smooth. Stem with two sets of copious straight prickles. Stipulas jagged. Leaflets obovate, simply serrated, glaucous, smooth. This fine and singular species, strangely confounded, by many botanists, with the last, was received by Clusius from the Levant, but its native country is not precisely known. It has been cultivated in England for near 200 years, and is perfectly hardy as to cold, but very impatient of low, confined, or smoky situations; nor does it, in the most favourable, often expand its copious and truly glorious flowers to advantage. We have seen them in the greatest perfection, on a poor gravelly soil, exposed to east winds, about outhouses and hovels, where no care was taken of the plant. The bush is larger than *R. lutea*, and evidently distinguishable by the pale glaucous hue of its smooth inodorous *leaves*. The prickles of the *stem* are of two kinds; some twice as large as the others. *Flowers* large and very double, without scent, of a rich but delicate golden yellow; their inner petals, when perfect, so profusely and elegantly crumpled, and so brightly transparent, that neither the structure, nor the colour, of any other rose, can give the slightest idea of their beauty; much less has any artist, except perhaps Van Huysum, in one or two of his finest pictures, done this flower tolerable justice. The foliage in Miss Lawrance's plate is much too dark, and wants the glaucous pale aspect which characterizes the species. The flower is well drawn in the old Hortus Eystetensis.

4. R. *Banksiæ*. Lady Banks's Rose. Ait. n. 4.—"Smooth, naked, and without prickles. Fruit globose. Leaves ternate or pinnate, shining. Stipulas setaceous, distinct."—Native of China, from whence it is said to have been brought, by Mr. W. Kerr, in 1807. It is marked, by Mr Aiton, as a green-house *shrub*, blossoming in June and July. We have seen neither specimen nor figure.

5. R. *blanda*. Labrador, or Hudson's bay, Rose. Ait. Hort. Kew. ed. 1. n. 3. ed. 2. n. 5. Willd. n. 4. Pursh n. 1. Lawr. Ros. t. 27.—Fruit globose, smooth. Adult stems, like the flower-stalks, quite smooth, and without prickles.—Native of the most northern parts of America, on the east, as well as west, coasts, flowering there, as in our gardens, from May to August. Mr. Gordon is known to have cultivated it in 1773, but the species has not excited general notice. The young *branches*, and their *leaf-stalks*, bear copious, straight, red prickles, but they afterwards become smooth, naked, red and shining. The *leaflets* are usually seven, oblong, or obovate, large, varying in breadth. *Stipulas* broad and long, with glandular spreading points. *Flowers* solitary, moderately large, crimson. Tube of the *calyx* short, and almost hemispherical; segments long and simple, tapering gradually to a point.

6. R. *cinnamomea*. Cinnamon Rose. Linn. Sp. Pl. 703. Willd. n. 5. Ait. n. 6. Engl. Bot. t. 2388. Ger. Em. 1268. Lawr. Ros. t. 34. (R. fluvialis; Fl. Dan. t. 868. Retz. Scandin. ed. 2. 120. R. majalis; Herm. Ros. 8. Rosier printanier; Reynier Mém. de la Suisse, v. 1. 222.)

β. R. collincola; Ehrh. Beitr. v. 2. 70. Arb. 25.

Fruit globose, smooth as well as the flower-stalks. Stem with occasional, small, twin prickles, below the stipulas. Footstalks scarcely prickly. Leaflets oblong, finely downy, glaucous beneath.—Native of Germany, Switzerland, Sweden, and Denmark; first observed wild in England by Mr. Salisbury, in the wood in Aketon pasture, near Pontefract, Yorkshire. In gardens the double variety is common. This is one of our earliest Roses, flowering in May. The bush is rather tall, with brown or reddish twigs, shining and smooth, except the small, and not universal, twin prickles, under each *stipula*. The *leaves* have a dull glaucous aspect, and are usually elliptic-oblong, unequally serrated; in β, Ehrhart's *collincola*, which our friend Dr. Afzelius is inclined to make a distinct species, they are broader and more obtuse, but we can find no permanent specific mark. Still less can we distinguish, even as a variety, the *fluvialis* of Fl. Dan. The *flowers* are of a delicate purplish blush-colour, at least such are the double ones, seen in gardens; in which we could never detect any of the cinnamon scent, mentioned by Bauhin, to justify the name. The *fruit* of the wild kind is small, globose, scarlet. Segments of the *calyx* simple, long, and slender, for the most part slightly spatulate at the end, but not invariably so. The bush, when young, is sometimes very prickly.

7. R. *kamtschatica*. Kamtschatka Rose. Venten. Hort. Cels. t. 67, not 68. Ait. n. 7.—Fruit globose, smooth as well as the flower-stalks. Stem downy, very prickly. Leaf-stalks somewhat prickly. Leaflets obovate, abrupt.—Native of Kamtschatka.—Sent to Kew by M. Cels, from his garden at Paris, in 1802; but it was, long before, cultivated in Chelsea garden, from whence we received a specimen in 1791. Every part is larger than the preceding. The *stem* is downy, and armed with numerous, scattered, straight, pale, slender prickles; some of which are also found on the leaf-stalks. *Leaflets* usually seven, of a pale glaucous green, veiny and rugged; somewhat downy beneath; coarsely serrated, abrupt and emarginate. *Stipulas* obovate, dilated, obtuse, veiny and downy. *Flowers* solitary, purplish rose-coloured, fragrant. Segments of the *calyx* simple, entire, spatulate at the ends. *Fruit* small, globose, red. Perhaps this species ought to have been introduced between *blanda* and *cinnamomea*.

8. R. *arvensis*. White Dog Rose. Hudf. Angl. ed. 1. 192. Linn. Mant. 2. 245. Willd. n. 6. Ait. n. 8. Fl. Brit. n. 2. Engl. Bot. t. 188. Lawr. Ros. t. 86. (R. sylvestris; Herm. Ros. 10. R. Herporhodon; Ehrh. Beitr. v. 2. 71. R. serpens; Ehrh. Arb. 35. R. sylvestris folio glabro, flore planè albo; Bauh. Hist. v. 2. 44.)—Fruit nearly globose, smooth. Flower-stalks glandular, somewhat cymose. Prickles of the stem and leaf-stalks hooked. Styles elongated, combined.—Native of England, Germany, and Switzerland. It often decorates, in profusion, the hedges and thickets of the gravelly counties of England, flowering in June and July, when its long, trailing, purplish-brown twigs, and copious milk-white blossoms, are highly ornamental. We believe this species is unknown in Sweden and Denmark; for the t. 398 of Fl. Dan. cited by Linnæus, whom Willdenow like Hudson copies, is most evidently, as it calls itself, *spinosissima*. There is a glaucous hue on the young *shoots*, as well as on the backs of the *leaflets*, which are mostly five, oval, pointed, smooth, with sharp unequal serratures. *Stipulas* linear, pointed. *Flower-stalks* rough with glandular bristles, not prickly. Base of the *calyx* smooth and ovate, but

but the *fruit* is globose, of a deep red, crowned with the elongated *styles*, so combined as to seem one.

9. R. *spinosissima*. Burnet Rose. Linn. Sp. Pl. ed. 1. 491. ed. 2. 705? Willd. n. 8. Ait. n. 9. Fl. Brit. n. 1. Engl. Bot. t. 187. Fl. Dan. t. 398. Lawr. Ros. t. 48 and t. 78. Ehrh. Arb. 85. (R. pimpinellifolia; Linn. Syst. Nat. ed. 10. 1062. Sp. Pl. 703. R. n. 1106; Hall. Hist. v. 2. 40. R. campestris spinosissima, flore albo odoro; Bauh. Pin. 483. R. campestris odora; Clus. Pan. 111. R. campestris odorato flore; Clus. Hist. 116. R. pimpinellæ folio; Ger. Em. 1270.)—Fruit globose, smooth as well as the flower-stalks. Prickles of the stem very numerous, straight and setaceous. Leaflets roundish, smooth. Calyx of the fruit reflexed.—Native of sandy downs near the sea, as well as the borders of fields, and mountains, in various parts of Europe, not uncommon in Britain, flowering in July.—This is a bush of humble growth, seldom more than two or three feet high, and much branched. The *stem* is copiously clothed with innumerable, straight, crowded, needle-like, pale prickles. The *leaf-stalks* are occasionally prickly. *Leaflets* seven or nine, roundish, or slightly elliptical, obtuse, serrated, small, even and smooth, a little glaucous, not shining. *Flower-stalks* terminal, solitary, single-flowered, rather swelling upwards, always, as far as we have seen, smooth and naked. *Germen* depressed, and nearly hemispherical. Segments of the *calyx* tapering, smooth, and entire. *Flowers* with a light pleasant scent, usually cream-coloured, yellow in the middle; but Miss Lawrance's t. 78 represents the red variegated variety, first described by Sibbald in his Scotia Illustrata, p. 2. 46. t. 2, under the name of *R. Ciphiana*. The *fruit* is much larger than the leaflets, globose, dark purple, and finally quite black, with large *seeds*, and crowned with the reflexed *calyx*.——We feel no scruple in referring the *pimpinellifolia* of Linnæus to his *spinosissima*, of which it is not even a variety; but we cannot take into consideration all the different things which various authors have supposed one or other of these species. We shall notice *pimpinellifolia* of Villars under *alpina*. Miss Lawrance's t. 15 and t. 19, are doubtful, on many accounts. The former indeed answers to our next species. Her t. 63 is surely different from both. The synonyms of old writers, regarding this Rose, are very puzzling, nor have they ever been well explained. The figure in Clusius's Stirp. Pannon. 114, belongs in truth to *spinosissima*, as he gives it in his Historia; while his 4th Rose, or χαμαιροδον of the former work, to which that figure seems annexed, is *pumila* of Jacquin. His other cut, at p. 111, more resembles *cinnamomea*, which is often very prickly the first season, as professor Swartz remarks. Our learned correspondent just named likewise suggests that the *cinnamomea* is one of various things which Linnæus in Fl. Suec. confounded under the name of *spinosissima*. Haller has certainly not adverted to all the Roses known to be found in Switzerland, but his n. 1106 can be no other than our *spinosissima*.

10. R. *rubella*. Red-fruited Dwarf Rose. Sm. Engl. Bot. t. 2521. (R. spinosissima γ; Fl. Brit. 537? β; Lawr. Ros. t. 15.)—Fruit globose, somewhat bristly. Flower-stalks bristly. Prickles of the stem very numerous, straight, and setaceous. Leaflets elliptical, smooth. Calyx of the fruit inflexed.—Gathered near Newcastle, by Mr. Winch. We have also specimens from Mr. James Backhouse, who has just informed us that he finds the inflexed *calyx*, after flowering, an invariable character of this species, that of the foregoing being always reflexed. The rough *flower-stalks* are less unalterable, though tolerably constant. The scarlet *fruit* is a very remarkable difference. The *flowers* are elegantly tinged with red. Mr. Backhouse thinks this rather the taller-growing shrub of the two, and he observes that the *leaves* fold together, or *sleep*, at night. We know not whether this is the case with *spinosissima*.

11. R. *involuta*. Dr. Walker's Rose. Fl. Brit. 1398. Engl. Bot. t. 2068. Ait. n. 10.—Fruit globose, very prickly as well as the flower-stalks. Prickles of the stem very numerous, and nearly straight. Petals involute and imperfectly expanded. Leaflets elliptical, hairy beneath.—Native of the Hebrides, where it was gathered by the Rev. Dr. Walker, and Mr. J. Mackay.—The present species has the general habit, and very prickly *stem*, of the two last. But the *flower-stalks*, *leaf-stalks*, and young *fruit*, are all extremely prickly, the latter being more disposed to be ovate than depressed. The *leaflets* are more elliptical, their under side hairy, especially the ribs. Segments of the *calyx* long, simple, pointed, rough externally with glandular prickles. *Petals* pale blush, with deeper tints here and there, concave and involute, seldom more than half expanded. Ripe *fruit* unknown to us.

12. R. *parviflora*. Small American Rose. Ehrh. Beitr. v. 4. 21. Willd n. 9. Pursh n. 2. (R. caroliniana; Mich. Boreal-Amer. v. 1. 295. R. carolina; Sm. Inf. of Georgia, v. 1. 49. t. 25.)—Fruit globose, slightly depressed, bristly as well as the flower-stalks and calyx. Leaf-stalks downy, somewhat prickly. Prickles in pairs under the stipulas, straight. Leaflets elliptic-lanceolate, simply serrated, smooth. Flowers solitary or in pairs.—"Native of woods on the sides of hills, from New York to Carolina, flowering in June and July. About two feet high. There are a number of varieties of this species." *Pursh*. Our specimens, sent by the Rev. Dr. Muhlenberg, answer well to the figure above cited, and have, like that, solitary *flowers*, of a pale pink hue. The *stem* is slender and smooth, except a pair of awl-shaped, slender, straight prickles under each *stipula*. *Leaflets* five, elegantly elliptical; their common *stalk* reddish, channelled, prickly, somewhat downy, or hairy. The Rose in Dill. Elth. t. 245. f. 316, is exactly our's, though quoted by authors for the *lucida*.

13. R. *nitida*. Polished American Rose. "Willd. Enum. 544." Pursh n. 3.—"Fruit globose. Calyx, flower-stalks, and branches hispid. Leaf-stalks rather downy, without prickles. Leaflets oblong-lanceolate, polished and smooth on both sides."—In Pennsylvania and Virginia, flowering from June to August. *Petals* red, obcordate. *Leaflets* seven. *Pursh*. We have not met with any specimen or figure.

14. R. *lucida*. Shining American Rose. Ehrh. Beitr. v. 4. 22. Arb. 76. Willd. n. 10. Pursh n. 4; excluding the synonym of Dillenius. (R. alpina β; Ait. n. 27. Lawr. Ros. t. 75.)—Fruit globose, depressed, rather hispid as well as the flower-stalks. Leaf-stalks somewhat prickly, not downy. Prickles usually in pairs under the stipulas, straight. Leaflets ovato-lanceolate, bluntish, coarsely serrated, very smooth, shining. Corymbs of few flowers.—On the borders of swamps, from New York to Carolina, flowering in July and August. From four to six feet high. *Pursh*. By Ehrhart's specimen, the only one we have seen, it evidently appears, that the R. carolina fragrans, foliis mediotenùs serratis; Dill. Elth. 325. t. 245. f. 316, is very erroneously referred by Willdenow and Pursh to the present species; belonging, if we are right in what we take for *parviflora*, n. 12, indubitably to that plant. The present has seven *leaflets*, of a larger size and firmer texture. Stipulary *prickles* shorter, thicker, not always present. *Flowers* corymbose, four or five together. If we are right in Miss Lawrance's figure, this species, as well as *parviflora*, ought to be placed on the list of our garden plants.

15. R.

15. R. *gemella*. Twin-flowered American Rose. "Willd. Enum. 544." Pursh n. 5.—Fruit globose, smooth as well as the flower-stalks. Flowers mostly in pairs. Leaflets elliptic-oblong, opaque; their veins hairy beneath. Leaf-stalks downy. Prickles in pairs under the stipulas, hooked. —On dry sunny hills, from New England to Carolina, flowering in July and August. A low *shrub*, with large red *flowers*. *Pursh*. Specimens in the herbarium of Linnæus, referred by him to *R. carolina*, have slender *branches*, quite smooth, and somewhat glaucous. *Leaflets* seven, smaller, thinner, and more acutely serrated than the last; rather glaucous and downy beneath; their veins as if fringed. *Leaf-stalks* and *stipulas* finely downy and hoary. *Flowers* terminal, in pairs, on short smooth *stalks*, enveloped in large downy *bracteas*. *Germen* exactly globular, quite smooth and naked. Segments of the *calyx* smooth at the base, downy at the edges and upper part, simple; spatulate at the end.

16. R. *Lyonii*. Lyon's American Rose. Pursh n. 6.—"Fruit nearly globose, smoothish. Flower-stalks hispid, mostly ternate. Leaf-stalks rather prickly. Stem with straight scattered prickles, not hairy. Leaflets ovate-oblong, acute, serrated; smoothish above; downy beneath: the upper leaves simple. Stipulas linear. Segments of the calyx downy, linear, scarcely laciniated."—Gathered by Mr. Lyon in Tenessee, North America, flowering in July. The *leaflets* are three or five, small, with coloured veins. *Flowers* pale red. *Pursh*.

17. R. *setigera*. Fringe-cupped American Rose. Mich. Boreal-Amer. v. 1. 295. Pursh n. 7.—"Fruit globose. Stalks and ribs of the leaves prickly. Branches not hairy; their prickles in pairs or scattered. Leaflets pointed, smooth. Segments of the calyx fringed with bristles."—In swamps of Virginia and Lower Carolina, flowering in June and July. From five to eight feet high. *Leaflets* three or five. *Pursh*.

18. R. *carolina*. Carolina Rose. Linn. Sp. Pl. 703, omitting the reference to Dillenius. Willd. n. 11. Ait. n. 11. Pursh n. 8. Lawr. Ros. t. 24. t. 3. t. 54; also perhaps t. 68, and t. 66; scarcely t. 36. (R. corymbosa; Ehrh. Beitr. v. 4. 21.)—Fruit globose, bristly as well as the flower-stalks. Leaf-stalks hairy, somewhat prickly. Stem smooth. Stipulary prickles slightly hooked. Leaflets elliptic-lanceolate, acute, finely serrated; downy and glaucous beneath. Flowers corymbose.—In swamps, and on the banks of ponds, from New England to Virginia, flowering in June and July. Pursh says, "there are a great many varieties of this species." So little, however, have these been attended to, that five or six of those species which we have last described have, by Linnæus and others, been usually referred to *R. carolina*. The true *carolina* common in our shrubberies, flowering in June and July, is well distinguished by the above characters, first pointed out by the accurate and observing Ehrhart. This *shrub* is five or six feet high, bushy, but erect, with red, smooth, a little glaucous, twigs. *Leaflets* large, more copiously and minutely serrated than in *lucida*, n. 14, which this species, at first sight, most resembles; but they differ also from that in their glaucous and downy under side, as well as in having a fine taper point. The *flowers* are more numerous in each *corymb*, large, of a full crimson. The Pensylvanian Rose of the gardens, figured by Miss Lawrance, t. 68, and t. 66, differs in some respects from the common *carolina*. Its *leaflets* are more coarsely and sharply serrated; pale, but not glaucous nor downy, beneath. *Flowers* smaller and paler; in the double variety peculiarly beautiful, most of the outer petals being of a light flesh-colour, the central ones involute or tufted, of a rich crimson.

19. R. *rubifolia*. Bramble-leaved Rose. Ait. n. 12. Pursh n. 9.—"Fruit globose, rather hispid as well as the flower-stalks. Calyx unexpanded, pointless. Leaves ternate; downy beneath. Leaf-stalks glandular and prickly. Stem with somewhat hooked, stipulary and scattered, prickles, not hairy. Flowers corymbose."—Discovered in North America, by the late Mr. Francis Masson, who sent it to Kew in 1800. It is a hardy *shrub*, flowering in June and July, but has not yet fallen under our observation.

20. R. *villosa*. Apple Rose. Linn. Sp. Pl. 704. Willd. n. 12. Ait. n. 13. Fl. Brit. n. 3. Engl. Bot. t. 583. Lawr. Ros. t. 33, and t. 29. (R. pomifera major; Park. Parad. 418. f. 7.)—Fruit globose, bristly as well as the flower-stalks. Prickles of the stem nearly straight. Leaflets elliptic-oblong, downy on both sides. Segments of the calyx the length of the ripe fruit.—Native of mountainous woods and thickets, in the north of Europe. Plentiful in Westmoreland, Cumberland, and the north of Yorkshire, flowering in June. It is often cultivated in shrubberies for the sake of the beauty of its large scarlet bristly fruit, above an inch in diameter. The double-flowered variety, when luxuriant, is one of our handsomest flowering shrubs. Miss Lawrance's figures of this species are not happy. The bush is from four to six feet high, with strong, straight, scattered *prickles*. *Leaflets* five or seven, large, of a peculiar elliptic-oblong shape, somewhat rounded at the end, doubly serrated and glandular at the edges, finely downy and hoary on both sides, aromatic or pungent, in some degree, when rubbed. *Flowers* one or two at the end of each branch, lightly scented, of a fine pale pink. *Fruit* at every period armed with strong thorns, and crowned when ripe with the hispid, involute, twisted *calyx*, which then hardly exceeds it in length.

21. R. *mollis*. Soft-leaved Round-fruited Rose. Sm. Engl. Bot. t. 2459. (R. villosa β; Fl. Brit. 538. Relh. Cant. 193. R. sylvestris, folio molliter hirsuto, fructu rotundo glabro, calyce et pediculo hispidis; Dill. in Raii Syn. 478.)—Fruit globose, half as long as the segments of the calyx, bristly as well as the flower-stalks. Prickles of the stem straight. Leaflets elliptic-ovate, downy on both sides.—Native of bushy places, in England, Scotland, and Wales, flowering in June or July. A much more humble shrub than the *villosa*; the *leaflets* less oblong, and more ovate; *petals* of a deeper red; ripe *fruit* much smaller, purplish, not scarlet, its length or diameter not above half the length of the permanent *calyx*, one segment of which, and no more, is often very distinctly pinnated. The Rev. H. Davies has found the *fruit* variable in Anglesea, from perfect smoothness, as mentioned by Dillenius, to every degree of roughness. The prickles of the *stem* vary in size, and are frequently hooked.

22. R. *glutinosa*. Clammy Cretan Rose. Sm. Prodr. Fl. Græc. Sibth. v. 1. 348. Fl. Græc. t. 482, unpublished. (R. cretica montana, foliis subrotundis glutinosis et villosis; Tourn. Cor. 43. R. pumila alpina, pimpinellæ exactè foliis sparsis, spinis incurvis, aquatè purpurea; Cupan. Panphyt. ed. 1. v. 1. t. 61.)—Fruit globose, hispid as well as the flower-stalks. Prickles of the stem copious, hooked. Leaflets roundish; downy and glandular on both sides.—Native of the Sphaciote mountains of Crete, and, from Cupani's synonym, of the mountains of Sicily. By a specimen sent to Linnæus, the plant seems to have been cultivated in the French gardens, but we know it not in England. The *stem* is low, bushy, with numerous stout *branches*, armed with many, scattered, strong, hooked prickles. *Leaflets* seven, roundish and obtuse, strongly and

often doubly ſerrated; downy, ſomewhat hoary, glandular and viſcid on both ſides, as are alſo the *leaf-ſtalks*. *Flowers* ſmall, pale-bluſh, terminal, ſolitary, on ſhort, briſtly, viſcid *ſtalks*. *Fruit* globoſe, ſcarlet, covered with rigid glandular-pointed briſtles, its diameter full half an inch, which nearly equals the length of the permanent, upright, converging, hiſpid *calyx*.

23. R. *hibernica*. Iriſh Roſe. Sm. Engl. Bot. t. 2196. Ait. n. 14.—Fruit nearly globoſe, ſmooth as well as the flower-ſtalks. Prickles of the ſtem ſlightly hooked. Leaflets elliptical, ſmooth; their ribs hairy beneath.—Diſcovered by John Templeton, eſq. in the county of Down, about Belfaſt harbour, where it grows abundantly, flowering from the early part of June, till the middle of November. The diſcoverer thus became entitled to the liberal premium of fifty pounds, offered by the patrons of botany at Dublin, for the detection of any new Iriſh plant. The above characters readily diſtinguiſh this ſpecies, from every other deſcribed roſe. The *ſtem* is ſix feet high, erect, much branched, and very prickly. *Leaflets* broadly ovate, deeply and acutely ſerrated, ſmooth, except the back of their ribs and veins, which are hairy. Sometimes a few coarſe hairs occur on the upper ſurface. *Flower-ſtalks* often ſolitary, ſometimes two or three together. *Petals* pale bluſh-coloured. *Fruit* ſcarlet, ſmooth, accurately globoſe when young, but in ripening ſometimes elongated at the ſummit, ſo as to become ſlightly ovate.

This is not the only new Iriſh Roſe that has been diſcovered of late; Dr. Taylor having favoured us with incomplete ſpecimens of what will certainly prove two or three others, hitherto nondeſcript; one of them with remarkably large, twin, hooked, ſtipulary *prickles*, unlike any other ſpecies with which we are acquainted.

24. R. *ſinica*. Three-leaved Chineſe Roſe. Linn. Syſt. Veg. ed. 13. 394. Ait. n. 15.—"Fruit nearly globoſe, ſmooth. Flower-ſtalks prickly, hiſpid. Stem and leaf-ſtalks prickly. Segments of the calyx lanceolate, ſomewhat ſtalked."—Native of China. Cultivated by Miller in 1759. A hardy ſhrub, flowering from May to July. *Aiton*. We adopt this entirely on the authority of the *Hortus Kewenſis*, having never ſeen the garden plant; nor have we any authentic ſpecimen to prove what *R. ſinica* of Linnæus really is; he having mentioned it only, under the above characters, in his *Syſtema Vegetabilium*. There occurs in his herbarium, a ſpecimen from the Upſal garden, marked *China*, which anſwers to the above characters; eſpecially in the paradoxical account of the ſtalked leaves, or ſegments of the *calyx*, they being here in a deformed or monſtrous ſtate. But the leaflets are five, not three, as Mr. Aiton's Engliſh name implies; and the very young *fruit*, though "nearly globoſe," has all the appearance of being truly oval when perfectly formed. Indeed we believe this ſpecimen to be not eſſentially different from *R. indica*, the Pale China Roſe, now ſo common in gardens.

25. R. *rugoſa*. Rugoſe Japan Roſe. Thunb. Jap. 213. Willd. n. 13.—"Fruit globoſe, ſmooth. Flower-ſtalks, leaf-ſtalks, and ſtem prickly. Leaflets obtuſe with a point, rugoſe, downy beneath."—Native of Miaco in Japan, flowering in May and June, and known by the name of Ramanas.—*Stem* ſhrubby. *Branches* ſomewhat downy, armed with larger and ſmaller, very denſe, ſpreading, white prickles. *Leaflets* nine, an inch long, ovate, blunt, with a point, ſerrated; green and rugoſe above; downy, veiny and rugoſe beneath; their *common ſtalk* downy, beſet with ſcattered, ſpreading, white prickles. *Flowers* ſolitary, on downy *ſtalks*, furniſhed alſo with copious, very ſlender, ſpreading, white prickles. *Calyx* downy within; hairy without. Young *fruit* globoſe, deſtitute of prickles or pubeſcence. *Thunberg*.

26. R. *provincialis*. Provins Roſe. Mill. Dict. ed. 8. n. 18. Ait. Hort. Kew. ed. 1. n. 11. ed. 2. n. 16. Willd. n. 14. Lawr. Roſ. t. 8. t. 22. t. 1. t. 4. t. 43. t. 21.

β. R. muſcoſa; Ait. n. 25. Willd. n. 22. Curt. Mag. t. 69. Lawr. Roſ. t. 14. (R. rubra plena ſpinoſiſſima, pedunculo muſcoſo; Mill. Ic. 148. t. 221. f. 1. R. provincialis ſpinoſiſſima, pedunculo muſcoſo; Hort. Angl. 66. t. 18.)

γ. Leaves and flowers much ſmaller. Roſe de Meaux, &c.; Lawr. Roſ. t. 31. t. 50. t. 71. Curt. Mag. t. 407. To which are moſt akin Lawr. Roſ. t. 88 and t. 76; mere evaneſcent varieties.

Fruit roundiſh. Flower-ſtalks and leaf-ſtalks hiſpid. Prickles of the branches ſcattered, ſomewhat hooked. Leaflets roundiſh-ovate; hairy beneath; with glandular ſerratures.—Native of the ſouth of Europe; at leaſt it is ſo conſidered; though a plant too generally cultivated for any thing to be averred on this ſubject. With us it is hardy, flowering in June and July. Moſt of the varieties are increaſed by roots or layers, and remain tolerably diſtinct; the different forms of variety γ are leaſt permanent. *Stems* uſually three or four feet high, ſtraight, very prickly. *Leaflets* five, of a rounded bluntiſh figure, veiny and rugoſe. *Stipulas* linear-lanceolate, acute, undivided; moſt entire in their lower part. *Flowers* two or three, or more, at the top of each branch, large, delightfully fragrant, of that peculiar bright crimſon hue popularly termed a roſe-colour, with broad brown ſtains on the backs of the outer *petals*, which are permanent in the otherwiſe white variety, repreſented in Miſs Lawrance's t. 4. In all our cultivated varieties the *flowers* are double, with ſlight remains of *ſtamens* or *ſtyles*; ſo that the *fruit* never ripens. We have however ſeen, in the ample collection of roſes at Meſſrs. Lee and Kennedy's, perfectly ſingle *flowers* of the Moſs Roſe, which thoſe experienced cultivators have proved to be only a variety of the Common Provins Roſe. Indeed we have been told in Italy, that this variety loſes its moſſineſs, almoſt immediately, in that climate.

27. R. *ferox*. Hedge-hog Roſe. Ait. n. 17. Lawr. Roſ. t. 42.—Fruit globoſe, hiſpid. Leaflets elliptic-oblong, rugoſe, four pair with an odd one. Stem, leaf-ſtalks, and young branches, very denſely ſpinous.—Native of mount Caucaſus. Introduced about 1796, by Lee and Kennedy. Hardy, flowering from June to Auguſt.—A ſtout buſhy *ſhrub*, very remarkable for its copious, long, ſtraight prickles. The *leaflets* are recurved, convex, and rugoſe, of a glaucous hue. *Flowers* large, crimſon, on ſhort ſtalks.

Section 2. *Fruit ovate, or oblong*.

28. R. *gallica*. Red Officinal Roſe. Linn. Sp. Pl. 704. Willd. n. 16. Ait. n. 19. Ehrh. Off. 324. Woodv. Med. Bot. t. 141. Lawr. Roſ. t. 16. t. 13. t. 57. t. 7, and t. 49. (R. rubra; Ger. Em. 1261. Bauh. Pin. 481. Roſa; Matth. Valgr. v. 1. 168. R. mileſia rubra, flore ſimplici; Hort. Eyſt. vern. ord. 6. t. 6. f. 3. R. præneſtina variegata; ibid. t. 2. f. 2. Mill. Ic. 148. t. 221. f. 2.

β. R. *centifolia*. Linn. Sp. Pl. 704. Willd. n. 15. Ait. n. 18. Lawr. Roſ. t. 11. t. 40. t. 85. t. 44. t. 51. t. 2. t. 35. t. 46. t. 67. t. 20. t. 59. t. 47. t. 55. t. 39. t. 73. t. 82. t. 87. t. 79. t. 89. (R. centifolia rubra; Hort. Eyſt. vern. ord. 6. t. 2. f. 1. R. hollandica, ſive batava; Ger. Em. 1262.)

Fruit ovate, hiſpid as well as the flower-ſtalks. Stem hiſpid

hiſpid and finely prickly. Leaflets ovate; hairy beneath. Calyx half-pinnate.—Native of the ſouthern parts of Europe. This, in its nearly ſingle ſtate, is the Roſe always uſed medicinally, for conſerve, tincture, &c. on account of the richer colour, and more aſtringent quality, of its petals. Its numerous varieties are common in gardens throughout Europe, blooming in June and July. We perfectly agree with our friend Mr. Lee of Hammerſmith, that the *R. centifolia* of authors, of which ſo many trifling varieties are indicated above, is itſelf merely a variety of the *gallica*. This a compariſon of their *leaves* will readily prove. The roughneſs of their *leaf-ſtalks* is undoubtedly variable. *R. gallica* in its natural ſtate, as it is ſaid to be in the ſouth of France, and as we ſee it uſually in country gardens and ſhrubberies, is ſcarcely three feet high, throwing up, from its creeping *roots*, many *ſtems*, armed with fine, diſperſed, and not numerous, ſtraight, ſhort *prickles*. *Leaflets* five, large, ovate, doubly ſerrated, overlapping each other at their heart-ſhaped baſe; the under ſide pale, downy or hairy, often whitiſh; the upper ſmooth, of a fine, rather ſhining, green. *Stipulas* linear-lanceolate, pointed, entire, downy and glandular. *Flowers* of a few large ſpreading *petals*, whoſe colour is a peculiarly rich and deep crimſon, their baſe, like the *ſtamens*, of a fine golden yellow. Segments of the *calyx* downy, broad at the baſe, ſome of them fringed at the keel or margin, with a row of linear-lanceolate leaflets, as if pinnate. *Fruit* globular, pale ſcarlet, becoming nearly ſmooth as it ripens. The red and white parti-coloured variety, or *Roſa mundi*, Miſs Lawrance's t. 13, differs only in colour. This is often termed the York and Lancaſter Roſe. The Giant Roſe, her t. 49, is gigantic in ſize and height, but paler in colour. The Velvet Roſe, her t. 51 and t. 2, Hort. Angl. t. 18, is of ſo very dark a colour, at leaſt thoſe flowers which firſt expand, that ſome perſons take the liberty of calling it black, and confirm the miſnomer by a round aſſertion of its being produced by grafting on a black-currant buſh. The innumerable varieties of the *centifolia* differ chiefly in the diſpoſition of their richly multiplied, though diminiſhed, *petals*, and are, many of them, very beautiful from their fullneſs, and preciſe neatneſs of figure; their colours are different ſhades of crimſon, verging to pink, or to a blueiſh-purple.

29. R. *damaſcena*. Damaſk Roſe. Mill. Dict. ed. 8. n. 15. Willd. n. 17. Ait. n. 20. Lob. Ic. v. 2. 206. Lawr. Roſ. t. 38. t. 52. t. 10. t. 5. t. 17. t. 70. t. 58. t. 18. t. 83. t. 80, and t. 90.—Fruit ovate, turgid, hiſpid as well as the flower-ſtalks. Stem and leaf-ſtalks with hooked prickles. Leaflets ovate, pointed, hoary; villous beneath. Calyx half-pinnate.—Native of the ſouth of Europe, and cultivated, time out of mind, in our gardens, flowering in June and July. The ſpecific name ſeems to have originated with Lobel, and indicates that this ſpecies of Roſe came from Damaſcus. Perhaps it may be what is reported to have been brought from Syria by a Comte de Brie, at his return from the cruſades, of which the abbé Rozier ſpeaks in his Cours complèt d'Agriculture; though that author's deſcription accords with the common *R. gallica*, and not with our *damaſcena*, and he calls it moreover *R. provincialis*. We have ſeen an extract only from his work, communicated by a learned friend, to whom we, as well as Mr. Aiton, are indebted for the more correct orthography of Provins, inſtead of Provence, Roſe, for our n. 26. We cite Rozier to ſhew that ſome particular ſort of Roſe was brought from Syria to France; but whether it might be our *damaſcena*, or the *moſchata* hereafter mentioned, which many old authors have termed *damaſcena*, and which is certainly an oriental Roſe; we have not materials even to form a conjecture. The Damaſk Roſe is proverbially ſweet, nor can any be more ſo than the ſpecies now under our conſideration, which forms a buſh four or five feet high. The *leaves* are diſtinguiſhed, at firſt ſight, by a hoary aſpect, and more downy ſurface, than the *provincialis* or *gallica*, as well as by the longer, more pointed, ſhape of their *leaflets*. The prickles of the *ſtem* are broader, and hooked. *Flowers* more copious, with more ſlender and hoary *ſtalks*, as well as *calyx*. Their uſual colour is a delicate uniform pink, verging rather towards purple than ſcarlet, and their fragrance is deliciouſly ſweet as well as laſting. The name of York and Lancaſter Roſe, given to a very caſual and tranſient variety of this, Lawr. t. 10, ſome of whoſe petals are white, others bluſh-coloured, appears much more ſuitable to the red and white *R. gallica*.

30. R. *ſempervirens*. Evergreen Roſe. Linn. Sp. Pl. 704. Willd. n. 18. Ait. n. 21. Sm. Prodr. Fl. Græc. Sibth. v. 1. 348. Fl. Græc. t. 483, unpubliſhed. Lawr. Roſ. t. 45. Cluſ. Exot. append. alt. Dill. Elth. 326. t. 246. (R. moſchata ſempervirens; Tourn. Inſt. 637.)—Fruit ovate, hiſpid as well as the calyx and flower-ſtalks. Stem and leaf-ſtalks with hooked prickles. Leaflets ovate, pointed, ſmooth and ſhining. Flowers ſomewhat umbellate. Bracteas lanceolate, recurved.—Native of Germany, in hedges near Tubingen. *Roth*. Dr. Sibthorp found it very frequent in the hedges of Greece, and the neighbouring iſlands, and judiciouſly conſidered it as the genuine κυνοσβαλον of Dioſcorides, with whoſe rather ample deſcription it exactly agrees. The reader may ſee in John Bauhin's Hiſt. v. 2. 33, what uncertainty has enveloped this ſubject. This Roſe has been cultivated about two hundred years, or perhaps longer, in England, being, on account of its ſingularly luxuriant and rapid growth, as well as the beauty of its ſhining evergreen *leaves*, very fit for covering tall buildings, as well as for making an impervious hedge or trellis. The *flowers* moreover are beautiful, ſweet, of a delicate white, and plentiful whenever they appear at all, laſting through June, July, and Auguſt; but we have, like Cluſius, found this ſhrub little diſpoſed to bloſſom. Its general aſpect, both in *leaf* and *flower*, is moſt like our wild *R. arvenſis*, n. 8; but the ovate *fruit*, yellow when ripe, and the want of a glaucous hue about the *foliage*, *flower-ſtalks* or *buds*, are, among other things, ſufficient marks of difference.

31. R. *lævigata*. Climbing American Roſe. Mich. Boreal-Amer. v. 1. 295. Purſh n. 10.—"Fruit ovate, very denſely hiſpid. Segments of the calyx nearly entire. Prickles in pairs, recurved. Leaf-ſtalks ſlightly prickly. Leaflets lanceolate-oval, almoſt ribleſs, poliſhed. Stipulas narrow, with awl-ſhaped points."—Found in the ſhady woods of Georgia, North America, climbing to a great height. An evergreen *ſhrub*. *Leaflets* three or five. Tube of the *calyx* clothed with long and ſlender *ſpines*. *Purſh*, *Michaux*.

32. R. *pumila*. Dwarf Auſtrian Roſe. Cluſ. Hiſt. 117. Linn. Suppl. 262. Willd. n. 19. Ait. n. 22. Jacq. Auſtr. v. 2. 59. t. 198. (R. auſtriaca; Crantz Faſc. 2. 38.) —Fruit obovate, hiſpid as well as the flower-ſtalks. Leaf-ſtalks and ſtem with ſtraightiſh prickles. Leaflets elliptical, glaucous beneath; their ſerratures glandular.—Common in Auſtria, on dry graſſy hills, eſpecially about woods and thickets, flowering in May and June. *Jacquin*. *Root* creeping. *Stems* twelve or eighteen inches high, erect, ſimple, or ſlightly branched, beſet, in the upper part chiefly, with copious, ſmall, ſlender, nearly ſtraight *prickles*. *Leaflets* five, ſometimes but three, drooping, of a roundiſh-elliptical ſhape, with double glandular ſerratures; ſmooth and green

green above; paler, glaucous, and ſometimes downy, beneath. *Flowers* ſolitary, rather large, crimſon; pale or whitiſh in the centre; very ſweet-ſcented. Segments of the *calyx* partly pinnate, downy within and without. *Fruit* obovate, or pear-ſhaped, ſcarlet, more or leſs hiſpid, its pulp ſweet and agreeable.—We are much inclined to refer this, as a variety, to *R. gallica*, n. 28; at leaſt, if a more natural arrangement of the ſpecies were attempted, they ought to ſtand next to each other. Schleicher has found the *pumila* in Switzerland, nor can we doubt its being Haller's n. 1104, though Jacquin ſays the contrary, on the authority of a dried ſpecimen, of what authority we know not. Haller, in his *Hiſtoria*, adopted his n. 1104 from other authors, nor did he there attempt a ſpecific character; but in his *Nomenclator*, he has given one which preciſely anſwers to Jacquin's plant.

33. R. *turbinata*. Frankfort Roſe. Ait. ed. 1. n. 17. ed. 2. n. 23. Willd. n. 20. Lawr. Roſ. t. 69, marked 63. (R. campanulata; Ehrh. Beitr. v. 6. 97. R. inapertis floribus, alabaſtro craſſiore, francofurtenſis quibuſdam; Tourn. Inſt. 639. R. francofurtenſis; Park. Parad. 414. t. 415. f. 3.)—Fruit turbinate, hairy as well as the flower-ſtalks. Leaf-ſtalks and leaflets villous. Prickles ſcattered, hooked. —The native country of this Roſe is not known; but the ſhrub has been cultivated in gardens, ever ſince the days of Parkinſon, from June to Auguſt. There is an appearance of monſtroſity about the *calyx*, whoſe tube is bell-ſhaped, thick, and dilated at the top; the ſegments however are, moſt of them, quite ſimple and entire. *Petals* large, crimſon. *Leaves* broad, villous.

34. R. *rubiginoſa*. Common Sweet-briar, or Eglantine. Linn. Mant. 2. 564. Willd. n. 21. Ait. n. 24. Fl. Brit. n. 5. Engl. Bot. t. 991. Jacq. Auſtr. t. 50. Ehrh. Beitr. v. 4. 22. Arb. 75. Lawr. Roſ. t. 56. t. 65. t. 72. t. 41. t. 61. t. 74. (R. eglanteria; Herm. Roſ. 17. Hudſ. Angl. 218. R. ſuavifolia; Lightf. Scot. 262. Fl. Dan. t. 870. R. ſylveſtris odora; Ger. Em. 1269. f. 1. R. n. 1103; Hall. Hiſt. v. 2. 39.)—Fruit obovate, briſtly as well as the flower-ſtalks. Prickles of the ſtem and leaf-ſtalks hooked. Leaflets elliptical, clothed beneath with ruſty-coloured glands.—Native of dry ſunny banks in various parts of Europe, flowering in June and July; truly wild in many places in England, where the ſoil is gravelly or ſandy, ſometimes even in wet ſituations about rivers. The *ſtem* is buſhy, much branched, about a yard high, with copious, broad, ſtrongly hooked prickles, of a pale brown, all over its green branches. *Leaflets* five or ſeven, of a roundiſh, elliptical figure, with ſtrong, double, glandular ſerratures; their upper ſurface bright green, ſlightly hairy; the under clothed with reddiſh viſcid glands, the ſeat of a delightful fragrance, which renders the plant acceptable to moſt people, though often compared to the ſcent of apples, which many perſons diſlike. *Flowers* alſo ſweet-ſcented, of a full and uniform pink: occaſionally double, and ſometimes pale or whitiſh, as repreſented in ſome of Miſs Lawrance's plates. *Fruit* ſcarlet, more or leſs obovate, briſtly, often nearly ſmooth; internally mealy and inſipid. This well-known ſhrub makes beautiful and fragrant, though not long-lived, hedges. It bears forcing well, and hence is generally introduced, in winter or ſpring, into the apartments of thoſe who delight in ſuch innocent luxuries. Care ſhould be taken to obtain the true ſort, and not the following ſpecies.

35. R. *micrantha*. Small-flowered Sweet-briar. Sm. Engl. Bot. t. 2490.—Fruit ovate, ſomewhat briſtly, as well as the flower-ſtalks. Stem ſtraggling, with ſcattered hooked prickles. Leaflets ovate, acute, clothed beneath with ruſty-coloured glands.—Mr. W. Borrer finds this ſpecies of Roſe common in hedges and thickets, in England, flowering about June and July. We have alſo met with it in gardens, confounded with the genuine Sweet-briar, from which it differs as follows. The *ſtem* is leſs prickly, leſs buſhy, and of a more elevated and ſtraggling form of growth, like *R. canina*. *Leaflets* leſs rounded, leſs ruſty beneath, and not ſo fragrant as thoſe of *rubiginoſa*. *Flowers* paler, and ſmaller, being leſs than thoſe of any other Britiſh Roſe. *Fruit* ovate, with a more gradual neck, not obovate or pear-ſhaped. It varies in roughneſs. *Footſtalks*, and backs of the *leaves*, downy as well as glandular.

36. R. *ſuaveolens*. American Sweet-briar. Purſh n. 11. ("R. eglanteria americana; Andrews's Roſes, with a figure.")—Fruit ovate. Flower-ſtalks, and prickly leaf-ſtalks, rough with glandular briſtles. Stem ſmooth; its prickles long, ſlender, ſlightly curved. Leaflets roundiſh-elliptical; downy above; ſomewhat glandular beneath.—Native of North America. We received ſpecimens from Pennſylvania, gathered by the Rev. Dr. Muhlenberg. Linnæus cultivated this ſpecies at Upſal, and has preſerved a branch, without name or deſcription, in his herbarium. The plant differs from both the foregoing, in its long, ſlender, ſlightly curved, but by no means hooked, *prickles*, which often ſtand, two together, near, or cloſe to, the baſe of the *leaf-ſtalks*. The *leaflets* are of a broad roundiſh form; finely hairy above; looſely beſprinkled with ſtalked glands, though not ruſty, beneath. *Flowers* pink, ſmall, often, but not always, ſolitary, nor are the ſegments of the *calyx*, as Mr. Purſh deſcribes them, always ſimple or entire; ſome of them are pinnate. *Fruit* ſmooth, or ſomewhat prickly.

37. R. *ſcabriuſcula*. Roughiſh-leaved Dog Roſe. Sm. Engl. Bot. t. 1896. (R. n. 459; Winch Guide, v. 1. 48. v. 2. preface, 5.)—Fruit roundiſh-ovate, briſtly as well as the flower-ſtalks. Prickles awl-ſhaped, nearly ſtraight. Leaflets elliptical, roughiſh with minute hairs.—Native of hedges in Durham and Northumberland, as well as on the north ſide of Bury in Suffolk, flowering in June.—This Roſe has a general reſemblance to *canina* and *tomentoſa*, hereafter deſcribed; but its *pubeſcence* is hairy, more of the nature of the two or three laſt, as are alſo the glandular ſerratures of the *leaves*. There is a harſhneſs about them, very unlike the *tomentoſa*, nor have they any greyiſh hoary hue. Their ſcent is ſcarcely any. The *ſtem* is tall, with copious, ſcattered, nearly ſtraight, and rather ſlender, brown *prickles*. *Leaf-ſtalks* hairy, prickly, and clothed with glandular briſtles. *Leaflets* elliptical, pointed, doubly and ſharply ſerrated, of a light bright green; finely hairy all over their upper ſurface, but moſt ſo on the rib and veins beneath. *Flower-ſtalks* and young *fruit* beſet with ſtrong glandular briſtles. *Calyx* partly pinnate; downy within; glandular and briſtly at the outſide. *Petals* moderately large; Mr. Winch finds them always white, tinged or blotched with red; in Suffolk they are moſtly of a pale pink. *Fruit* large, red, inclining to a globular figure.

38. R. *cæſia*. Glaucous-leaved Dog Roſe. Sm. Engl. Bot. t. 2367. (R. canina pubeſcens; Afzel. in Sims and Kon. Ann. of Bot. v. 2. 211.)—Fruit roundiſh-ovate, ſmooth. Prickles of the ſtem hooked. Leaflets ovate, pointed, doubly ſerrated, downy; very glaucous as well as the germen and young branches.—Found by Dr. Adam Afzelius in Sweden, and by Mr. W. Borrer in the highland valleys of Perthſhire and Argyleſhire, flowering profuſely in July. Mr. Borrer deſcribes the *buſh* as "compact, not ſo tall as the *canina*. *Flowers* uſually ſolitary; ſometimes in pairs, generally of an uniform, but very beautiful, carnation hue; occaſionally white. *Calyx* ſometimes ſprinkled with glands, ſometimes not. Young *twigs*, *leaves* and *germen*

men remarkably cæſious." His ſpecimens accord preciſely with thoſe ſent by Dr. Afzelius. The very glaucous *leaves*, clothed on both ſides with fine hairy pubeſcence, eſſentially diſtinguiſhes this plant from *canina*, under which ſo many diſtinct ſpecies have been negligently confounded, by moſt botaniſts, till within a few years paſt. The *fruit* has been obſerved by Dr. Swartz to vary ſomewhat in form, being occaſionally oblong, obovate, or nearly globoſe: in a young ſtate it is glaucous and blueiſh; always ſmooth. *Calyx* partly pinnate.

39. R. *tomentoſa*. Downy-leaved Dog Roſe. Fl. Brit. n. 4. Engl. Bot. t. 990. Ait. n. 31. (R. villoſa; Ehrh. Arb. 45. Villars Dauph. v. 3. 551. R. ſylveſtris alba, cum aliquo rubore, folio hirſuto; Bauh. Hiſt. v. 2. 44.)—Fruit ovate, briſtly as well as the flower-ſtalks. Prickles of the ſtem hooked. Leaflets ovate, downy on both ſides.—Native of woods, hedges, and thickets, in various parts of England, flowering in June and July. It is alſo found in Germany and Dauphiny. The *ſtem* is buſhy, and moderately tall. *Prickles* hooked, generally placed under the inſertion of each leaf-ſtalk, either ſolitary or in pairs. *Leaflets* five or ſeven, ovate, acute, with fine double glandular ſerratures, of a grey hoary green, denſely clothed on both ſides with ſoft pubeſcence, and, when rubbed, exhaling a ſlight aceſcent fragrance, moſt like the ſmell of *R. villoſa*, n. 20. *Calyx* pinnate, in the manner deſcribed in the generic character, clothed externally with glandular briſtles. *Fruit* in every ſtate, more or leſs briſtly, though ſometimes nearly ſmooth, while the *flower-ſtalks* are always very briſtly; its colour when ripe is a tawny ſcarlet. *Petals* almoſt white towards their baſe, otherwiſe elegantly roſe-coloured, and a little fragrant. Specimens from Ehrhart and Villars have determined their ſynonyms; though the latter, at leaſt, by his deſcription, has apparently confounded the true *villoſa* with our *tomentoſa*. So little were Roſes underſtood or conſidered at one time, that we recollect many grave debates among the Norwich botaniſts, about thirty years ago, whether this moſt diſtinct ſpecies were different or not from the common *canina!*

40. R. *canina*. Common Dog Roſe, Wild Briar, or Hep-tree. Linn. Sp. Pl. 704. Willd. n. 31. Ait. n. 30. Fl. Brit. n. 6. Engl. Bot. t. 992. Curt. Lond. faſc. 5. t. 34. Woodv. Med. Bot. t. 139. Fl. Dan. t. 555. Lawr. Roſ. t. 81. t. 60. Ehrh. Arb. 55. (R. n. 1101; Hall. Hiſt. v. 2. 38.)—Fruit ovate, ſmooth as well as the flower-ſtalks. Prickles of the ſtem ſcattered, hooked. Leaflets ovate, pointed, very ſmooth, unequally ſerrated.—Very common in hedges and thickets in Britain, as well as throughout Europe, flowering in June. Few plants contribute ſo much to the ornament of the country, for it is certainly the moſt elegant of our Roſes; the ſcent of its *flowers*, and the flavour of its *fruit*, are both peculiarly grateful. The latter, when mellowed by froſt, affords a moſt agreeable conſerve, kept in the apothecaries' ſhops. The *ſtem* is often ſix or ſeven feet high, erect and ſtraggling, with irregularly diſperſed, pale brown, broad *prickles*. *Leaflets* uſually ſeven, of a dark ſhining myrtle-like green; paler, or glaucous in ſome degree, underneath; with numerous, ſharp, unequal, not glandular, ſerratures. *Leaf-ſtalks* ſmooth, armed with a few hooked prickles. *Flower-ſtalks* terminal, naked and very ſmooth, often ſolitary, ſometimes two, three, or four in a kind of umbel. *Calyx* downy, ſcarcely ever glandular. *Fruit* oblong-ovate, of a coral red, almoſt always quite ſmooth.

41. R. *collina*. Rough-ſtalked Dog Roſe. Jacq. Auſtr. v. 2. 58. t. 197. Willd. n. 32. Ait. n. 32. Engl. Bot. t. 1895.—Fruit ovate, ſmooth. Flower-ſtalks briſtly, cluſtered. Prickles of the ſtem ſcattered, hooked. Leaflets ovate, downy beneath, ſimply ſerrated. Leaf-ſtalks downy.—Gathered by Jacquin on hills in Auſtria. Mr. W. Borrer finds it common in Suſſex, flowering in July, and ripening fruit in October.—Its habit and general aſpect are like the *canina*. The *prickles* are diſperſed, hooked. *Leaflets* uſually ſeven, variable in length and roundneſs, ſimply, and tolerably equally, ſerrated; always downy, or finely hairy, beneath, eſpecially the rib; ſometimes ſlightly ſo above. They have no ſcent, and are thicker, as well as leſs ſhining, than thoſe of *canina*. *Leaf-ſtalks* downy and prickly. *Flowers* pale pink, fragrant, commonly two or three together, on *ſtalks* covered with glandular briſtles. *Fruit* in every ſtage ovate and ſmooth, except now and then a ſtraggling briſtle or two; ſcarlet when ripe, and ſaid not to be diſtinguiſhable from *canina*. We have never taſted it. The *ſtyles*, after flowering, are combined and elongated, as in *R. arvenſis*.

42. R. *dumetorum*. Downy-ſtalked Dog Roſe. "Perſ. Syn. part 2. ſect. 1. 50?" Engl. Bot. t. 2579.—Fruit ovate, ſmooth. Flower-ſtalks villous, ſomewhat briſtly, cluſtered. Prickles of the ſtem hooked, rather aggregate. Leaflets ovate, doubly ſerrated; ſlightly hairy beneath. Leaf-ſtalks very downy.—Gathered by Mr. W. Borrer, in buſhy places in Suſſex, flowering in July, and ripening fruit in October. We believe it alſo to have been found in Switzerland, near Orbe, by the late Mr. Davall, and there is a ſpecimen, without name, or any mark, in the Linnæan herbarium. The ſynonym of Perſoon was ſuggeſted by Mr. Borrer, nor have we any further authority for its application. The habit of the *ſhrub* is more robuſt than *R. canina*, with very ſtrong hooked *prickles*, uſually placed in pairs under each *footſtalk*, and ſometimes three or more together under the lateral branches. It differs alſo from that ſpecies in having very downy *footſtalks*; *leaflets* rounder and flatter, doubly ſerrated, their ribs and veins hairy beneath; the *flower-ſtalks* either villous and briſtly, or only villous, with ſoft, ſpreading, permanent hairs; rarely ſmooth. Theſe hairs, and the double ſerratures, diſtinguiſh it from *collina*, with which its downy *leaf-ſtalks* agree. The *flowers* are ſmaller and paler than in either of thoſe ſpecies. The *ſtyles* accord with *canina*, not with thoſe of *collina*.

43. R. *moſchata*. Muſk, or Cluſter, Roſe. Mill. Dict. ed. 8. n. 13. Willd. n. 23. Ait. n. 26. Desfont. Atlant. v. 1. 400. Lawr. Roſ. t. 64. t. 53. Jacq. Hort. Schoenbr. v. 3. 16. t. 280. Ger. Em. 1265. f. 1 and 2. (R. moſchata minor, flore ſimplici; Bauh. Hiſt. v. 2. 45; and flore pleno; ibid. 47.)—Fruit ovate, villous when young, as well as the flower-ſtalks. Stem and leaf-ſtalks prickly. Leaflets oblong, pointed, ſmooth. Panicles many-flowered, downy as well as the calyx.—Desfontaines found this elegant and fragrant Roſe growing every where in the hedges of Barbary. It is cultivated by the inhabitants of Tunis, who obtain from its petals, by diſtillation, a very fragrant eſſential oil; the ſame, if we miſtake not, which in the Eaſt Indies is called *Ottar*. The *ſhrub* is common in our gardens, and has been ſo from Gerarde's time, flowering from July to October. The ſemidouble kind moſt uſually occurs. The *ſtems* are long and lax, ſmooth, beſet with ſcattered, ſhort, hooked *prickles*. *Leaves* of a light, ſlightly glaucous green, eſpecially beneath, ſmooth, except ſome downineſs on their *footſtalks*, and their ribs beneath. *Stipulas* ſmall, narrow, fringed with glands, and divaricated at the points. *Flowers* rather ſmall, white, exceedingly numerous, in large terminal *panicles*, whoſe *ſtalks* are ſlender, downy, deſtitute of prickles or glands, as is likewiſe the ſlender, downy, partly pinnate, *calyx*. *Petals* with ſlender claws. *Fruit* ſmall, ſmooth, orange-coloured.—R. moſchata major, Bauh. Hiſt.

v. 2. 45. Lob. Ic. v. 2. 208, quoted by Miller incautiouſly for this, may be *R. damaſcena.*

44. R. *rubrifolia.* Red-leaved Roſe. Villars Dauph. v. 3. 549. Willd. n. 24. Bellardi Append. ad Fl. Pedem. 23. t. 4. (Roſier multiflore; Reynier Mem. de la Suiſſe, v. 1. 222.—Fruit roundiſh-ovate, ſmooth as well as the flower-ſtalks. Prickles of the ſtem and leaf-ſtalks hooked. Leaflets ovate, ſmooth, coloured, ſimply ſerrated. Flowers corymboſe, with ſheathing dilated bracteas and ſtipulas.—Native of the mountains of Switzerland, Dauphiny, and Savoy; a ſtranger to our gardens. The whole plant, *branches, leaves, ſtalks,* and tube of the *calyx,* are more or leſs tinged with a vinous red. The *ſtem* is erect and robuſt, ten to fifteen feet high, armed with ſcattered, diſtant, recurved *prickles. Leaflets* ſeven or nine, large, broadly ovate, with ſtrong ſharp ſerratures, ſmooth on both ſides, with numerous, parallel, red veins. *Stipulas* red, ſmooth; the upper ones, near the flowers, much dilated, and replaced immediately by ſimilar, but ſmaller, *bracteas. Flowers* from three to five, of a fine pink, forming a ſhort ſmooth *corymb.* Segments of the *calyx* almoſt entirely ſimple, very long and ſlender, downy within, ſlightly glandular at the edges, each terminating in a long, lanceolate, leafy point. *Fruit* oval, ſmall, ſmooth. Villars ſays the cultivated plant retains the peculiar red tints of its *bark* and *foliage;* only the ſize of the *flowers* is ſomewhat diminiſhed.

45. R. *lagenaria.* Bottle-fruited Roſe. Villars Dauph. v. 3. 553. Willd. n. 25.—Fruit obovate, beaked, ſmooth, pendulous. Stem without prickles. Leaf-ſtalks rather prickly. Flower-ſtalks downy, ſomewhat cymoſe. Leaflets elliptical, doubly ſerrated, ſmooth as well as the calyx. —Native of France, in the diſtrict of Embrun, among the woods of Boſcodon. Villars ſays he never met with this ſpecies elſewhere. He deſcribes it as akin to the following, but differing in its large leafy *calyx,* and the greatly elongated ſpindle-ſhaped *fruit,* having a neck like that of a bottle. The *ſtem* is from three to five feet high, without thorns. *Leaflets* thin, obtuſe. *Flower-ſtalks* three together, ſlightly downy, recurved. We have ſeen no ſpecimen.

46. R. *alpina.* Alpine Roſe. Linn. Sp. Pl. 703. Willd. n. 26. Ait. n. 27. Villars Dauph. v. 3. 552. Sm. Tour on the Cont. v. 3. 137. 140. Jacq. Auſtr. t. 279. Lawr. Roſ. t. 30. (R. n. 1107; Hall. Hiſt. v. 2. 41.)—Fruit ovate, ſmooth. Stem without prickles. Leaf-ſtalks and flower-ſtalks briſtly. Leaflets elliptic-oblong, doubly ſerrated, ſmooth.—Very common in the alpine thickets of Switzerland, Savoy, Dauphiny, Auſtria, &c. flowering from June to Auguſt. It has long been cultivated in botanic gardens, but is not one of our popular ſpecies, being, though an elegant plant, and remarkable for the want of prickles, leſs ſtriking than *R. pendulina,* which is alſo known by the name of "the Roſe without a thorn." The preſent has ſmooth, ſpreading, ſometimes procumbent, *ſtems* and *branches,* of a ſhining deep red, obſerved by Jacquin to be occaſionally hairy or briſtly, but never thorny. *Leaflets* ſeven or nine, elliptic-oblong, uſually more than an inch in length, thin, ſmooth, doubly and ſharply ſerrated; paler beneath, with ſome hairs, now and then, on the midrib. *Flowers* generally ſolitary, of a rich and elegant roſe-colour, on drooping, red *ſtalks,* clothed with glandular briſtles. *Calyx* downy, with long, ſimple, ſlender, rather leafy-pointed ſegments; its tube generally ſmooth, though we have from M. Du Cros, a ſpecimen with briſtles on that part, as well as on the ſegments of the calyx. *Fruit* pendulous, oval, ſomewhat beaked, of a fine ſcarlet.—Miſs Lawrance's t. 75 cannot poſſibly have any relationſhip to this ſpecies; ſee *lucida,* n. 14.

47. R. *pyrenaica.* Pyrenæan Roſe. Gouan. Illuſtr. 31. t. 19. Willd. n. 27.

β. R. pimpinellifolia; Villars Dauph. v. 3. 553. (R. glanduloſa; Bellardi Append. ad Fl. Pedem. 24.)

Fruit ovate, hiſpid as well as the flower-ſtalks, and ſomewhat prickly leaf-ſtalks. Stem without prickles. Leaflets elliptical, doubly ſerrated, ſmooth.—Native of vallies among the Pyrenæan mountains, as well as of Switzerland and Dauphiny. We are fully perſuaded that the *R. pimpinellifolia* of Villars is, as he himſelf ſuggeſts, but a variety of Gouan's *pyrenaica,* nor can we trace out ſufficient marks to deſcribe it even as a variety. The glandular edging of the *ſtipulas,* on which our worthy friend Bellardi has founded its character and name, is no leſs evident and conſtant in *pyrenaica,* and even in *alpina* itſelf; of which laſt indeed we are ſtrongly inclined to conſider the ſuppoſed ſpecies, both of Gouan and Villars, as mere varieties, differing from the uſual kind in their briſtly *calyx* and *fruit.* The ſegments of the *calyx* are ſimple, with more or leſs leafy points in all, nor does Gouan mention any thing that affords a permanent mark of diſcrimination between *pyrenaica* and *alpina.*

48. R. *pendulina.* Smooth Pendulous Roſe. Roſe without a thorn. Linn. Sp. Pl. 705. Willd. n. 28. Ait. n. 28. Purſh n. 12. Ehrh. Arb. 105. Lawr. Roſ. t. 9. (R. ſanguiſorbæ majoris folio, fructu longo pendulo; Dill. Elth. 325. t. 245. f. 317.)—Fruit ovate, elongated, ſmooth, pendulous. Stem and branches ſmooth, without prickles. Flower-ſtalks and leaf-ſtalks hiſpid. Leaflets elliptical, doubly ſerrated, ſmooth, rather numerous. Segments of the calyx ſimple, naked and entire. Dillenius ſays this ſpecies was raiſed, in the Eltham garden, from New England ſeeds; but Mr. Purſh never met with it wild in any part of North America; and Ehrhart gives his ſpecimen as a Swiſs plant. We believe however that it is a North American, not an European ſhrub. In our gardens it bloſſoms towards the end of May, ripening fruit in Auguſt. The *ſtem* is five or ſix feet high, buſhy, ſmooth, dark red, nor is there a prickle to be found on any part of the plant. *Leaves* bearing a conſiderable reſemblance to thoſe of the Greater Burnet, *Sanguiſorba,* and compoſed of from nine to thirteen large, elliptical, ſmooth *leaflets,* paler beneath, with double glandular ſerratures. *Flowers* ſolitary, crimſon, on glandular, rather than briſtly, *ſtalks.* Tube of the *calyx* oblong, very ſmooth; its ſegments quite ſimple, entire, narrow, downy at the edges, but deſtitute of dorſal prickles or glands. *Fruit* pendulous, ſcarlet, ſmooth and ſhining, remarkably elongated, beaked and curved, ſufficiently diſcriminating the ſpecies, which nevertheleſs is nearly related to *R. alpina,* but in every part more robuſt.

49. R. *montana.* Round-leaved Mountain Roſe. Villars Dauph. v. 3. 547. Willd. n. 29.—Fruit oval, briſtly as well as the flower-ſtalks. Leaf-ſtalks prickly and glandular. Stem with hooked ſolitary prickles, below each leaf. Leaflets roundiſh, abrupt, doubly ſerrated, ſmooth.—Native of hills in Dauphiny and Switzerland. A very diſtinct ſpecies, of which we have ſpecimens from Mr. Schleicher. The *ſtem* is only two or three feet high, but ſtrong, with many ſpreading, reddiſh, ſmooth *branches. Prickles* pale brown, moderately hooked or deflexed, awl-ſhaped, with a long linear baſe. They ſtand ſolitary, a little below each branch or leaf. *Stipulas* broad, fringed with glands. *Leaf-ſtalks* purpliſh, ſlightly prickly and glandular. *Leaflets* ſeven, ſomewhat glaucous, much reſembling thoſe of the Leſſer Burnet, *Poterium;* their termination generally abrupt, and their ſerratures coarſe, ſcarcely glandular; the midrib now and then hairy beneath. *Flower-ſtalks* terminal, ſhort, very briſtly and glandular, either ſolitary,

litary, or two or three together, enveloped in the uppermoſt *ſtipulas*. *Petals* ſmall, generally white, ſometimes red. Segments of the *calyx*, briſtly and glandular at the back, partly pinnate. *Fruit* red, armed with many ſtrong briſtles. This ſpecies has but a remote affinity to either *canina* or *arvenſis*, with which Villars contraſts it, except that the *ſtyles* are ſaid to be elongated, after flowering, as in the latter.

50. R. *multiflora*. Bramble-flowered Chineſe Roſe. Thunb. Jap. 214. Willd. n. 30. Ait. n. 29. Curt. Mag. t. 1059. ("R. flava; Donn. Cant. ed. 4. 121.") —Fruit ovate, villous, unarmed. Flower-ſtalks villous, racemoſe. Stem and leaf-ſtalks prickly. Leaflets ovate, ſimply ſerrated; downy beneath.—Native of Japan and China. Introduced into this country by Thomas Evans, eſq. of Stepney, about the year 1804. It is hardy, flowering in June and July, and a great acquiſition to the gardens, being a *ſhrub* of luxuriant growth, eaſily trained to a conſiderable height. The *leaves* are of a greyiſh aſpect; ſmooth above; paler and downy beneath; their ſerratures ſimple. *Flowers* in cluſters, ſimple or compound, reſembling thoſe of the double-flowering Bramble, and not much larger. Thunberg deſcribes them white; with us they are pink, with very numerous, ſmall, imbricated *petals*, a few remains of *ſtamens*, and ſome elongated, dilated, greeniſh *ſtyles*. The *flowers*, on the firſt introduction of the plant, were reported to be yellow, but we have not heard of any ſuch variety having made its appearance.

51. R. *caucaſica*. Caucaſian Roſe. "Marſch. Taurico-Caucaſ. v. 1. 400." Ait. n. 33.—"Fruit ovate, ſmooth as well as the flower-ſtalks. Leaf-ſtalks prickly. Stem not hairy; its prickles hooked. Leaflets doubly ſerrated, downy. Flowers umbellate."—Native of mount Caucaſus, from whence it is ſaid, in Hort. Kew., to have been brought to England about the year 1798. It is a hardy ſhrub, flowering in June and July. We have ſeen neither ſpecimen nor figure. If the plant ſtill exiſts in our collections, it ought to be delineated and given to the public.

52. R. *parvifolia*. Small-leaved, or Burgundy, Roſe. Ehrh. Beitr. v. 6. 97. Willd. n. 33.—"Fruit ovate, nearly ſmooth. Flower-ſtalks glandular. Leaf-ſtalks and ſtem with minute ſtraight prickles. Leaflets ovate, rugged; ſomewhat villous beneath; their ſerratures glandular." Said to be a native of Europe. A dwarf *ſhrub*. *Leaflets* five, ſmall, ovate, acute. *Flowers* ſmall. *Willdenow*. We know not what is intended under the above deſcription, unleſs it be the Burgundy Roſe, Miſs Lawrance's t. 44, which we have, after the example of Hort. Kew. conſidered as a variety of *centifolia* or *gallica*, ſee n. 28. The characters anſwer, as far as any thing can be made out by the figure. We ſhould have ſuſpected the Roſe de Meaux, Miſs Lawrance's t. 31, might have been Ehrhart's and Willdenow's plant; but the latter has duly referred that, as we have done, to *provincialis* in its proper place, and having ſeen both in a living ſtate, muſt be preſumed to have diſtinguiſhed them. There ſeems a great probability that the *parvifolia* in queſtion is ſome garden variety of the *gallica*, to which its characters approach ſufficiently near to authorize this opinion. We leave it for the final determination of thoſe who may meet with authentic ſpecimens.

53. R. *ſemperflorens*. Dark Chineſe Roſe. Curt. Mag. t. 284. Willd. n. 34. Ait. n. 34. Sm. Exot. Bot. v. 2. 63. t. 91. Lawr. Roſ. t. 28. Jacq. Hort. Schoenbr. v. 3. 17. t. 281. (R. diverſifolia; Venten. Jard. de Cels, t. 35.)—Fruit ovate, roughiſh. Stem, leaf-ſtalks, and flower-ſtalks, hiſpid or prickly. Prickles hooked. Leaflets three or five, ovate, ſmooth; paler beneath, with a hairy rib. Calyx reflexed, entire.—Native of China, from whence it was introduced by the late Mr. Slater, about the year 1789. The ſhrub is perfectly uninjured by any of our froſts, and where the air is pure, grows luxuriantly in the open ground, flowering moſt part of the year. Yet it ſometimes dies off unaccountably, and is not become ſo general an ornament of every cottage garden as the Pale Chineſe Roſe, hereafter mentioned, brought to England about the ſame period. The *ſemperflorens* is generally of humble growth, but in a rich loamy ſoil, on the outſide of a greenhouſe, may be trained to a conſiderable height. The *ſtem* is much and variouſly branched, armed with ſcattered, ſhort, hooked prickles. *Leaflets* three or five, ovate, acute, rigid, unequally ſerrated; of a dark ſhining green, and ſmooth, above; paler, and rather glaucous, beneath, with a denſely hairy rib. *Leaf-ſtalks* clothed with glandular briſtles, and ſome ſoft hairs, as well as with a few hooked prickles. *Stipulas* linear, acute, fringed with ſtalked glands. *Flower-ſtalks* terminal, uſually ſolitary, rough with glands or prickles, ſingle-flowered. Segments of the *calyx* reeflxed, lanceolate, coloured, ſimple and entire, downy, more or leſs fringed or glandular at the edges. *Petals* deep crimſon, ſometimes very dark, tremulous from the ſlenderneſs of their claws; paler at the back. The figures in Ventenat, and our Exotic Botany, exhibit the *flowers* in a ſingle ſtate; the reſt have double *flowers*, as uſually ſeen in gardens. Jacquin repreſents a ſuppoſed bluſh-coloured variety, which is probably *indica*, n. 55. The *fruit* is moſtly roughiſh, at leaſt when young; but ſometimes quite ſmooth. We have not met with it ripe. The *ſhrub* is readily increaſed by cuttings.

54. R. *chinenſis*. Slender Chineſe Roſe. Jacq. Obſ. faſc. 3. 7. t. 55.—"Fruit ovate, ſmooth as well as the flower-ſtalks. Leaf-ſtalks and ſtem prickly. Leaflets uſually three, ovato-lanceolate, finely ſerrated, ſmooth."—Native of China. Deſcribed by Jacquin from ſome ſpecimens belonging to Gronovius. He ſpeaks of the *leaves* as perfectly ſmooth and ſhining, and the ſegments of the *calyx* fringed with down. The *leaves* were moſtly ternate, ſome of them only having a ſmall additional leaflet at one ſide. This is very likely to be, as Willdenow ſuſpected, the ſame ſpecies with our *ſemperflorens*. If it ſhould ſo prove, we hope the latter name, though of poſterior date, will not be ſacrificed to one ſo vague and indiſcriminate as *chinenſis*; eſpecially as *ſemperflorens* is now eſtabliſhed in ſyſtematic works of authority, and Jacquin himſelf, who, in his Hort. Schoenbr. conſidered theſe plants as the ſame, has liberally preferred it.

55. R. *indica*. Bluſh Chineſe Roſe. Linn. Sp. Pl. 705. Willd. n. 36. Ait. n. 35. (R. ſemperflorens β; Lawr. Roſ. t. 26. R. longifolia; Willd. n. 37.)—Fruit ovate, ſmooth. Flower-ſtalks briſtly and glandular. Leaf-ſtalks glandular and prickly. Leaflets ovate, pointed, ſmooth; paler beneath. Prickles of the ſtem ſcattered, ſlightly hooked. Flowers ſomewhat corymboſe. Calyx partly pinnate and leafy.—Native of China and the Eaſt Indies. Introduced by ſir J. Banks, about the year 1789, into the gardens of England, where it proves quite hardy, flowering profuſely, almoſt throughout the year; and is undoubtedly one of the moſt deſirable acquiſitions, of the ornamental kind, that our collections have for a long time received. The *ſhrub* is of rapid and lofty growth, much ſtronger than *R. ſemperflorens*. *Stem* more or leſs armed with ſcattered, very ſtrong, reddiſh, ſharp, hooked or recurved *prickles*, which we have never found entirely wanting. *Leaves* of a full, bright, ſhining green on the upper ſide; paler, opaque, and a little glaucous, beneath; their *leaflets* for the more part five, ovate, taper-pointed, ſharply and

pretty equally, but not ſtrongly, ſerrated. *Leaf-ſtalks* bordered with glandular briſtles, and furniſhed with a few hooked prickles. *Stipulas* linear, narrow, reticulated, fringed with red glandular briſtles; their points acute, divaricated at right angles. *Flower-ſtalks* terminal, very numerous and corymboſe in ſtrong-growing plants; in ordinary ones fewer; in ſome ſolitary and ſingle-flowered at the ends of weak lateral branches. They are always clothed with minute glandular briſtles, even in the original ſpecimen of Linnæus, which he deſcribed as ſmooth. Neither are the *leaves* of that ſpecimen downy beneath. He ſeems to have taken that character from another, which he confounded therewith, but which we judge to be *moſchata*, whoſe very young *leaves* bear a few hairs on their ribs and veins. *Flowers* moderately large, in a double ſtate conſiſting of numerous, lax, diſorderly *petals*, varying with every tint of pink or carnation, and having a ſweet, though light, odour, as in *ſemperflorens*, but not exactly the ſame. The perfume of both is very inferior to moſt of our garden Roſes, and even to the wild *R. canina*. The *calyx* of *R. indica* is variable in luxuriance, but always in ſome degree leafy, pinnate, or jagged. *Fruit* large, pale ſcarlet. On a careful compariſon of Willdenow's *longifolia*, (ſent by the Rev. Dr. Rottler, and by the late Dr. Koenig, from the Eaſt Indies,) with our garden plant, and the Linnæan ſpecimen, we can have no doubt of their perfect identity; though the prickles of the *ſtem* ſeem wanting on the upper part, at leaſt, of the luxuriant Indian ſpecimens. Every one, who has attended to the cultivated *R. indica*, will be aware that this circumſtance is of no importance, in the conſideration of ſuch materials as we have before us.

56. R. *bracteata*. Macartney Roſe, or Sir George Staunton's Roſe. Willd. n. 38. Ait. n. 36. Venten. Jard. de Cels, t. 28. Curt. Mag. t. 1377. (R. lucida; Lawr. Roſ. t. 84.)—Fruit obovate. Bracteas pectinated, concealing the flower-ſtalk, which is villous like the young branches. Prickles in pairs under the prickly leaf-ſtalks. Leaflets obovate, obtuſe, crenate, ſmooth and ſhining. Stipulas deeply jagged. Calyx ſilky, taper-pointed.—Native of China, from whence it was brought by lord Macartney and ſir G. Leonard Staunton, in 1795. It proves tolerably hardy in England, flowering from Auguſt to the end of autumn; but is often ſo much injured by expoſure to our ſevere froſts, as ſeldom to recover ſufficiently to bloſſom well in the enſuing ſummer. The *ſtem* is four or five feet high, downy, armed with a pair of deflexed reddiſh prickles under each *leaf-ſtalk*, and with innumerable minute ſtraight ones over the whole ſurface. *Leaf-ſtalks* hairy, glandular, and prickly. *Leaflets* about ſeven or nine, rigid, ſhining, of a fine green; their ribs minutely prickly. *Stipulas* but little attached to the leaf-ſtalk, deeply cut, or pectinated, at one ſide. *Flowers* terminal, ſolitary, large, cream-coloured, agreeably ſcented, on ſhort hairy *ſtalks*, which are concealed by ſeveral large, ſheathing, deeply pectinate, or pinnatifid, *bracteas*. *Calyx* coriaceous, taper-pointed, very ſilky externally. Ventenat mentions a ſmall central point, in the ſinus of each *petal*, which we do not find conſtant. The *ſtipulas*, and eſpecially the *bracteas*, are ſo peculiar, that this ſpecies can be confounded with no other.

57. R. *alba*. White Garden Roſe. Linn. Sp. Pl. 705. Willd. n. 39. Ait. n. 37. Lawr. Roſ. t. 37. t. 25. t. 23. t. 32. Ger. Em. 1260, with the ſame cut which Lobel uſes for *R. damaſcena*.—Fruit ovate, ſmooth. Flower-ſtalks and calyx briſtly. Leaf-ſtalks downy, armed like the ſtem with hooked prickles. Leaflets roundiſh-ovate, ſharply ſerrated, downy beneath. Calyx partly pinnate.—Native of Europe; in the hedges and thickets of Heſſe and Saxony, according to Roth. Common in our gardens from the days of Gerarde, flowering in June and July. The buſh is five or ſix feet high. *Leaves* dark green, of five or ſeven large, broad *leaflets*, ſharply and copiouſly ſerrated, veiny; paler, and more or leſs downy, beneath. *Stipulas* paler, broad, dilated upwards, with glandular ſerratures, and obliquely ſpreading points. *Flowers* large, ſomewhat corymboſe, pleaſantly but weakly ſcented, uſually pure white, but often tinged with a moſt delicate bluſh, as in Miſs Lawrance's t. 23 and t. 32. Segments of the *calyx* partly bordered with long leafy appendages, glandular at the edges. *Bracteas* like the *ſtipulas*, but more ovate. *Fruit* tawny, rarely perfected in gardens. We can give no good reaſon for placing the preſent ſpecies here, at a diſtance from *gallica*, n. 28, to which it is moſt naturally allied. No difficulty or confuſion indeed can ariſe reſpecting a plant ſo well known, and ſo clearly defined. The White Roſe was formerly an article of the Materia Medica, its diſtilled water, which poſſeſſes a ſlight aſtringency, being ſuppoſed good for inflammations and weakneſſes of the eyes. A more fragrant water, equally colourleſs and efficacious, is diſtilled from the Provins roſe, n. 26; which, we believe, is uſually kept in the ſhops. In ſome of this, after long keeping, we have ſeen a floating oilineſs, as deliciouſly and powerfully fragrant as the oriental ottar of roſes.

Our catalogue of ſpecies thus amounts to 18 more than Willdenow's, notwithſtanding ſome retrenchments. The drawings of the Chineſe afford reaſon to ſuppoſe we are not yet acquainted with all their ſpecies, and we have already hinted that ſome Iriſh ones are ſtill waiting for more complete elucidation than they have hitherto received. The diſtribution of the ſpecies in general requires reviſion; nor have botaniſts ſufficiently adverted to ſome characters, that appear to us more important than ſeveral they have depended upon. The number, and preciſe ſituation, of the ſubſtipulary prickles, the form of the ſtipulas, and the ſtructure of the calyx, appear to us more conſtant, than the abſence or preſence of glands, or of pubeſcence, in certain parts. The nature of the ſerratures of the leaves, whether ſimple or double, glandular or not, is likewiſe occaſionally worthy of notice.

Rosa, in *Gardening*, contains plants of the deciduous flowering, ſhrub, and evergreen kind, of which the ſpecies cultivated are: the ſingle yellow roſe (R. lutea); the double yellow roſe (R. ſulphurea); the Hudſon's-bay roſe (R. blanda); the cinnamon roſe (R. cinnamomea); the white dog roſe (R. arvenſis); the ſmall burnet-leaved roſe (R. pimpinellifolia); the Scotch roſe (R. ſpinoſiſſima); the ſmall-flowered American roſe (R. parviflora); the ſhining-leaved American roſe (R. lucida); the Carolina roſe (R. carolina); the apple roſe (R. villoſa); the Provence roſe (R. provincialis); the hundred-leaved roſe (R. centifolia); the red roſe (R. gallica); the damaſk roſe (R. damaſcena); the evergreen roſe (R. ſempervirens); the dwarf Auſtrian roſe (R. pumila); the Frankfort roſe (R. turbinata); the ſweet-briar roſe (R. rubiginoſa); the moſs Provence roſe (R. muſcoſa); the muſk roſe (R. moſchata); the Alpine roſe (R. alpina); the deep red China roſe (R. ſemperflorens); and the white roſe (R. alba).

Of the firſt there is a variety termed the Auſtrian roſe, which has the ſtalks, branches, and leaves, like thoſe of the ſingle yellow roſe, but the leaves are rounder. The flowers are alſo larger; the petals have deep indentures at their points; are of a pale yellow on the outſide, and of a reddiſh copper colour, orange ſcarlet, or barré colour within; are ſingle, have no ſcent, or a diſagreeable one, and ſoon fall away.

away. It has ſometimes flowers entirely yellow on one branch, and copper-coloured on another.

In the fourth ſpecies there is a double variety, in which the ſhoots are redder; the flowers ſmall, ſhort, thick, and double, of a pale red colour at the end of the leaves (petals), ſomewhat redder and brighter towards the middle. It is the ſmalleſt and earlieſt of the double garden roſes, flowering in May.

In the ſeventh ſort there are ſeveral varieties, as the ſtriped-flowered, or with variegated flowers, red ſtriped with white. The red Scotch roſe, which ſeldom riſes more than a foot high; the ſtalks are covered with a brown bark, and are cloſely armed with ſmall ſpines; the leaves are very ſmall; the flowers are alſo ſmall, ſeſſile, and of a livid red colour; the fruit is round, of a deep purple colour, inclining to black when ripe. And according to Withering, there is alſo a variety with prickly peduncles, and cream-coloured flowers, changing to white. Lawrance likewiſe mentions a double Scotch roſe.

In the eighth kind there is a variety with a double flower.

Of the twelfth ſpecies there are ſeveral varieties, as the red Provence roſe; the ſtem and branches are not ſo great as thoſe of the other, but greener, the bark not being ſo red; the flowers are not ſo large, thick and double, but of a little deeper damaſk or bluſh colour, turning to red, but not coming near the full colour of the beſt red roſe; nor is the ſcent ſo ſweet as that of the damaſk Provence, but coming near that of the ordinary red roſe. It is not ſo plentiful in bearing as the damaſk Provence. The bluſh Provence roſe, in which the ſtalks riſe from three to four feet high, and are unarmed; the leaves are hairy on their under ſide; the peduncles have ſome ſmall ſpines; the ſegments of the calyx are ſemi-pinnate; the corolla has five or ſix rows of petals, which are large, and ſpread open; they are of a pale bluſh colour, and have a muſky ſcent. The white Provence roſe, which differs only in the colour of the flowers. The great and ſmall dwarf Provence roſes, called roſe de Meaux, differ from each other in little except ſize; the ſmaller of the two is generally known by the nurſery-men and gardeners by the name of Pompone roſe. It throws out numerous ſtems, which rarely exceed a foot, or a foot and half, in height; uſually ſtraight, rigid, and very prickly; the flowers very ſmall, and diſtinguiſhed by the brilliant colour of the central petals, appearing in June. All the ſorts flower from July to Auguſt.

In the thirteenth ſpecies the varieties are very numerous; as the Dutch hundred-leaved roſe; the bluſh hundred-leaved roſe; the Singleton's hundred-leaved roſe.

The ſingle and double velvet roſe, which, according to Parkinſon, has the old ſtem covered with dark-coloured bark, but the young ſhoots of a ſad green, with few or no thorns; the leaves are of a ſadder green than in moſt roſes, and very often ſeven on a ſtalk; the flower is ſingle; or double, with two rows of petals, the outer larger, of a deep red, like crimſon velvet; or more double, with ſixteen petals or more in a flower, moſt of them equal: they have all leſs ſcent than the ordinary red roſe. The Burgundy roſe, which is an elegant little plant, not more than a foot or eighteen inches in height. The ſultan roſe, the Stepney roſe, the gurnet roſe, the biſhop roſe, and the Liſbon roſe.

In the fourteenth ſort there are ſeveral varieties; as the red officinal roſe, the Mundi roſe, which has the flowers very elegantly ſtriped or variegated with red and white: in other circumſtances it ſo perfectly reſembles the red roſe, that there can be no doubt of its being a variety of that; indeed it frequently happens that a red roſe or two appears on the ſame plant with the variegated flowers. The Childing roſe, the marbled roſe, and the double virgin roſe, which have great affinity with each other, according to Miller.

Of the fifteenth ſort there are alſo ſeveral varieties, as the red damaſk roſe, the bluſh damaſk roſe, which differ only in the ſhade and colour. The York and Lancaſter roſe, which agrees with the damaſk in ſtalk, leaf, &c. differing only in the flower being variegated with white ſtripes. Mr. Hart's roſe has the white ſtripes more diſtinct; the flowers in theſe being leſs double than in ſeveral others, are frequently ſucceeded by fruit, and have ripe ſeeds, from which other varieties may be obtained. According to Parkinſon, ſometimes one half of the petal is of a pale whitiſh colour, and the other half of a paler damaſk than common; or one petal is white or ſtriped with white, and the other half bluſh or ſtriped with bluſh; ſometimes alſo ſtriped or ſpotted over, and at other times little or no ſtripes or marks, and the longer it remains blown open in the ſun, the paler and the fewer ſtripes, marks, or ſpots will be ſeen in it. The ſmell is of a ſweet damaſk roſe ſcent. The red monthly roſe, the white monthly roſe, which are ſo called from their continuing to blow in ſucceſſion during the greater part of the ſummer; not that they blow in every month, as the name implies. They are, in every reſpect, like the damaſk roſe, unleſs it be that they are more full of prickles than that. The bluſh Belgic roſe, which riſes about three feet high, with prickly ſtalks; the leaves are compoſed of five or ſeven leaflets, which are oval, hairy on their under ſide; and ſlightly ſerrate; the peduncles and calyxes are large and ſemi-pinnate; the flowers very double, of a pale fleſh colour, with little ſcent, generally in great quantities. The red Belgic roſe, which differs only in having the colour of the flower a deep red. The great royal roſe, and the imperial bluſh damaſk roſe.

In the nineteenth ſort the cultivated plant grows larger and more erect; the leaves are bigger and much ſweeter than in the wild one, the ruſty colour of them diſappears, and the whole puts on a more vigorous appearance; the ſweet ſcent is ſuppoſed to proceed from the gland. There are varieties with double flowers; as the common double ſweet-briar, the moſſy double ſweet-briar, the evergreen double ſweet-briar, the red double ſweet-briar, the royal ſweet-briar, and the yellow ſweet-briar.

Of the twenty-firſt kind there is a variety with double flowers. And the editor of Miller's dictionary conſiders the evergreen muſk roſe of Miller to be the ſame with this.

Of the twenty-fourth ſort, according to Parkinſon, there are two varieties of the white garden roſe; one attaining ſometimes the height of eight or ten feet, with a ſtock of a great bigneſs, the other ſeldom higher than a damaſk roſe. Both have ſomewhat ſmaller and whiter-green leaves than in many other roſes, five moſt uſually on a ſtalk, and paler underneath; as alſo a whiter-green bark, armed with ſhort prickles. The flowers in the one are whitiſh, with an eye of bluſh, eſpecially towards the bottom, very double, and for the moſt part not opening ſo fully as the red or damaſk roſe. In the other more white, leſs double, and opening more. Some have only two or three rows of petals; and all have little or no ſmell.

Method of Culture.—In all the ſorts the increaſe may be effected by ſuckers, layers, or by budding upon ſtocks of other ſorts of roſes; but this laſt method is only practiſed for ſome peculiar ſorts, which do not grow well upon their own ſtocks, and ſend forth ſuckers ſparingly. Where more

ſorts than one are to be had upon the ſame plant, ſuch ſorts only ſhould be budded upon the ſame ſtock as are nearly equal in their manner of growth, otherwiſe the ſtrong one will draw all the nouriſhment from the weaker.

The ſuckers ſhould be taken off in October, and planted out either in nurſery-rows, or in the places where they are to remain; as where they are permitted to ſtand upon the roots of the old plants more than one year, they grow woody, and do not form ſo good roots as if planted out the firſt year. The beſt method to obtain good-rooted plants is to lay down the young branches in autumn, which will take good root by the autumn following; eſpecially when watered in dry weather; when they may be taken off from the old plants, and be planted out where they are to remain. The ſeeds are ſometimes ſown in the autumn, to produce new varieties, in beds of light mellow earth, or in drills, eſpecially for the common ſweet-briar kinds, and for raiſing hedges of them.

But although new varieties and ſome particular permanent ſorts, ſuch as continue the ſame by ſeeds, may occaſionally be raiſed in this way; all the double kinds and peculiar varieties, are by no means, in general, to be produced in this manner, as they cannot be continued, with certainty, the ſame by ſeeds, but conſtantly require, in this intention, to be raiſed from layers or ſuckers.

The moſt proper ſeaſon for planting all the ſorts is the autumn or winter, when the weather is mild and open, when they will, for the moſt part, flower in full perfection during the ſucceeding ſummer, but, ſhould there be a neceſſity, they may be replanted out even ſo late as the beginning of the ſpring months without much danger. And it is often an uſeful practice to ſet out a few plants in this late manner for the ſake of a late long continued blow in the autumnal ſeaſon. In general, however, the ſooner the work of planting them out is performed, the ſtronger and more fully will the plants afford their flowers.

In planting them out in the common or ſhrubbery borders, it ſhould moſtly be done in a ſingle manner; and they may be trained with ſingle ſtems to the height of one, two, or more feet, and then managed ſo as to branch out into buſhy heads; and it is commonly adviſeable to have them in this form; though ſome, for the ſake of a more buſhy growth, ſuffer them to branch away immediately from the bottom, as they will flower well in any mode of training.

Some, for curioſity, may alſo be run up with ſingle ſtems to the height of from five or ſix to ten feet, and be kept in erect poſitions by means of proper ſupports, being made to form branchy heads at theſe heights, ſome running up more or leſs for the ſake of greater variety. The large growing ſorts may likewiſe, in ſome caſes, be planted out againſt walls, pales, &c. and be trained laterally as well as in an upright manner to ſome conſiderable extent.

Some plants of the early ſorts, as the monthly, &c. may alſo be ſet out in warm ſituations for more early blowing, and be treated in the ſame way.

But in the gardens about the metropolis, where large quantities of flowers of this kind are wanted for ſale, the plants are generally ſet out in cloſe rows, being put into the ground, in a ſort of trench planting manner, at the diſtance of about a foot from each other, and afterwards kept down to the height of from not more than one to three feet, according to the ſorts and circumſtances by cutting them over, or clipping them, every autumn or winter, at the top and on the ſides, by which lateral branches are ſent off in greater abundance for future flowering.

All good gardens ſhould moſtly be poſſeſſed of the different ſorts of theſe flowers, as they are eaſily procured, and multiply in an expeditious manner.

Some of the beſt ſorts of theſe plants may further alſo occaſionally be put in pots for the purpoſe of being ſet out conveniently in different parts for the ſake of ornament.

And where there are the conveniencies of hot-houſes and forcing-frames, it may, in many caſes, be deſirable and proper to place ſome of the prime ſorts in pots for the purpoſe of being forced in ſuch places for an early blow by means of artificial heat. In this way they may be made to flower either in the winter or early ſpring months. In which intention ſome potted plants of the monthly, common, or moſs Provence, or other choice ſorts of roſes, muſt, in the winter, be ſet in the above ſort of frame, wrought by dung, bark, or fire heat, or in a hot-houſe, which is by much the beſt, and be, by ſuch means properly applied, forced into blow in the beginning of the new year and in ſucceſſion for the two following months, and until the plants in the natural open ground begin to flower, different ſucceſſional ſupplies of plants being ſo placed at the diſtance of every two or three weeks.

For this uſe a quantity of plants ſhould, in general, be annually potted, which, if they have had a ſummer's growth in the pots, plunged in the ground, before they are employed in this way, it will be the better, as they will be more firmly rooted, and conſequently blow in greater perfection and beauty. See FORCING, and FORCING-*Frame*.

It is not unuſual for the gardeners in the vicinity of the metropolis to form conveniencies of the above kinds in order to force flower-plants of this nature, as there is almoſt conſtantly a great demand and ready ſale for them, at an early ſeaſon, while they are in flower in the pots, as well as when the flowers are gathered in noſegays and other ways. They often pay extremely well in this manner of cultivating them.

Almoſt all the open ground ſorts delight in a rich moiſt ſoil and an open ſituation, in which they produce a greater quantity of flowers, and thoſe much fairer, than when they are upon a dry ſoil, or in a ſhady ſituation. The pruning which they afterwards require, is only to cut out their dead wood, and take off all their ſuckers, which ſhould be done every autumn; and if there are any very luxuriant branches, which draw the nouriſhment from the other parts of the plant, they ſhould be taken out, or ſhortened, to cauſe them to produce more branches, if there be occaſion for them to ſupply a vacancy; but it is beſt to avoid crowding them with branches, which is as injurious to theſe plants as to fruit-trees; for if the branches have not equal benefit from the ſun and air, they will not produce their flowers ſo ſtrong, or in ſo great plenty, as when they are more open, and better expoſed to the ſun, ſo as to have a more free circulation of air. As the moſs Provence roſe ſeldom ſends out ſuckers, and does not ſtrike very freely by layers, it is often increaſed by budding it upon ſtocks of the other ſorts; but the plants are beſt when raiſed from layers.

In general the beſt ſort for flowering early and late is the monthly, next to which in flowering in the open air is the cinnamon, which is immediately followed by the damaſk roſe, then the bluſh, York, and Lancaſter; after which, the Provence, Dutch hundred-leaved, white, and moſt other ſorts; and the lateſt ſorts are the Virginian and muſk roſes, which, if planted in a ſhady ſituation, ſeldom flower until September, and if the autumn proves mild, continue often till the middle of October. And the plants of the two ſorts of muſk roſes ſhould be placed againſt a wall, pale, or other building, that their branches may be ſupported, otherwiſe they are ſo ſlender and weak as to trail

upon

upon the ground. These plants should not be pruned until spring, because their branches are somewhat tender; so that when they are cut in winter, they often die after the knife; these produce their flowers at the extremity of the same year's shoots in large bunches, so that their branches must not be shortened in the summer, lest the flowers should be cut off. The shrubs will grow to be ten or twelve feet high, and must not be checked in their growth, if intended to flower well. They are all highly ornamental plants, mostly for the shrubbery borders and clumps, being planted according to their habits of growth.

Rosa, Salvator, in *Biography*, so well known among the cognoscenti as the author of spirited and extravagant pictures of banditti, &c., was born at Naples in 1614, and received his first knowledge of design from his kinsman, F. Francazano; but by the death of his father, being reduced to extreme poverty, he was constrained to provide himself a maintenance by sketching designs upon paper, and selling them at any price he could obtain.

In that wretched situation he laboured for some time, till one of his designs, an historical subject of Hagar and Ishmael, accidentally happened to fall into the hands of Lanfranc. Pleased with the ability it displayed, he eagerly enquired for the artist; and as soon as he became acquainted with him, took him under his protection, and provided for him generously. This unexpected and happy change in his circumstances, enabled Salvator to pursue his studies with more effect; and he soon acquired considerable eminence, and his works were eagerly sought after.

The style which he formed is peculiarly his own, and his best productions are beautiful imitations of nature; but in general his works are artificial combinations, and wrought with extravagance; the spirit and fire with which they are executed, too frequently giving them a consequence and a name they do not deserve. This, indeed, may perhaps be said, that half the pictures which go under his name, are spurious or heavy imitations, and he pays the tax which all mannerists, like him, must submit to.

He certainly possessed a comprehensive genius; and was an excellent satirical poet, as well as an ingenious painter. In landscape painting he was entirely original, delighting in scenes of desolation and terror; these he peopled with banditti reposing, or lurking for their prey, or dividing their spoils; lonely shepherds, or forlorn travellers. Sometimes he attempted to create an interest by filling the scene he drew with some sacred or historic subject, but in this he seldom succeeded; his figures being ill proportioned, falsely attired, and void of expression. In colour he sometimes attained excellence. The dull, low, or lurid tone, which so justly becomes the character of loneliness, of forests almost impenetrable, or dreadful to see, and conveying ideas of danger in their aspect, he frequently presented most perfectly; and wrought the various parts with the greatest freedom of touch, and the utmost readiness of invention. His pictures are not unfrequent in our collections in this country; and genuine ones of the first quality are sold at extravagant prices. He died at the age of 59, in the year 1673.

Among musical MSS. purchased at Rome in 1770, was the music-book of Salvator Rosa, the painter, in which are contained, not only airs and cantatas set by Carissimi, Cesti, Luigi, Cavalli, Legrenzi, Capellini, Pasqualini, and Bandini, of which the words of several are by Salvator Rosa; but eight entire cantatas written, set, and transcribed by this celebrated painter himself. The book was purchased of his great grand-daughter, who inhabited the house in which her ancestor lived and died. The hand-writing was ascertained by collation with his letters and satires, of which the originals are still preserved by his descendants. The historians of Italian poetry, though they often mention Salvator as a satirist, seem never to have heard of his lyrical productions; and as this book is not only curious for the music it contains, but the poetry, we shall be somewhat minute in our account of its contents.

The first composition in this MS. was luckily a scene in Cesti's opera of Orontea, which it would have been difficult to have found elsewhere; for of the many hundred operas that were composed for the different theatres of Italy, during the last century, except two or three that have been printed, an entire copy, in score, it would be difficult to find, if not impossible.

II. Is a cantata by Capellini, a composer of no great eminence; yet there is in it a very pleasing air in triple time of $\frac{3}{4}$, in which the crotchets are expressed by minims hooked or tied like quavers.

III. Is an elegant simple air, by Legrenzi, sung to two different stanzas. See Legrenzi.

IV. Is a beautiful Siciliana by Cavalli, the composer of Erismena. See Cavalli.

V. Is a cantata written by Salvator Rosa, and set by Cesti. Recitative had not, as yet, banished formal closes, or regular modulation, which encroached too much upon air, and destroyed its narrative and declamatory plainness and simplicity.

Salvator was either the most miserable or the most discontented of men. Most of his cantatas are filled with the bitterest complaints, either against his mistress, or mankind in general. In this he says, that he has had more misfortunes than there are stars in the firmament, and that he has lived six lustres (thirty years) without the enjoyment of one happy day.

VI. Is a cantata set by Luigi, almost wholly in recitative, which, but for the formality of the closes, would be admirable. See Luigi.

VII. Another cantata by the same composer, of which the words are very beautiful.

VIII. A cantata set by Carissimi, in which the melody is impassioned, and the recitative admirable. See Carissimi.

IX. Is a pleasing and natural air by Marc Antonio Pasqualini, which is repeated to different stanzas. The composer of this air was admitted into the Papal chapel in 1630; and from the year 1643 to 1670, he was a favourite stage-singer, with a soprano voice. Many of his compositions are preserved in the collections of the time, in which more grace and facility appear than force and learning.

X. A cantata, of which the words are by Salvator Rosa, and the music by Cesti. There are great strength and imagination in this poetry.

In the church of Santa Maria degli Angeli de' PP. Certosini, at Rome, where Salvator Rosa was buried, there is an inscription on his tomb, at which Crescimbeni, a Florentine, is angry; as it gives him *il primato sopra tutti i Rimatori Toscani*. This, like almost all monumental praise, is certainly hyperbolical; but Salvator's poetry seems to have great merit for its boldness and originality; it is indeed somewhat rough, even in his lyrics; and his satires are often coarse; but he appears to us always more pithy than his contemporaries, whom Marini's affectation had perhaps enervated and corrupted.

Salvator's cantata, of which we are now speaking, is the incantation of a female, distracted with love, disappointment, and revenge. This lyric poem seems to have furnished ideas to the author of Purcell's Mad Bess.—" By the

the croaking of the toad," &c. And in Salvator all the charms and ſpells of the witches in Macbeth are invoked.

XI. Is a gloomy, grumbling hiſtory of this painter and poet-muſician's life, in which the comic exaggeration is not unpleaſant; but it is rather a ſatire on the times in which he lived, than a lyric compoſition. However, it is ſet by Bandini; but being chiefly narrative, the muſic is almoſt wholly recitative; ſcarcely any meaſured melody being introduced, except to the firſt line, which ſerves as a refrein, or burden.

XII. Is an excellent cantata on the torments of *jealouſy*, ſet by Luigi, in which there is more air and leſs recitative than uſual at this period.

XIII. Is a ſingle air by Aleſſandro Scarlatti, which muſt have been produced early in that great compoſer's life; as Salvator, in whoſe hand-writing it is entered in his book, died in 1675 (Orlandi Abcdario Pittorico); ſome writers ſay in 1673. See SCARLATTI.

XIV. and XV. Are two ſingle airs by Legrenzi, of which the melody is pleaſing; they were perhaps ſung in operas. The muſic of all the reſt of the cantatas and ſongs in this book, amounting to eight, is of Salvator's own compoſition, and is not only admirable for a dilettante, but in point of melody ſuperior to that of moſt of the maſters of his time.

The two firſt are cantatas, but ſo ill written as to be difficult to read. The third begins with a pleaſing air; and the fourth with ſuch a ſpirited movement as the ſeventeenth century ſeldom produced. Two other airs in the ſame cantata are well accented, and pleaſing. In the recitative of the fifth cantata, ſome of the firſt true cloſes occur that we have met with in narrative melody. There are ſeveral airs in this and the reſt of Salvator's cantatas on pleaſing ſubjects, and treated in a manner above mediocrity. The laſt of his airs is chiefly remarkable for its moving baſe: and if we only ſuppoſe this cantata to have been compoſed juſt before the author's death, it will be of a higher date than the publication, or perhaps the exiſtence of any of Corelli's works, who is ſuppoſed to have been the inventor of this kind of pendulum baſe; which, however, frequently occurs in the cantatas of Ceſti.

Whoever is curious to ſee ſpecimens of Salvator Roſa's muſical compoſitions, may find in the fourth volume of Burney's Gen. Hiſt. Muſ. fragments, not only of his own productions, but of his contemporary compoſers of eminence, whoſe works he thought worth entering in his muſic-book. Signorelli, tom. v. p. 338.

ROSA DA TIVOLI. See ROOS.

ROSA, in *Geography*, a ſmall iſland near the E. coaſt of Sardinia. N. lat. 39° 5′. E. long. 9° 3′.—Alſo, a town of Germany, in the county of Henneberg; five miles S. of Saltzungen.—Alſo, a town of Spain, in the province of Seville; eight miles S. of San Lucar.

ROSA. See ST. *Roſa*.

ROSA, *Cape*, a cape on the coaſt of Algiers. N. lat. 37° 2′. E. long. 8° 5′.

ROSA, *Mount*, an eminence of the Alps, reckoned the ſecond mountain of that famous ridge, lying about midway between Great St. Bernard and the lake of Locarno. M. Sauſſure viſited this mountain, which has been reckoned only 60 feet inferior in height to Mont Blanc, this being eſtimated about 14,700 feet above the level of the ſea. But in ſir George Shuckburgh's table of heights taken by the barometer, &c. (Phil. Tranſ. vol. lxvii. p. 592.) Mont Blanc is elevated 14,432 feet above the lake of Geneva, and 15,662 feet above the Mediterranean; and mount Roſa, as meaſured geometrically by Father Beccaria, is 15,084 feet above the ſame ſea.

ROSA *Crucis*, in *Church Hiſtory*. See ROSYCRUCIANS.

ROSA *Fatuina*, in *Botany*, a name given by ſome authors to the piony.

ROSA *Junonis*, a name given by ſome authors to the lily.

ROSACEÆ, the 92d natural order in Juſſieu's ſyſtem, the 10th of his 14th claſs. See FICOIDEÆ, for the diſtinctions of that claſs. The characters of this large and important order, named from the Roſe, and roſe-like flowers, which compoſe it, are the following.

Calyx either ſuperior, and tubular; or inferior, pitcher or wheel-ſhaped; its limb moſtly divided, and generally permanent. *Petals* definite, uſually five, inſerted into the upper part of the calyx and alternate with its diviſions; ſometimes wanting. *Stamens* indefinite, rarely definite, inſerted into the ſame part below the petals; anthers often roundiſh. *Germen* in ſome caſes ſimple, inferior, the ſtyles and ſtigmas moſtly numerous; in others ſuperior, ſimple, with one ſtyle, or manifold with many ſtyles; the ſtyles in every inſtance lateral, or proceeding from the ſide of each germen. Structure of the *fruit* various; in ſome an inferior apple, of many cells, or a ſort of cup or urn, apparently inferior, bearing many ſeeds, over which it cloſes; in others the ſeeds, or ſeed-veſſels, each of one cell, and moſtly ſingle-ſeeded, indefinite or definite, are ſuperior, ſtanding on a common receptacle; in others, again, there is either a ſolitary ſuperior capſule of one cell; or a ſuperior nut, with one or two ſeeds, which is either naked, or inveſted with a drupaceous coat. The ſcar of each *ſeed* is lateral, juſt below the ſummit, connected by a thread, or umbilical cord, with the lower part of the ſeed-veſſel. *Corculum* ſtraight, without an *albumen*. *Stem* herbaceous, ſhrubby, or arboreous. *Leaves* either ſimple or compound, alternate, accompanied by *ſtipulas*.

Section 1. POMACEÆ. *Germen ſimple, inferior, with many ſtyles. Apple umbilicated, or bordered, with the limb of the calyx, of many cells.* Trees or ſhrubs.—This ſection contains the Linnæan genera of *Pyrus*, (from which Juſſieu diſtinguiſhes *Malus* and *Cydonia*,) *Meſpilus*, *Cratægus*, and *Sorbus*.

Sect. 2. ROSÆ properly ſo called. *Germens ſeveral, indefinite, inveſted with the urn-like calyx contracted at the top, ſo that they ſeem inferior; each accompanied by one ſtyle. Seeds as many.* Shrubs.—*Roſa* here ſtands alone.

Sect. 3. SANGUISORBÆ. *Germens ſeveral, definite, rarely ſolitary, inveſted with cup-like calyx contracted at the top, ſo that they ſeem inferior; each with one ſtyle. Seeds as many.* Moſtly herbaceous, many of them without petals, many with a definite number of ſtamens, ſome with ſtamens and piſtils in ſeparate flowers.

Poterium, Sanguiſorba, Anciſtrum, Acæna, Agrimonia, Neurada, Cliffortia, Aphanes, Alchimilla, and *Sibbaldia*.

Sect. 4. POTENTILLÆ. *Germens ſeveral, indefinite, truly ſuperior, ſtanding on a common receptacle, each with one ſtyle. Seeds as many, naked, rarely pulpy.*—Herbs, rarely ſhrubs.

Tormentilla, Potentilla, Fragaria, Comarum, Geum, Dryas, Rubus; to which is to be added our *Duchesnea*, (ſee FRAGARIA, at the concluſion) now deſcribed in Tr. of Linn. Soc. v. 10. 372.

Sect. 5. SPIRÆÆ. *Germens ſeveral, definite, ſuperior, each with one ſtyle. Capſules as many, with one or more ſeeds.*—Shrubs, rarely herbs.

Spiræa, Suriana, and *Tetracera*.

Sect. 6. PROCKIÆ. *Germen ſingle, ſuperior, with one ſtyle.*

ſtyle. Fruit of one cell, with one or more ſeeds.—Trees or ſhrubs, ſometimes deſtitute of petals.

Tigarea of Aublet; *Delima*, *Prockia*, and *Hirtella* of Linnæus.

Sect. 7. Amygdaleæ. *Germen ſingle, ſuperior, with one ſtyle. Nut either naked, or more uſually inveſted with a pulpy coat, and containing one or two ſeeds.*

Hedycrea of Schreber, which is Aublet's *Licania; Grangeria* of Commerſon; *Chryſobalanus* of Linnæus; *Ceraſus*, *Prunus* and *Armeniaca* of Tournefort, all three included in the Linnæan *Prunus; Amygdalus* of Tournefort and Linnæus, including *Perſica* of the former; *Moquilea*, *Couepia*, and *Acioa* of Aublet, (the latter Schreber's *Acia*); and *Parinari* of Aublet, which is Schreber's *Petrocarya*.

Sect. 8. *Genera akin to the Roſaceæ.*

Plinia of Plumier and Linnæus, the uncertainty of whoſe hiſtory we have fully explained; ſee Plinia.

Calycanthus, allied by its fruit to *Roſa*, but the leaves are oppoſite and ſimple, and the flower in a manner apetalous.

Ludia of Commerſon; *Blackwellia* of the ſame author; *Homalium* of Jacquin and Linnæus; and *Napimoga* of Aublet. The three laſt appear to conſtitute one genus; ſee Homalium.

ROSACEOUS Corolla, is one which conſiſts of ſeveral petals ranged in a circle; ſo that, according to Tournefort's acceptation of the word, it includes, not only the natural order of Rosaceæ, (ſee that article,) and other flowers agreeing therewith in having moſtly five petals, as *Ranunculus;* but even ſuch as have only two, like *Circæa*. The author is obliged to exclude the Cruciform and Umbelliferous plants from this order by a particular and arbitrary exception; for according to his primary idea, it would admit every polypetalous regular flower, as well as ſome that are irregular, as *Caſſia*, &c. See Corolla.

ROSACLORUM, or, according to ſome authors, *Roſichiero*, a fine red uſed to enamel on gold with. It is prepared in this manner: take ten pounds of cryſtal-glaſs, put it into a pot, and when it is well melted, add to it, at twice, a pound of the beſt red-lead; ſtir the maſs well together, and afterwards caſt it into water. Repeat this proceſs three times, then when the matter is again in fuſion, mix with it five ounces of calcined braſs, and the ſame quantity of the deepeſt cinnabar; ſtir the whole well together, and let it ſettle three hours; then add of glaſs of tin three ounces, mix the whole, and it will be of a fine roſe-colour. Merret's Notes on Neri, p. 350.

ROSADE, a kind of liquor, prepared of pounded almonds and milk, mixed with clarified ſugar.

ROSALBA, Carriera, in *Biography*, was of Chiozza, and carried crayon painting to a high degree of perfection. Orlandi celebrates her miniatures. Her crayon painting arrives, not ſeldom, at the ſtrength of painting in oil. Her portraits ſpread all over Europe, are as elegant and graceful in conception and attitude, as freſh, neat, and alluring in colour. Her Madonnas, and other ſacred ſubjects, riſe from grace to dignity, and even majeſty. Equal and inceſſant application deprived her of ſight during the laſt ten years of her life. She died in 1757, at the age of 82.

Roſalba is celebrated by Walther for her muſical talents and exquiſite taſte in ſinging.

ROSALE, in *Geography*, a town of Perſia, in the province of Fars, or Farſiſtan; 15 miles W. of Kazeron.

ROSALGATE, Cape. See Rasalgata.

ROSALIA, a name uſed by authors for the meaſles, or a diſeaſe very like the meaſles, conſiſting of a number of aſperities and protuberances of the ſkin, which ſoon die away.

Rosalia, in *Muſic*. See Repetitions.

ROSALIND, a maſk, written by Lockman, ſet by Smith for Hickford's rooms, and performed there in ſtill life, oratorio wiſe, in 1740. This little drama would not be mentioned here, as the poetry is upon a level with Mr. Lockman's other productions; and of the muſic we know nothing, as it was never publiſhed. But as, "to raiſe the pamphlet price a ſhilling," the poetry is preceded by "inquiries into the origin of operas."

ROSAMARINA, in *Geography*, a town of Sicily, in the valley of Demona, at the mouth of a river of the ſame name, which runs into the ſea, 10 miles N.E. of Miſtretta.

ROSAMOND, in *Biography*, daughter of lord Clifford, was a young lady of great beauty, fine accompliſhments, and endowed with the moſt engaging wit and ſweetneſs of temper. She had been educated, according to the cuſtom of the times, in the nunnery of Godſtow, and the popular hiſtory of her is as follows. Henry II. of England ſaw her, was ſmitten with her beauty, and triumphed over her honour. To avoid the jealouſy of his queen, Eleanor, he kept her in a labyrinth at Woodſtock, and by his connection with her had two children, who were afterwards William Longſword, earl of Saliſbury, and Geoffrey, biſhop of Lincoln. On Henry's abſence in France, the queen found means to diſcover her, and, jealous of her great beauty, cauſed her to be poiſoned. This ſtory is not well ſupported by hiſtorical documents. Several writers mention no more of her, than that the queen cauſed her to be ſo haraſſed, that ſhe did not long ſurvive after ſhe was diſcovered. Other writers aſſert, that ſhe died a natural death, and the ſtory of her being poiſoned is ſuppoſed to have ariſen from the figure of a cup being placed on her tomb. She was buried in the church of Godſtow, oppoſite to the high altar, where her body remained till it was ordered to be removed with every mark of diſgrace by Hugh, biſhop of Lincoln, in 1191. By many, however, ſhe has been regarded as a ſaint, but her hiſtory is in every reſpect very uncertain. See Groſe's Antiq. of Eng. and Wales.

Rosamond, an Engliſh opera, written by Addiſon on the Italian model. After the great ſucceſs of Arſinoe and Camilla in 1705 and 1706, in which the dialogue was wholly ſpoken in recitative, and the performers all Engliſh ſingers; in 1707, notwithſtanding the deficiencies of thoſe dramas in poetry, muſic, and performance (for as yet no foreign compoſer or captivating ſinger was arrived) this kind of exhibition became ſo formidable to our own actors, that a ſubſcription was opened the beginning of this year, "for the encouragement of the comedians acting in the Haymarket, and to enable them to keep the diverſion of plays under a ſeparate intereſt from operas." Daily Courant, January 14th, Cibber gives a circumſtantial account of this humiliating tranſaction, and ſpeaks of its ſucceſs with conſiderable triumph. See Clayton.

The verſes of Roſamond are highly poliſhed, and more lyrical perhaps than in any poem of the ſame kind in our language. And yet this drama is not wholly free from opera abſurdities, on which Addiſon was afterwards ſo ſeverely pleaſant. For inſtance, the king's approach to the ſecret bower of bliſs, where his fair Roſamond was treaſured up from the reſentment of his jealous queen, is always announced and publiſhed by a loud concert of military inſtruments: Act i. ſc. 1.

"Hark,

"Hark, hark! what ſound invades my ear?
The conqueror's approach I hear.
He comes, victorious Henry comes!
Hautbois, trumpets, fifes, and drums,
In dreadful concert join'd,
Send from afar the ſound of war,
And fill with horror ev'ry wind."

It was the faſhion in almoſt all the ſerious operas that were written in Italy, before the time of Apoſtolo Zeno and Metaſtaſio, to mix comic and buffoon characters with the tragic, even in *dramme ſacri*, notwithſtanding the ſeverity of ſome Italian critics upon our Shakſpeare for the ſame practice.

And Mr. Addiſon has fully complied with this cuſtom, in the characters of ſir Truſty and Grideline, which are of the loweſt ſpecies of comic.

If it can be proved that gunpowder was invented, and in military uſe in the time of Henry II. Mr. Addiſon was guilty of an anachroniſm in making him aſk,

"Why did I not in battle fall
Cruſh'd by the *thunder* of the Gaul?"

The loſs of Roſamond in the ſecond act of this drama is not compenſated by a ſingle intereſting event in the third, which drags and languiſhes for want of her ſo much, that neither the flat and forced humour of ſir Truſty and Grideline, nor the elegant compliments made to the duke of Marlborough and Blenheim, ever kept the audience awake in the performance.

In 1733, Roſamond was ſet by Mr. (afterwards Dr.) Arne, his firſt attempt at dramatic muſic, in the performance of which his ſiſter, Miſs Arne, afterwards the juſtly celebrated actreſs Mrs. Cibber, performed the part of Roſamond. The airs in this *coup d'eſſai* of Arne, were extremely pleaſing, and far ſuperior to thoſe of any Engliſh compoſer of that period. Many of them were afterwards ſung at Vauxhall by Mrs. Arne and Low with great applauſe. "Was ever Nymph like Roſamond," was long in univerſal favour all over the kingdom.

ROSAN, in *Geography*, a town of the duchy of Warſaw, on the Narew; 110 miles E. of Thorn.

ROSANA, a river of Germany, which runs into the Inn, near Landeck, in the county of Tyrol.

ROSANI, Cape, a cape on the coaſt of Romania, in the Grecian Archipelago. N. lat. 40° 35′. E. long. 24° 14′.

ROSANNA, a town of Lithuania, in the palatinate of Novogrodek; 36 miles W. of Novogrodek.

ROSARBA, in *Botany*, the name of an imaginary plant, which has given great trouble to the commentators on the works of the ancients.

The Arabian writers, Avicenna, Serapion, and others, have mentioned two kinds of carob or ceration; the one eſculent, and endowed with the virtue of a gentle purgative, the other an aſtringent.

This laſt they have diſtinguiſhed from the other by the name of the nabathæan pod or aljembut. They ſay in their deſcriptions, that the aljembut is like the roſarba; ſo run the old tranſlations, but the true meaning of the original is *roſa vineæ*. This was a name given to the common wild acacia-tree, and the tree which produced the nabathæan pod, might be very well likened to this; it being, in reality, only a ſpecies of the acacia, and the ſuccus acaciæ, or inſpiſſated acacia juice of the ſhops, being, according to Iſidore, made oftentimes from the unripe fruit of this very ſpecies.

ROSARIA, among the Romans, a kind of perfumes, ſo called either from their being chiefly made of roſes, or becauſe they had a moſt exquiſite odour.

ROSARIO, in *Geography*, a ſmall iſland in the Spaniſh main, near the coaſt of Carthagena. N. lat. 10° 5′. W. long. 75° 56′.—Alſo, a town of New Navarre; 30 miles S.W. of Caſa Grande.—Alſo, a town of South America, in the province of Tucuman; 78 miles N. of St. Miguel de Tucuman.—Alſo, a town of Brazil, in the government of Minas Geraes; 220 miles N. of Villa Rica.—Alſo, a town of North America, in the county of California; 30 miles S.W. of Loreto.—Alſo, a town of the iſland of Cuba; 45 miles S. of Havannah.

Rosario, *El*, a town of Mexico, in the province of Chiapa; 140 miles S.E. of Chiapa dos Eſpagnols.

Rosario, or *Neuſtra Senhora del Roſario*, a canal of a ſtrait in the gulf of Georgia, which ſeparates the iſland of Florida from America; about 30 miles in length. At the S.E. extremity the canal is ſix miles broad; but towards the N.W. its breadth is gradually diminiſhed to two miles, in its narroweſt part.

ROSARUM Acetum. See Acetum.

ROSARUOLO, in *Geography*, a town of Iſtria; 8 miles E. of Capo d'Iſtria.

ROSARY, in the *Romiſh Church*, a chaplet conſiſting of five or fifteen decads of beads, to direct the recitation of ſo many Ave Maria's, in honour of the Virgin.

Rosary alſo denotes a particular maſs or form of devotion addreſſed to the Virgin, to which the chaplet of that name is accommodated. It conſiſts of fifteen repetitions of the Lord's prayer, and an hundred and fifty ſalutations of the bleſſed Virgin; whilſt the *crown*, as it is called, according to the different opinions of the learned concerning the age of the Virgin, conſiſts of ſix or ſeven repetitions of the Lord's prayer, and ſix or ſeven times ten ſalutations or Ave Maria's.

Some attribute the inſtitution of the roſary to St. Dominic; but F. d'Achery ſhews it was in uſe the year 1100; ſo that St. Dominic could only make it more celebrated. Others attribute it to Paulus Libycus, and others to St. Benedict; others to the Chartreux; others to Venerable Bede; and, finally, others to Peter the Hermit. Thoſe who aſcribe it to St. Dominic, differ as to the particular time of its inſtitution; ſome referring it to the year 1208, when he preached againſt the Albigenſes; others will have him to have ſet it on foot in the courſe of his miſſions in Spain, before he paſſed into France.

Rosary, *Order of the*, or of *our Lady of the Roſary*, is an order of knights, ſuppoſed by Schoonebeck, and the Jeſuit Bonanni, to have been inſtituted by St. Dominic, but by miſtake; for that ſaint never inſtituted any order under this name, and theſe authors apparently make a military order of an army of croiſes, who, under the command of the count de Montfort, fought againſt the Albigenſes.

The abbot Juſtiniani, and M. Hermant, will have this order to have been eſtabliſhed by an archbiſhop of Toledo, named Frederic, after St. Dominic's death; and to have borne for a badge a black and white croſs, in the middle of which was repreſented our Lady, holding her little ſon in one hand, and in the other a roſary. F. Mendo adds, that they were obliged to rehearſe the roſary on certain days. After all, F. Helyot doubts whether or no ſuch an order in reality ever exiſted. Edmondſon refers the inſtitution of this order to the year 1212; and he ſays, the badge of the order was a croſs patonce per croſs countercharged argent and ſable, ſurmounted on the centre with a medal or, enamelled

melled with the image of the Virgin, ſupporting the infant in one hand, and holding a roſary in the other, all proper. The order of the "Celeſtial Collar of the Holy Roſary" is a religious order for ladies, inſtituted at the requeſt of father Francis Arnoul, a Dominican, by queen Anne of Auſtria, widow of the French king Lewis XIII., and mother of Lewis XIV., for fifty young ladies of the firſt families in France. The collar of the order was compoſed of a blue ribbon, enriched with white, red, and maiden's bluſh roſes, interlaced with the capital letters A. V. in cypher affixed to it; and pendent at the breaſt by a ſilk cordon, a croſs of eight points pomettée, and in each angle a fleur-de-lis: on the centre the image of the Virgin Mary, and on the reverſe the image of St. Dominic, enamelled.

Rosary is a word frequently met with in the ancient hiſtories of Ireland, and uſed to expreſs a peculiar ſort of baſe money coined abroad, in the form of the penny, current in that kingdom; but of ſo much baſer an alloy, that it was not worth quite half the real value of the penny. This and many other ſuch coins were decried, and it was made death to import any of them, by Edward I., in 1300.

Rosary, *Perſian*, a beautiful compendium of oriental ethics, written by a Perſian poet, whoſe name was Eddin Sadi; who, about the middle of the 13th century, when the Turks invaded Perſia, withdrew from his own country, and ſettled at Bagdad, for the purpoſe of proſecuting his ſtudies. After experiencing much viciſſitude of fortune, he returned home, and compiled the book juſt mentioned, which he completed in the year 1257. This book, we are informed, has been univerſally read in the Eaſt; and has been tranſlated into Latin, and into ſeveral modern languages. As our readers in general may not have acceſs to the original work, which is divided into eight chapters, nor to extracts from it, we ſhall here ſubjoin, both for their information and amuſement, the following citations.

1. Paradiſe will be the reward of thoſe kings who reſtrain their reſentment, and know how to forgive. A king, who inſtitutes unjuſt laws, undermines the foundation of his kingdom. Let him, who neglects to raiſe the fallen, fear, leſt when he himſelf falls, no one will ſtretch out his hand to lift him up. Adminiſter juſtice to your people, for a day of judgment is at hand. The diſhoneſt ſteward's hand will ſhake, when he comes to render an account of his truſt. Be juſt, and fear not. Oppreſs not thy ſubjects, leſt the ſighing of the oppreſſed ſhould aſcend to heaven. If you wiſh to be great, be liberal; for, unleſs you ſow the ſeed, there can be no increaſe. Aſſiſt and relieve the wretched, for miſfortunes may happen to yourſelf. Wound no man unneceſſarily; there are thorns enough in the path of human life. If a king take an apple from the garden of a ſubject, his ſervants will ſoon cut down the tree. The flock is not made for the ſhepherd, but the ſhepherd for the flock.

2. Excel in good works, and wear what you pleaſe: innocence and piety do not conſiſt in wearing an old or coarſe garment. Learn virtue from the vicious; and what offends you in their conduct, avoid in your own. If you have received an injury, bear it patiently: by pardoning the offences of others, you will waſh away your own. Him, who has been every day conferring upon you new favours, pardon, if, in the ſpace of a long life, he ſhould have once done you an injury. Reſpect the memory of the good, that your good name may live for ever.

3. In your adverſity, do not viſit your friend with a ſad countenance; for you will embitter his cup: relate even your misfortunes with a ſmile; for wretchedneſs will never reach the heart of a cheerful man. He who lives upon the fruits of his own labour, eſcapes the contempt of haughty benefactors. Always encounter petulance with gentleneſs, and perverſeneſs with kindneſs: a gentle hand will lead the elephant itſelf by a hair. When once you have offended a man, do not preſume that a hundred benefits will ſecure you from revenge: an arrow may be drawn out of a wound, but an injury is never forgotten. Worſe than the venom of a ſerpent is the tongue of an enemy, who pretends to be your friend.

4. It is better to be ſilent upon points we underſtand, than to be put to ſhame by being queſtioned upon things of which we are ignorant. A wiſe man will not contend with a fool. It is a certain mark of folly, as well as rudeneſs, to ſpeak whilſt another is ſpeaking. If you are wiſe, you will ſpeak leſs than you know.

5. Although you can repeat every word of the Koran, if you ſuffer yourſelf to be enſlaved by love, you have not yet learned your alphabet. The immature grape is ſour; wait a few days, and it will become ſweet. If you reſiſt temptation, do not aſſure yourſelf that you ſhall eſcape ſlander. The reputation, which has been fifty years in building, may be thrown down by one blaſt of calumny. Liſten not to the tale of friendſhip, from the man who has been capable of forgetting his friend in adverſity.

6. Perſeverance accompliſhes more than precipitation; the patient mule, which travels ſlowly night and day, will in the end go further than an Arabian courſer. If you are old, leave ſports and jeſts to the young: the ſtream, which has paſſed away, will not return into its channel.

7. Inſtruction is only profitable to thoſe who are capable of receiving it: bring an aſs to Mecca, and it will ſtill return an aſs. If you would be your father's heir, learn his wiſdom: his wealth you may expend in ten days. He who is tinctured with good principles while he is young, when he is grown old will not be deſtitute of virtue. If a man be deſtitute of knowledge, prudence, and virtue, his doorkeeper may ſay, Nobody is at home. Give advice where you ought; if it be not regarded, the fault is not yours.

8. Two kinds of men labour in vain: they who get riches, and do not enjoy them; and they who learn wiſdom, and do not apply it to the conduct of life. A wiſe man, who is not at the ſame time virtuous, is a blind man carrying a lamp: he gives light to others, whilſt he himſelf remains in darkneſs. If you wiſh to ſleep ſoundly, provide for to-morrow. Truſt no man, even your beſt friend, with a ſecret; you will never find a more faithful guardian of the truſt than yourſelf. Let your misfortunes teach you compaſſion: he knows the condition of the wretched, who has himſelf been wretched. Exceſſive vehemence creates enmity; exceſſive gentleneſs, contempt: be neither ſo ſevere, as to be hated; nor ſo mild, as to be inſulted. He who throws away advice upon a conceited man, himſelf wants an adviſer. In a ſingle hour you may diſcover, whether a man has good ſenſe; but it will require many years to diſcover whether he has good temper. Three things are unattainable; riches without trouble, ſcience without controverſy, and government without puniſhment. Clemency to the wicked is an injury to the good. If learning were baniſhed from the earth, there would, notwithſtanding, be no one who would think himſelf ignorant. Brucker's Hiſt. of Philoſ. by Enfield, vol. ii.

ROSAS, in *Geography*, a ſea-port town of Spain, in Catalonia, on the north ſide of a gulf of the Mediterranean, to which it gives name, with a good harbour, defended by a fort. It was anciently called "Rhoda," and "Rhodope;" 22 miles N.E. of Gerona. N. lat. 42° 17′. E. long. 3° 0′.

ROSATA Aloe. See Aloe.

ROSATE, in *Geography*, a town of Italy, in the department of the Olona; 9 miles S.W. of Milan.

ROSATUM Acetum. See Acetum.

Rosatum *Vinum*. See Vinum.

ROSAZZO, in *Geography*, a town of Italy, in Friuli; 6 miles S. of Friuli.

ROSBACH, a town of Germany, in the county of Sayn; 8 miles E. of Hachenburg. See Rossbach.

ROSBEGH Point, a cape on the weſt coaſt of Ireland. N. lat. 52° 6′. W. long. 9° 52′.

ROSBOTH, a word uſed by ſome authors to expreſs a ſoft excreſcence from any part.

ROSCHINTZE, in *Geography*, a town of Pruſſia, in Natangen; 12 miles S. of Lick.

ROSCHITZ, a town of Auſtria; 2 miles S.W. of Schrattentaal.—Alſo, a town of Moravia, in the circle of Brunn; 8 miles W. of Brunn.

ROSCIUS, Quintus, in *Biography*, a Roman actor of great celebrity, was a native of Gaul. He was contemporary at Rome with the celebrated actor Eſopus. So great were his talents for the ſtage, and ſuch was the degree of perfection to which he carried his art, that, according to Cicero, a complete maſter in any other art was popularly called the Roscius of it. Roſcius was not leſs eſteemed for his morals and good conduct, than admired for his profeſſional talents. The greateſt men in the ſtate were his intimate friends, and the loſs of him was univerſally lamented. "Which of us," ſays Cicero, alluding to Roſcius in his oration for the poet Archias, "was ſo rude and unfeeling as not to be affected by the recent death of Roſcius, who, though he died at an advanced age, appeared, on account of his excellence in his art, worthy of immortal life." His death took place in the year 61 B.C. He compoſed a parallel between theatrical and oratorical action, which is loſt.

There are ſeveral paſſages in Cicero concerning Roſcius, which, if the ancient actors, Romans as well as Greeks, did not declaim in muſical notes, would be wholly unintelligible. He tells us (de Orat.), that Roſcius had always ſaid, when age ſhould diminiſh his force, he would not abandon the ſtage, but would proportion his performance to his powers, and make muſic conform to the weakneſs of his voice; which really happened: for the ſame author informs us (de Leg.), that in his old age he ſung in a lower pitch of voice, and made the tibicines play ſlower.

As there were combats, or conteſts, eſtabliſhed by the ancients for the voice, as well as for other parts of the *Gymnaſtice*, thoſe who taught the management of the voice were called φωνασκοι, *phonaſci*; and under their inſtructions were put all thoſe who were deſtined to be orators, ſingers, and comedians. Roſcius had an academy for declamation, at which he taught ſeveral perſons, preparatory to their ſpeaking in public, or going on the ſtage. He had a law-ſuit with one of them, in which Cicero pleaded his cauſe.

Theſe are proofs ſufficient of the dramatic declamation of the ancients being uttered in muſical tones, agreeing with thoſe of the muſical inſtruments by which they were accompanied. See Declamation and Recitative.

ROSCOEA, in *Botany*, being a new and very diſtinct genus of the natural order of *Scitamineæ*, was dedicated, by the writer of the preſent article, to his diſtinguiſhed friend William Roſcoe, eſq. F.L.S., whoſe papers in the Linnæan Society's Tranſactions, and eſpecially his New Arrangement of the order in queſtion, printed in their eighth volume, richly entitle him to this botanical honour. Of his particular obſervations and diſcoveries reſpecting this order, by which he has reduced to clear ſcientific principles, what had hitherto been an indigeſted chaos, we ſhall ſpeak under the article Scitamineæ, in its proper place.—Sm. Exot. Bot. v. 2. 97.—Claſs and order, *Monandria Monogynia*. Nat. Ord. *Scitamineæ*, Linn. *Cannæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, tubular, cylindrical, its limb ſheathing, erect, undivided, membranous at the edge. *Cor.* of one petal, irregular; tube ſcarcely longer than the calyx, erect, ſtraight, triangular upwards: outer limb ringent, two-lipped; its upper lip broadeſt, erect, obovate, acute, concave; lower about as long, in two deep, linear-lanceolate, acute, reflexed lobes: inner limb ringent, two-lipped; the upper lip erect, ſhorter than the outer limb, of two cohering, half-ovate lobes, tapering at the baſe, and embracing the organs of fructification; lower much longer and broader, ſpreading, cloven. *Stam.* Filament one, inſerted into the top of the tube, ſhort, linear, channelled, erect; anther much longer than the filament, linear, channelled, greatly incurved, bearing pollen in the upper part only, its baſe extended in the form of two lanceolate, horizontal, aſcending, acute, membranous, lobes. *Piſt.* Germen inferior, oval, very ſmall; ſtyle thread-ſhaped, lodged in the groove of the filament, and of the anther, to whoſe curvature it conforms; ſtigma obtuſe, concave, downy, juſt projecting beyond the anther. *Peric.* Capſule? we preſume it to be analogous to that of other *Scitamineæ*.

Eſſ. Ch. Anther two-lobed, incurved, terminal, embracing the ſtyle, with a cloven appendage at its baſe. Outer limb of the corolla irregular; upper lip vaulted; lower deeply divided: inner limb in three parts, two-lipped.

1. R. *purpurea*. Purple Roſcoea. Sm. Exot. Bot. v. 2. 97. t. 108. (Hatucon Swa of the Nawars of Nepaul.)—This plant was found at Narainhetty, in the mountains of Upper Nepaul, by Dr. Francis Buchanan, flowering in April 1802. It is the only ſpecies, hitherto diſcovered, of this very well-defined genus, which ſhould be arranged near Hedychium and Kæmpferia, (ſee thoſe articles,) to both of which genera it has ſome points of affinity; but *Roſcoea* is diſtinguiſhed from every other known plant of the *Scitamineæ*, by the irregularity of its two-lipped outer limb, and the peculiar appendages to the baſe of the anther.

The *root* is perennial, of ſeveral, cluſtered, ſpreading, oblong, tapering knobs, producing branched fibres. No aromatic or pungent flavour is perceptible in our ſpecimens. *Stem* ſolitary, erect, a foot or more in height, ſimple, leafy, compreſſed. *Leaves* ſpreading in two ranks, alternate, oblong, pointed, folded, wavy, entire, ſmooth, with many oblique parallel veins; pale at the under ſide; ſomewhat rounded and heart-ſhaped at the baſe, running down into broad, ſheathing, compreſſed, furrowed, purpliſh *footſtalks*, which embrace and conceal the ſtem. *Stipula* crowning the inſide of the footſtalk, very ſhort, entire. *Flowers* ſeveral, opening in ſucceſſion, terminal, cluſtered, ſeſſile, erect, large, and handſome, of a violet-purple, with whitiſh organs of impregnation; the tube of the calyx of each concealed by the ſheaths of the upper leaves.

ROSCOFF, or Roscou, in *Geography*, a ſea-port town of France, in the department of Finiſterre; 4 miles N. of St. Pol de Leon. As a ſea-port it is much frequented by thoſe who carry on a contraband trade with England, eſpecially in wine and brandy. The inhabitants uſed formerly to import linſeed, and export linen manufactured in the country annually to the amount of 500,000 livres. Since the

the revolution this trade has been interrupted, but with the return of peace may be easily revived. The harbour, however, without timely precaution, is in danger of being choaked up with sand. In the neighbourhood of the town, and throughout the department of Finisterre, the fields are manured with sea-weed. Wood is very scarce, and their fruit-trees occasionally serve for fuel. In the island of Bas they burn cow-dung and sea-weed. Roscoff contains 1000 inhabitants; nevertheless, the depopulation from its loss of trade, the arid sandy ground on which it is built, and the desolated ruins of former establishments, give the place a melancholy appearance of desolation. In this place there is not a single fountain, nor any institution for the instruction of youth, nor any regulation for preserving the health of the inhabitants. This is said to be the place where the chevalier St. George landed, after his unsuccessful attempt in 1745.

ROSCOLÆ, a name given by some medical writers to the measles.

ROSCOMMON, *Earl of*, in *Biography*. See DILLON.

ROSCOMMON, in *Geography*, a county of Ireland, in the province of Connaught, is bounded on the east by the river Shannon, which separates it from the King's county, West-Meath, Longford, and Leitrim; and on the west by Galway, Mayo, and Sligo. Towards the north and south it is contracted into narrow necks of land, between the east and west confines. According to Dr. Beaufort, its length from north to south is 47 miles (60 English), and its breadth about the middle of the county 29 (37 English) miles. The latter varies considerably, being in some parts less than 10 miles. The area measures 346,650 acres, or 541 square miles, equal to 556,847 acres, or 869 square miles, English measure. This county contains 56 parishes, 22 of which have churches. Of these the greater part are under the see of Elphin. When Dr. Beaufort wrote, the population was estimated at 86,000; what it is at present cannot be ascertained. Roscommon is a flat open country, in some places sprinkled with rocks, in many interrupted by extensive bogs, and but little diversified with hills. The only mountains within the county are in a narrow part between Lough Arrow and Lough Allen; and these are become valuable, on account of the coal and iron which they are found to contain. The lofty Curlew mountains, which join Lough Arrow, separate this county from Sligo. The Shannon beautifully delineates the eastern confines, branching in a course of 50 miles into several fine lakes, of which Lough Ree, Lough Baffin, and Lough Allen, are the largest. The Suck divides it from Galway for a great length of way, till it loses its name and waters in the Shannon. A number of small streams from the interior intersect the county, fertilizing and enlivening the fields. The largest of the lakes is Lough Key, in the north of the county, which is rendered delightful by wooded islands and surrounding groves. The soil is fertile; lime-stone and marle are abundant, and the climate not severe. The county has long been famed for its pastures; but as population increases, wants and cares are augmented, and pasturage gives way to tillage, as a more abundant source of supply. Hence we find, that although pasturage is calculated to cramp population, yet, by the introduction of manufactures, it may be so increased, that pastures must be broken up and tilled. This natural course of events has operated very powerfully in Roscommon. The manufacture of linen and woollen stuffs has been diffused; bounties have also been offered for farinaceous produce; and under these necessities and incitements, pasturage has considerably decreased. It has been contended, that converting such rich pastures to tillage must prove a great loss to the country; but although the land cannot, for a considerable time, so fully repay the labours of the husbandman, as when in the zenith of their pastoral utility, yet in the end there cannot surely be a doubt of their more amply remunerating the country. In the pastoral economy of this district we find sheep the largest proportion of the farm-stock: bullocks and cows form a lesser share. Mr. Wakefield commends the quality of both. The farms are generally divided by stone-walls. Agriculture is in its infancy, but the abundance of lime-stone has contributed, in a great degree, to promote the extension of tillage. This is conducted on the same plan as in other parts of Connaught, and is thus described by Dr. M'Parlan. "The mode of culture is with a long narrow spade, commonly called a loy. This machine they prefer to ploughs, and assign many reasons for doing so. The hills are very steep, (speaking of Leitrim,) beset with stones; and notwithstanding the soil being generally gravelly, so tough and retentive of wet, as to render ploughing objectionable. They also complain of a scarcity of horses: but, above all, they assign, as a peculiar inducement, the abundance of crop produced by the loy culture compared to that of the plough. In some of the more level parts, ploughing is in practice; and in some others they unite both, first ploughing, then mincing and dressing with the loy. The soil being in general of the stiff argillaceous kind, wherever it is so, the potatoes are planted by dibbling with the *steveen*. In a few places they plant, by spreading the cuts on the dung or green turf, and then digging up the furrows; and in still fewer, where the soil is light and friable, they plant potatoes by drilling with a one-horse plough, particularly in stubble and old potatoe ground." Mr. Wakefield calls this a faithful picture of the cultivation of this district. Roscommon is the shire-town, but Boyle is more thriving. None of the towns are large. The county is represented in parliament by two members only. Beaufort. Wakefield. Robertson.

ROSCOMMON, a post-town of Ireland, and the shire-town of the county of the same name, where the assizes are held. It is situated about three miles from the Shannon, where it expands into Lough Ree. It is a small place, agreeably situated, but has little trade. The ruins of a Dominican friary exhibit some remains of elegant architecture, especially a tomb of Felim O'Connor, king of Connaught, adorned with a number of emblematical devices. Roscommon is 69 miles W.N.W. from Dublin.

ROSCOTTY, a town of Thibet; 18 miles W. of Sirinagur.

ROSCREA, a post-town of the county of Tipperary, Ireland, on the border of the King's county. It is a neat and thriving town. The church is very ancient, and has a curious frontispiece at the west end. Near it stands one of the largest round towers in Ireland, all built with square stone, which is unusual in these edifices. Roscrea was once a bishopric, but was united with Killaloe in the twelfth century. The large old castle was built by the Ormond family. It is 59 miles S.W. from Dublin.

ROSE, in *Botany* and *Gardening*. See ROSA.

It is a tradition among the ancients, that the god of love made a present to Harpocrates, the god of silence, of a beautiful rose, the first that had been known, to engage him not to discover any of the private practices of his mother Venus. And hence it became a custom to have a rose placed in their rooms of mirth and entertainment, that under the assurance thereof they might be induced to lay aside all constraint, and speak what they pleased. Thus did the rose become a symbol of silence; so that to be *sub rosa*, *under the rose*,

rose, denotes as much as to be out of danger of having any conversation divulged.

Rose *Bay*. See Nerium.

Rose, *Campion*. See Agrostemma.

Rose, *China*, the name by which some call the ketmia of botanists. See Hibiscus.

Rose, *Christmas*. See Helleborus.

Rose, *Corn*. See Papaver.

Rose, *Mountain-bay*, or *Dwarf-bay*, a name by which the chamærhodendros of botanists is sometimes called. See Kalmia, and Rhododendrum.

Rose, *Guelder*, a name sometimes given to the opulus, or water-elder. See Viburnum.

Rose, *Virginian Guelder*. See Spiræa.

Rose, *Martinico*. See Hibiscus.

Rose *of Jericho*, a name by which some call the hesperis. See Anastatica.

Rose *Mallow*. See Aliza.

Rose, *South Sea*, a name sometimes given to the *Nerium* of botanists; which see.

Rose, *Rock*. See Cistus.

Rose-*Root*. See Rhodiola.

Rose, in the *Materia Medica*. The flowers of the *Rosa canina*, dog-rose, or hep, are said by some botanists to be inodorous, and yet their fragrance is often very perceptible. The fruit called heps, or hips, has a pleasant acidulous taste, depending on the uncombined citric acid and sugar which it contains. This pulpy fruit is cooling, but possesses no specific medicinal virtue. It is used in the preparation of a conserve or confection. For this purpose the London pharmacopeia directs a pound of the pulp and 20 ounces of refined sugar, in powder, to be rubbed together until they be well incorporated; and in the Edinburgh Dispensatory, it is ordered, that the fresh fruit of the dog-rose, carefully freed from the seeds and inclosed spiculæ, be beaten into a pulp, and, while beating, that three times its weight of double refined sugar be gradually added. (See Conserve). Formerly, says Woodville, it was esteemed useful in many disorders, as dropsies, calculous complaints, dysenteries, hæmorrhages, &c. A moss-like excrescence, called "Badeguar," "Rose-sponge," and by the French "Galle cheveluë," is frequently found upon the branches of this tree, and is the habitation of the insect called "cynips rosæ." This excrescence was formerly in great repute as a remedy for various diseases.

The *Rosa centifolia*, or hundred-leaved rose, of which there are many varieties, is improperly confounded in the Dublin pharmacopeia with the damask rose, *Rosa damascena*, which is altogether a different species. The petals of this species are directed for medicinal use. They are of a pale red colour, and of a very fragrant odour, which is to many people very agreeable, and therefore this as well as most of the other roses, are made up into nosegays: and these, in some circumstances, have produced alarming symptoms, such as sneezing, inflammation of the eyes, faintings, hysterical affections, abortion, &c.: and persons confined in a close room, with a large quantity of roses, have been in danger of immediate extinction of life. The petals impart their odorous matter to watery liquors, both by infusion and distillation. Six pounds of fresh roots impregnate, by distillation, a gallon or more of water strongly with their fine flavour. On distilling large quantities, there separates from the watery fluid a small portion of a fragrant butyraceous oil, which liquefies by heat, and appears yellow, but concretes in the cold into a white mass: 100 pounds of the flowers, according to the experiments of Tachenius and Hoffman, afforded scarcely half an ounce of oil. The smell of this oil exactly resembles that of the roses, and is therefore much used as a perfume.

The oil of roses possesses very little pungency, and has been highly recommended for its cordial and analeptic qualities. The flower also contains a bitterish substance, which is extracted by water along with the odorous principle, and remains entire in the decoction after the latter has been separated by distillation or evaporation. This fixed sapid matter of the petals manifests a purgative quality, and it is on this account that the flowers are received in the materia medica. The pharmacopeias direct a syrup to be prepared of this rose, which is ordered as an adjunct to oil and other purgatives in the diseases of infants; but they are chiefly employed for the distillation of rose-water. The London pharmacopeia directs seven ounces of the petals of the hundred-leaved rose dried to be macerated in four pints of boiling water for 12 hours, and to strain it; and then to evaporate the strained liquor in a water-bath down to $2\frac{1}{2}$ pounds, and to add six pounds of refined sugar, so as to make a syrup. This syrup is prepared, according to the Edin. Pharm. by macerating one pound of the fresh petals of the *rosa centifolia*, or, as it is erroneously denominated, damask rose, in four pounds of boiling water for 12 hours, and adding three pounds of refined sugar to the strained liquor, and boiling so as to form a syrup. This syrup, in doses of a spoonful, or from f ʒij to f ʒxij or more, is found to be pleasant and useful as a laxative for children, or to obviate costiveness in adults.

The Rose-*Water*, *Aqua rosæ*, (Lond. and Dub. Ph.), *Aqua rosæ centifoliæ* (Edin.) is prepared by taking 8lbs. (Lond.), 6lbs. (Edin. and Dub.), of the petals, and pouring over them as much water as will prevent empyreuma during the distillation; and then distilling a gallon (Lond. and Dub.), or 10 pounds (Edin.) This water has the agreeable odour of the rose in great perfection, when properly prepared; but it is very apt to spoil, unless it be rectified by a second distillation. As it is free from acrimony, and, except in point of odour, does not differ from distilled water, it is generally employed in collyria, with acetate and superacetate of lead, and acetate and sulphate of zinc. The oil and water, obtained by distillation, and used chiefly in perfumes and flavouring materials, are recommended by Hoffman as excellent cordials for raising the strength and spirits, and allaying pain. They appear to be of a mild nature, and not liable to heat or irritate the constitution. Rose-water is, however, in great esteem throughout the East, particularly in China and Persia, where the trade of it is very considerable. The rose-leaves, remaining at the bottom of the still, are kept under the name of rose cakes for a perfume.

The flowers of the *Rosa gallica*, or red officinal rose, give out their virtue both to water and rectified spirit, and tinge the former of a fine red colour, but the latter of a very pale one. The extract obtained by inspissating the watery infusion is moderately austere, bitterish, and subsaline. The spirituous extract is considerably stronger both in astringency and bitterness. Water at 212° extracts both its odour and taste; and the infusion strikes a black with sulphate of iron; and also forms a precipitate of a dark colour with sulphate of zinc. The red rose is astringent and tonic. It forms an useful and elegant vehicle for the exhibition of mineral acids, nitrate of potass, and other neutral salts, in hæmorrhages and some other diseases. It has been said, that the flowers of this species possess neither the fragrance nor the laxative power of those of the *centifolia*; but Poterius, cited by Lewis, relates, that he found a drachm of powdered red roses occasion three or four stools, and this not in a few instances,

inſtances, but conſtantly in ſeveral. Its fragrance is improved by drying; and both the aſtringency and the colour of the petals are beſt preſerved by haſty exſiccation. Its flowers are chiefly valued for their aſtringent qualities, which are moſt conſiderable before the petals expand, and, therefore, in this ſtate they are choſen for medicinal uſe, and ordered by the pharmacopeias in different preparations, as thoſe of a conſerve, a honey, an infuſion, and a ſyrup. Theſe preparations, eſpecially the firſt and ſecond, have been highly eſteemed in phthiſical caſes, particularly by the Arabian phyſicians; who mention ſome in which they were effectual remedies. The caſe of Kruger, related in the German Ephemerides, has been thought a more evident proof of the efficacy of the conſerve of roſes in phthiſis pulmonalis; but as the uſe of the conſerve was commonly joined with that of milk and farinacea, together with proper exerciſe in the open air, it has been doubted if theſe recoveries could be wholly imputed to the roſes, though their mild aſtringent and corroborant virtues certainly contributed much. In ſome of the caſes above alluded to, 20 or 30 pounds of the conſerve were taken in the courſe of a month.

The *Confectio roſæ gallicæ*, confection of the red roſes of the Lond. Pharm. is prepared by beating a pound of the unblown petals of the red roſe, freed from the claws, in a ſtone mortar, and adding three pounds of refined ſugar, and then beating again until the whole be thoroughly incorporated. The Edin. Pharm. directs the unblown petals of the red roſe to be beaten to a pulp, and during the beating to add three times their weight of refined ſugar. The *Conſerva roſæ*, or conſerve of roſes of the Dubl. Pharm. is prepared by beating the unblown petals of the red roſe, freed from their claws, and adding gradually three times their weight of refined ſugar. The confection of the red roſe poſſeſſes a ſmall degree of aſtringency, and is ſometimes given diſſolved in new milk as a tonic in early convaleſcence from acute diſeaſes; but its chief uſe is to form a pleaſant vehicle for more active medicines.

Mel Roſæ, or roſe honey. See HONEY.

Infuſion of Roſes. See INFUSION.

Syrup of red roſes, *Syrupus roſæ gallicæ*, is prepared, according to the Edin. Pharm. by macerating ſeven ounces of the dried petals of the red roſe in five pounds of boiling water for 12 hours, then boiling a little and ſtraining; and adding ſix pounds of refined ſugar to the ſtrained liquor, and again boiling a little ſo as to form a ſyrup. This ſyrup is a weak aſtringent; and as ſuch is added to aſtringent and ſtomachic infuſions and gargles: it is uſeful in hæmoptyſis and ſome other hæmorrhagic complaints as a gargle, and its efficacy chiefly depends on the acid; but it is principaly valued on account of its flavour and colour. Lewis Mat. Med. Woodville Med. Bot. Thomſon Lond. Diſp.

ROSES, *Eſſence of.* There is ſcarcely a more valuable perfume in the world, than the eſſence of damaſk roſes, and ſcarcely any thing is obtained from its ſubject with more difficulty, and in leſs quantity. All eſſences or eſſential oils are, while in the plant, contained in certain veſicles lodged in different parts, and of different ſtructure; theſe veſicles are in the roſe particularly ſmall and tender, and are placed very ſuperficially; the conſequence of this is, that there is originally but a very little of this eſſence in the flower, and this is the very ſubject that will be diſſipated and loſt when the flowers are gathered and thrown in a heap together, as they are ſucculent, and very quickly heat in lying together. To avoid all diſſipation and waſte of this choice eſſence, the roſes ſhould be thrown into the ſtill as ſoon as gathered, and diſtilled with very little water, and that in a balneum Mariæ; then the fire is to be continued ſo long as the flowers float ſeparate about in the water; but as ſoon as ever they form themſelves into a cake, and ſtick to the bottom, the diſtillation ſhould be finiſhed, as they then yield no more eſſence. With all theſe precautions, however, it is with great difficulty we can procure any eſſence of roſes. What we obtain by this diſtillation being chiefly a very odoriferous and fragrant water. In the warmer countries the ſame caution affords a larger quantity of oil, which may be ſeparated and preſerved under the name of the eſſence. In Italy, they make ſome quantity of it, but there it is very dear; a vaſt quantity of the flowers yielding only a very little eſſence, and that being thick and troubleſome in the procuring, as it every where ſticks to the veſſels.

It is to be obſerved, that the ſeaſon of the year as to wet or dry, makes a very great difference in the eſſential oils of all plants; they are always much finer in dry and hot ſeaſons, than in cold and moiſt; we find our roſe-water in England much finer, and more fragrant, though diſtilled in the ſame proportion, in hot and dry ſummers, than in cold and rainy ones; and Mr. Geoffroy gives an account that he ſucceeded, one very hot and dry year, in the making eſſence of roſes in France in the following manner.

As the roſes were brought to him freſh gathered, he turned them immediately into the ſtill; and drawing over the water into a glaſs matraſs, when it had ſtood by ſome time, and was perfectly cold, he diſcovered ſome of the eſſence fixed to the ſides of the matraſs, and the ſurface of the water covered with a thin reticular pellicle. All the contents of the matraſs were put to filter through a paper, ſupported by a fine linen cloth; and the filtrated water was added to new roſes for many ſucceeding diſtillations, the produce of which was all filtered through the ſame paper. After a long courſe of diſtillations, with freſh flowers every time, but ſtill with the ſame veſſels and the ſame water, there was found in the paper of the filtre a quantity of thick eſſence; this being carefully waſhed out of the paper, with a ſmall quantity of the moſt fragrant of the water, and afterwards ſeparated pure from its ſurface, was very white and extremely fragrant, and as thick as fine butter. This is not the only eſſential oil which naturally concretes into this firm ſtate; oil of aniſeed, though fluid when diſtilled, always concretes in the ſame manner on the firſt approach of cold; and another oil of this kind is that of the laurel, which is uſed in ſome places, though very improperly, to give the ſcent and taſte of bitter almonds, or apricot kernels, to foods of different kinds.

Monſieur Homberg has taught us how to gain a larger quantity of the eſſential oil of roſes than in the uſual diſtillation, by the previous addition of mineral acids, as the ſpirit of ſalt, vitriol, &c. thereto; which increaſe the fermentation, and joining with the oil, render it more liquid, and eaſier to be raiſed by heat. He adviſes a perfumer (who before ſcarcely obtained an ounce of oil from a hundred weight of roſes) to ſteep his flowers, for fifteen days, in water made ſharp with the ſpirit of vitriol; by which means the perfumer, upon diſtillation, found his quantity of oil increaſed almoſt a third.

The perfumers keep the ſtructure of the veſſel they employ in this diſtillation a great ſecret. M. Homberg tells us, it is a large convenient ſtill, that opens in a tube at the top to receive the water, which muſt often be poured upon the roſes, to bring over the oil with it; this it does but very ſlowly, and ſo requires that its quantity be large; the ſtill alſo opens below, that the flowers, when they will yield no more oil, may be eaſily taken out; but the principal contrivance

contrivance is the figure of the veſſel which receives the oil; this is made like an ordinary matraſs, from the lower part of the belly of which comes a tube, as from an old-faſhioned cruet, and riſing to the bottom of the neck of the receiver, it bends outward; ſo that though the veſſel uſually contains but two or three French pints, it conveniently receives and lets paſs many hundred pints of the roſe-water, without any neceſſity of being changed; for a change would loſe the ſmall quantity of the oil obtained. The water diſtilled runs through a pipe into a ſecond receiver; the oil, being lighter than the water, floats upon its ſurface, and adheres to the neck of the veſſel, as high as the aperture of the little pipe, while the water runs from the bottom of the firſt receiver into the ſecond. See Mém. de l'Acad. des Sciences, 1700.

M. Homberg obſerves, that this ſtill may be uſeful to draw off any kind of precious eſſential oils.

The proceſs for making attar, or eſſential oil of roſes, ſo much eſteemed as a perfume, is related in the "Aſiatic Reſearches," (vol. i. p. 332.) by lieutenant-colonel Polier, and is as follows. "Forty pounds of freſh roſes, with their calyces, but the ſtems cut cloſe, are put in a ſtill with 60 pounds of water. The maſs is then well mixed together with the hands, and a gentle fire is made under the ſtill. When the water begins to grow hot, and fumes to riſe, the cap of the ſtill is put on, and the pipe fixed; the chinks are then well luted with paſte, and cold water put on the refrigeratory at the top. The receiver is alſo adapted at the end of the pipe; and the fire is continued under the ſtill, neither too violent nor too weak. When the impregnated water begins to come over, and the ſtill is very hot, the fire is leſſened by gentle degrees, and the diſtillation continued till thirty pounds of water are come over, which is generally done in about four or five hours. This roſe-water is to be poured again on a freſh quantity (forty pounds) of roſes; and from fifteen to twenty pounds of water are to be drawn by diſtillation, following the ſame proceſs as before. The roſe-water thus made and cohobated, will be found, if the roſes were good and freſh, and the diſtillation carefully performed, highly ſcented with the roſes. It is then poured into pans either of earthen-ware or of tinned metal, and left expoſed to the freſh air for the night. The *attar*, or *eſſence*, will be found in the morning congealed, and ſwimming on the top of the water. This is to be carefully ſeparated, and collected, either with a thin ſhell or a ſkimmer, and poured into a vial. When a certain quantity has thus been obtained, the water and feces muſt be ſeparated from the clear eſſence, which, with reſpect to the firſt, will not be difficult to do, as the eſſence congeals with a ſlight cold, and the water may then be made to run off. If, after that, the eſſence is kept fluid by heat, the feces will ſubſide, and may be ſeparated; but if the operation has been neatly performed, theſe will be little or none. The feces are as highly perfumed as the eſſence, and muſt be kept after as much of the eſſence has been ſkimmed from the roſe-water as could be. The remaining water ſhould be uſed for freſh diſtillations, inſtead of common water; at leaſt as far as it will go.

"The above is the whole proceſs of making genuine attar of roſes. But, as the roſes of this country give but a very ſmall quantity of eſſence, and it is in high eſteem, various ways have been thought of to augment the quantity, though at the expence of the quality. In this country it is uſual to add to the roſes, when put in the ſtill, a quantity of ſandal-wood raſpings, ſome more, ſome leſs, from one to five tolahs, or half ounces. The ſandal contains a deal of eſſential oil, which comes over freely in the common diſtillation, and mixing with the roſe-water and eſſence, becomes ſtrongly impregnated with their perfume. The impoſition, however, cannot be concealed; the eſſential oil of ſandal will not congeal in common cold; and its ſmell cannot be kept under, but will be apparent and predominate, in ſpite of every art. In Caſhemire they ſeldom uſe ſandal to adulterate the attar; but I have been informed, to increaſe the quantity, they diſtil with the roſes a ſweet-ſcented graſs, which does not communicate any unpleaſant ſcent, and gives the attar a high clear green colour. This eſſence alſo does not congeal in a ſlight cold, as that of roſes."

The quantity of eſſential oil to be obtained from the roſes is very precarious, as it depends not only on the ſkill of the diſtiller, but alſo on the quality of the roſes, and the favourableneſs of the ſeaſon. In order to obtain 4 maſhas (about $1\frac{1}{2}$ drachm) from 80 pounds, which, deducting the calyces, amounts to ſomething leſs than 3 drachms *per* 100 pounds of roſe-leaves, the ſeaſon muſt be very favourable, and the operation carefully performed. The colour of the attar of roſes is no criterion of its goodneſs, quality, or country. In the year 1787, Col. Polier had attar of a fine emerald green, of a bright yellow, and of a reddiſh hue, from the ſame ground, and obtained by the ſame proceſs, only of roſes collected at different days. The calyces, he obſerves, do not in any degree diminiſh the quality of the attar, nor impart any green colour to it; though perhaps they may augment the quantity; but the trouble neceſſary for ſtripping them muſt, and ought, to prevent its being ever put in practice.

Roses, *Oil of*. See Rose, and the preceding article.

Rose-*Fly*, in *Natural Hiſtory*, the name given by authors to a peculiar ſpecies of fly, found very frequent on roſe-buſhes, and produced out of a baſtard caterpillar, which feeds on the leaves of that tree. See Cynips.

The male of this fly has a long body, the female a ſhort and thick one; ſhe depoſits her eggs in ſmall holes, which ſhe makes in the bark of the young branches, and for this purpoſe is furniſhed with a very remarkable inſtrument, placed at the hinder part of the body, which is a kind of ſaw.

This is a four-winged fly, and is ſo common on roſe-buſhes, that it is ſcarcely poſſible to miſs it in any of the ſummer months; and the parts of the branches where it has depoſited its eggs are ſo vitiated by it, that they alſo are eaſily known. They are uſually ſwelled to a greater bigneſs than either the part above or below them, and are uſually ſomewhat bent; they are often black on the under ſide, and among this blackneſs the holes made for the eggs, and often the eggs in them, may be ſeen. The head and breaſt of this fly are black; its wings alſo are edged with black, its body is yellow, and its legs yellow, with a few black ſpots.

If theſe flies be obſerved in a ſummer morning, as they are crawling on the branches of a roſe-tree, they will ſoon be found at work for the depoſiting of their eggs. Theſe creatures give us a very good opportunity of obſerving the manner in which they perform this, as they are of a very ſluggiſh diſpoſition, and will ſtand ſtill even to be taken between the fingers; ſo that when one of them is in a proper ſituation, it may be examined by bringing the eye near it, and by uſing the common magnifying glaſſes, without quitting its place or its work; and if there be leaves of the tree, or ſmall branches of it in the way, they may be removed without diſturbing the creature. Reaumur's Hiſt. Inſ. vol. ix. p. 145.

There is, beſides this ſpecies, another fly of the ſame genus, produced from a baſtard caterpillar of the roſe-tree, and of the ſame ſhape and ſtructure of parts with this, but different

different in colour. The head and breaſt of this fly are of a deep violet colour, the body is yellow, and the legs and wings are of a ſomewhat paler violet tinge. This creature alſo depoſits its eggs in holes made in the branches of the roſe-tree, by means of a double ſaw, placed at the hinder part of the body; but, as the former ſpecies lays them in a ſingle ſtraight line, this diſpoſes them in a very beautiful and very regular manner in two rows.

Rose-*Galls*, a name given by authors to certain unnatural productions of the *roſa ſylveſtris*, or dog-roſe, occaſioned by the bites of inſects. There are two kinds of theſe, the one very common, the other more rare.

The ſcarcer kind is uſually found on the young ſhoots, and on the heps, or fruit, and is of a woody ſubſtance; the other is hairy and ſpongy, and is found on the old branches. The woody kind uſually appears in the months of June and July, and is always found in cluſters. Theſe are compoſed of ten, twelve, or more galls of different ſizes and figures, ſome round, others oblong, ſome of the ſize of an olive, and others not larger than a pea. They are of the common ſubſtance of the white wood, or blea, of trees, and when ſituated on the fruit, they prevent its ripening, and make a very ſingular figure. They are of a reddiſh colour, and are uſually ſmooth and gloſſy, but ſometimes they are beſet with ſhort and fine prickles.

The hairy roſe-gall is too common, and too ſingular a figure to have eſcaped the obſervation of perſons in all ages; it has been introduced into medicine in many parts of the world, and is at this time preſcribed in Germany, when reduced to powder, in diarrhœas, dyſenteries, and other diſorders of the bowels, and to promote urine and break the ſtone.

Theſe roſe-galls, though they appear at firſt ſight compoſed of tufts of hair, are, however, in reality, made up of ſeveral ſmall galls, growing from a bud on the branch, and forming a cluſter on the part. They are of an oblong figure, and reſemble the ſhape of a plum-ſtone. Each of them is the habitation of a ſingle worm, each having one cell in the centre.

All theſe galls of the roſe-tree afford the ſame ſpecies of worms and flies. The proper inhabitants, however, are hardly to be diſtinguiſhed by the moſt curious obſerver from the great variety of ſpecies which are found in them, all produced of the eggs of other flies, whoſe worms are of the carnivorous kind, and are lodged in the gall, not to feed on the juices of the tree, but on the fleſh of the proper inhabitant. When the parent-fly, who gives origin to the galls, has depoſited her eggs, and the tumour, in conſequence, begins to be formed, an enemy of this kind pierces the covering, and ſends in her offſpring to feed on the inhabitant. Theſe are flies of the ichneumon kind, and ſeveral ſpecies of them are of great beauty. All the flies deſcribed by authors as iſſuing out of this gall ſeem to have been of this kind; the proper inhabitant, being a ſmall black fly of no great beauty, is diſregarded, while the others have been particularly deſcribed.

Mentzelius has given an elegant account of a ſpecies whoſe back is of a fine blue, and its belly purple; and others have figured and deſcribed greeniſh and gold-coloured ones; but theſe are all ichneumons, all bred of devouring enemies which have fed on the proper inhabitants of the galls, and lived and transformed themſelves in their cells.

Rose-*Wood*, *lignum rhodium*, or *aſpalathum*. See Aspalath.

Rose *Pink*. See Pink.

Rose, *Golden*, is a roſe which the pope bleſſes at maſs, on the firſt Sunday in Lent, while they ſing Lætare Jeruſalem; and which, after maſs, he carries in proceſſion; and then ſends as a preſent to ſome ſovereign prince.

Rose, *the factions of the red and white*, are famous in our Engliſh hiſtories. They had their riſe in 1454, under Henry VI. between the houſes of York and Lancaſter, and ended in Henry VII. who united the two branches. The houſe of Lancaſter had for its badge a *red* roſe; that of York a *white* one.

Rose, in *Architecture* and *Sculpture*, an ornament cut in reſemblance of a roſe.

It is chiefly uſed in friezes, corniches, and vaults of churches, and particularly in the middle of each face of the Corinthian abacus. And in the ſpaces between the modillions, under the plafonds of corniches.

Roses, in *Heraldry*, is a difference denoting the ſeventh ſon of a family.

Rose-*Nails*. See Nail.

Rose-*Diamond*. See Diamond.

Rose-*Noble*, an ancient Engliſh gold coin, firſt ſtruck in the reign of Edward III. when the ſeries of gold coinage commences, and then called the *penny of gold*; ſince called *roſe-noble*, becauſe ſtamped with a roſe. It was current at 6*s*. 8*d*., and conſequently formed half a "mark," ſo called as being a grand limited ſum in account (Marc, *limes*, Goth.), 8 oz. in weight, and $\frac{3}{4}$ds of the money pound. This, as one half of the commercial pound of 16 ounces, is ſometimes called "ſelibra." The *noble* (which ſee) was ſo called from the nobility of the metal, being of the fineſt gold then, or now, uſed in the world for coinage; and it was attended by its half and quarter; the proportion of ſilver to gold being then 1 to 11. This coin was ſometimes called the "roſe-noble," from both ſides being impaled in an undulating circle, reſembling the outline of an expanded roſe, together with its half and quarter; and theſe continued the only gold coins till the angels of Edward IV. 1465, ſtamped with the angel Michael and the dragon, and the angelets, equal to half the angel, or 3*s*. 4*d*. were ſubſtituted in their place. Antiquaries likewiſe aſſert, that gold being ſcarce in Henry Vth's time, that prince diminiſhed the noble, retaining its former value; but that Henry VI. reſtored it to its ſize, and cauſed it to paſs for 10*s*. under the new name of ryal. Accordingly, the noble of Henry V. weighs only 108 grains now, while thoſe preceding his reign weigh 120. This ſpeaks gold to have increaſed in value about 10 *per cent*. The old noble of Edward III. and Richard II. at 120 grains, paſſed but for 6*s*. 8*d*.; but in the fifth year of Edward IV. 1465, the angel was of equal value, though but 80 grains in weight; which ſhews gold to have increaſed in value then no leſs than 30 *per cent*. Certain it is that the ryal of 10*s*. and the angel of 6*s*. 8*d*. with their diviſions of half and quarter, were the ſole gold coins till, in 1485, Henry VII. publiſhed the double ryal, or ſovereign, of 20*s*. accompanied by the double ſovereign, of 40*s*. See Money.

Rose *Engine*, *Roſe lathe*, or *Figure lathe*, in the *Mechanic Arts*, is a machine uſed for turning any articles in wood, ivory, or metal, in the ſame manner as a common lathe, but it has additional parts, by which the ſurface of the ſubject which has been turned, can afterwards be engraved with a great variety of patterns of curved lines, which, in general, are denominated from the French *roſette*, from a ſlight general reſemblance which they have to a full-blown roſe, and hence the machine is called a roſe engine.

This machine, as we have ſaid, contains all the parts of the *lathe*, (ſee that article,) and in the ſame manner as in turning, the work is cauſed to revolve, whilſt the cutting tool is kept ſtationary; but the difference between the roſe lathe

lathe and the common lathe is, that in the former the centre of the circle, in which the work revolves, is not a ſtationary point, but a ſlight motion is given to the centre whilſt the work is revolving upon it, the tool being all the while ſtationary; the ſurface of the figure which it forms will be, of courſe, out of round, *i. e.* it will deviate from the circular figure as much, and as often, as the motion is given to the centre.

The art of turning curioſities in wood or ivory, is one of thoſe which is beſt adapted, of any of the mechanic arts, as an amuſement for perſons who either have leiſure to apply to ſuch ſubjects, or who require relaxation from mental ſtudies: it has long been a favourite purſuit of many gentlemen, and the machines they employ are very ingeniouſly conſtructed. The curious in this art reckon two points of perfection in their works, one where the extreme delicacy, or elegance, of the object renders it admirable, and the other is conſidered from the difficulties of the execution; the former may be judged by all perſons poſſeſſed of good taſte, but to judge of the latter requires ſome knowledge of the art, or, at leaſt, ſo far as to know that the lathe will form only ſuch articles as are perfectly circular, all the parts having a common axis; therefore the ſpecimens of turning are to be more or leſs eſteemed, in proportion as they are more oppoſed to the circular figure. This art was more cultivated a hundred years ago than at preſent, and more curious ſpecimens were then produced, ſuch as hollow balls of ivory, containing many excentric figures, formed within each other, all being cut from the ſame ſolid piece, and every one beautifully ornamented upon the ſurface, although only ſmall holes were left through them to gain acceſs to the interior ones: this was carried ſo far as to form twelve balls of ivory one within the other. A great collection of curioſities of this kind will be found in a French work entitled "Récueil d'Ouvrages Curieux dans le Cabinet de M. Grollier de Servir," 4to. Lyons, 1719. This contains drawings of ſome very curious articles; but although the art is not ſo generally practiſed at the preſent day as formerly, the machines which are now invented are vaſtly ſuperior, and, with the ſame attention, would doubtleſs admit of the curioſities being equally extended. Meſſrs. Holtzapffel and Deyerlien, of Cockſpur-ſtreet, London, have made many improvements in the conſtruction of roſe engines, which they execute, as well as all other tools, for ornamental turning, in the moſt finiſhed ſtyle. We have obtained drawings of one of theſe, ſee *Plate* III. *Engines*, in which *fig.* 6. is an elevation in front of the machine. A A B B is the wooden frame; D, the large foot-wheel, to give motion to the mandrel, or ſpindle, T T, by the band and pulley F. The work is fixed in a chuck I, at the extremity of the mandrel; and the tool is held by the ſlide-reſt K, which, though it has the means of moving the tool a ſmall quantity, to adjuſt it to the radius of the roſe, or figure intended to be cut, ſtill it will firmly retain the poſition in which it is placed. The upper part, A, of the frame of the machine is made of mahogany, but has within it a caſt-iron frame, conſiſting of two bars, or bearers, which being placed parallel, and at a ſmall diſtance aſunder, leave a groove or opening between them, in the ſame manner as the cheeks of any other lathe, for the reception of the tenon, at the lower end of the back puppet (ſhewn by the dotted lines) L, which is uſed to ſupport the end of a long piece of work; though this is ſeldom uſed, becauſe the work can only be turned circular, when the back centre ſupports it. All work which is to be figure-turned muſt be held in a chuck, ſcrewed on to the end of the mandrel T; becauſe it is only the mandrel which is moveable, to give thoſe deviations from the circular figure, which are neceſſary to form the figured work. For this purpoſe, the two ſtandards, G and H, which ſupport the mandrel, are not firmly fixed to the bed, A, of the machine, as in other turning-lathes; but they deſcend between the cheeks or caſt-iron bed, almoſt as low as the bottom of the mahogany bed A, and have there an axis P (dotted), which is parallel to the mandrel, and ſupported on pivots at its ends; theſe pivots being received in pieces of caſt-iron, deſcending from the cheeks, and ſtrengthened by the iron bar, Q, extended between them. The two ſtandards, G, H, are formed of one piece, and have a ſtrong bracing of iron between them, in addition to the axis P; but this cannot be ſeen in the figure, becauſe it is concealed between the cheeks of the bed O. The oſcillating motion is given to the mandrel by means of metal roſettes M: theſe are wheels, fixed upon the mandrel, each having its periphery indented and curved with a waving line, as ſhewn at M, *fig.* 7. The roſettes are acted upon by a ſmall roller, placed at the end of a piece *n*, which is ſupported by a triangular bar *m*, fixed parallel to the mandrel, upon the upper ends of curved arms, as ſhewn in both figures. Now it is evident that when the mandrel revolves, the eminences and depreſſions of the roſette, applying themſelves to the roller of the piece *n*, which is ſtationary, will cauſe a vibrating or oſcillating motion of the mandrel, and the frame, G H, which contains it. A ſtrong ſpring is placed within the cavity of the bed A, and applied to the frame of the mandrel; ſo that it inclines the latter always towards the central or vertical poſition, that is, the poſition, when the line of the mandrel is produced, would paſs exactly through the point of the ſcrew of the back puppet L; therefore, when the protuberant or waved parts of the roſette cauſes the mandrel to depart from this ſituation, the ſpring will be bent, and ready to force it back, the inſtant the curvature of the roſette will permit. The ſpring is ſlightly curved, and placed in the ſpace between the inſides of the iron cheeks of the bed and the frame of the mandrel, ſo that the middle of the curved part acts thereupon, and the two ends bear againſt the inſide of the frame, to give the re-action. Seventeen different roſettes are placed upon the mandrel, as ſhewn in a cluſter at M, each being of a different pattern. Several are of the kind ſhewn in *fig.* 7, that is, ſcolloped out with waves or concave depreſſions, but differing in the number of waves from 12, as in the figure, to 144, which will, therefore, be very minute. The ſocket for the piece *n* can be fixed, by its clamp ſcrew, upon any part of the triangular bar *m*, to bring it oppoſite any one of the roſettes which is required to be uſed. Other roſettes, inſtead of having waves or concave depreſſions, as ſhewn in *fig.* 7, have convex protuberances. In either caſe, when the pattern is very fine, the roller upon the end of the bearing-piece, *n*, cannot be admitted, becauſe its curvature would not be ſufficiently rapid to ſuffer it to fall into the depreſſions. In theſe caſes, therefore, the end of the piece *n* is uſed for the contact, being rounded, and well hardened and poliſhed, to diminiſh as much as poſſible the friction of the roſette revolving, whilſt in contact with it.

The ſlide-reſt, which ſupports the tool, is next to be deſcribed: the manner in which it applies to a piece of work, when fixed in a chuck at the end of the mandrel, is ſhewn in *fig.* 6, whilſt *figs.* 11 and 12 are on a larger ſcale to deſcribe it minutely. The reſt can be faſtened at any part of the bed, by the lower part of the foot, which is ſupported on the bed, A, of the lathe, and is divided with a dove-tailed groove in the under ſide, to receive the head of a ſcrew-bolt, going down through the lathe-bed, and fixing it at any place by a thumb-nut, as ſhewn at *k*, *fig.* 6; the groove in the foot is for the purpoſe of allowing the reſt to be moved to and from the

centre

centre of the lathe, to adjuſt it to the diameter of the work which is turning. The foot has a ſtrong cylindrical pin fixed upright in the end of it, and this is fitted into a correſponding ſocket S, formed out of a ſolid piece, with the lower ſlider K of the reſt; a clamp-ſcrew in the ſide fixes the ſocket faſt upon the pin, and there is a wheel *s*, cut with notches, at the bottom of the ſocket, with a catch *t*, fixed upon the foot R, to engage its teeth and hold it faſt; by which means the ſliders, K, can be fixed, and held faſt at any required angle with the mandrel, for purpoſes we ſhall hereafter mention.

The upper part of the ſlide-reſt conſiſts of two horizontal ſliders, K and *g*, placed in directions perpendicular to each other; to one of theſe the tool is firmly attached, and by means of ſcrews with handles, the ſliders and the tool can be moved in any direction, to follow the tool to the work; K, in both figures, is a frame of metal, formed from the ſame piece as the ſocket S; its upper ſurface is made flat, and upon this a ſlider, or flat plate, *e e*, is fitted, to move with freedom and preciſion. A ſcrew is mounted in the opening of the frame, and is tapped into a piece of metal, projecting from the lower ſide of the ſlider, ſo that the ſcrew, when turned round by a handle *d*, fitted on its ſquare end, advances, or draws back the ſlider, which is guided in a right line by two pieces of braſs, ſcrewed to the under ſide of it, to form a dove-tailed groove, to which the edges of the frame K are fitted very accurately: upon this ſlider a frame, or two rulers, are ſcrewed, having a ſecond ſteel ſlider *g*, fitted in the dove-tailed groove formed between them, and provided with a ſcrew *i*, as the former, to move it. This upper ſlider carries a piece of metal, with a ſquare hole through it, in the direction of its length, to receive the tool *k*, and a ſcrew at top to faſten it in. The ſlide-reſt being mounted in the manner of *fig.* 6, upon the bed of the lathe, the upper ſlider, *g*, is parallel with the mandrel, and the lower one perpendicular thereto. For turning flat or face work, the tool is put as there ſhewn. Now, by turning the ſcrew, *i*, of the upper ſlider, the tool advances to a contact with the work, which is mounted in a chuck, as in the figure; then by the other ſcrew, *d*, it is moved acroſs the face of the work, turning it as it proceeds to a perfectly flat ſurface. For turning a cylinder, mounted between centers, the ſlide-reſt is to be turned one quarter round upon the pin in the ſocket S, ſo that the upper ſlider will be perpendicular to the mandrel, and the lower one parallel thereto; in this caſe, the upper ſlider muſt be moved, to adjuſt the tool to the diameter of the intended work, and the lower ſlider is moved by its handle *d*, to carry the tool along the length of the cylinder, and cut it as it goes. The whole reſt can be fixed at any part of the bed, and can be moved inſtantly if required. The ſlide-reſt will alſo turn cones by the following contrivance: the plate, or dove-tailed groove ſupporting the upper ſlider, *g*, may be turned round upon the plate *e e*, and faſtened at any inclination by a ſcrew paſſing through a circular groove in the plate. By this means, the upper ſlider is inclined, in any required angle, to the mandrel, and will then turn a cone, either hollow or ſolid. The ſlide-reſt preſents the tool ſo firmly to the work, that it will not retreat in the leaſt when any protuberance comes by, but cuts it away, if the ſtrain is not ſo great as to break the tool: but of this there is no danger if it be properly managed, becauſe the ſcrews advance the tool ſo ſlowly, that there is no need to puſh it forwards ſuddenly, as it is often unavoidable in turning by hand. The ſliders are often divided into inches and ſubdiviſions, by which the work can be made exactly to any dimenſions without trouble, or two things may be fitted exactly together. The upper ſlider, *g*, has a graduated arc to ſhew the angle of inclination which it makes with the lower one, when ſet for turning cones, ſo that a hollow cone being bored out in a chuck, a ſolid plug may at once be turned to fit it, without trial, the reſt making it certainly of the true angle.

The lathe is put in motion either by the hand, or by the foot of the turner. The latter, when the work is to be turned or reduced to the circular figure, as in any common lathe; and the former, when the work, after being turned, is to be ornamented, an operation which, from its delicacy, requires a very regular motion.

When the machine is turned by the foot, it is done by the preſſure upon the treadle E, which acts upon the crank C, on the axis of the foot-wheel, or fly-wheel, D. The motion is communicated from the treadle by a crank-hook, or connecting rod, *a*, faſtened to the crank of the wheel, by a collar embracing and turning round at the upper end. When the foot puſhes down the treadle, it gives the wheel a rotative motion; and when the crank has been drawn to the loweſt point, the momentum which the wheel has thus acquired, draws up the treadle, and thus, by the alternate preſſure of the foot, and the momentum of the wheel, the motion is regularly continued. The wheel is made of caſt iron, and fixed on the extreme end of the axis; it has two rims of different ſizes, and the ſurface of each is made conical, and cut with three annular grooves, which are receſſed, with an angle at the bottom, ſo as not to have a flat bottom. This form is advantageous, on account of the band having more power to turn the wheel F. Theſe different grooves are made, in order to give different degrees of velocity to the lathe, or to increaſe the power. The axle of the wheel is made of wrought-iron, except the pivots or centers, and it is bent in the middle to form the crank C: the pivots at the ends are made of hard ſteel, welded to the iron parts of the axle. The band which connects the fly and mandrel is made of catgut, of ſuch thickneſs as the nature of the work may require, and is either ſpliced at the joining of the two ends, or they are faſtened together by a ſteel hook and eye. The band may be either tightened, by ſhifting it to other grooves in the great wheel, or in the pulley F, of the mandrel; or otherwiſe by a ſliding-piece in the leg B, which is regulated by a ſcrew *x*.

The motion for the hand is given by a ſmall handle O, *fig.* 6; this is fixed upon the end of a ſpindle, which at the other end carries a ſmall wheel N, communicating by a band with the great wheel D. The ſpindle is ſupported in a frame, which is attached to the lathe-frame, by a centre or joint, on which it can be raiſed up, and fixed by a toothed ſector, to tighten the band when it is required.

The pulley F has three or four grooves, of different ſizes, to receive the band, and by this means the mandrel may be turned with different degrees of velocity, and made to accommodate itſelf to the length of the band. The wheel N is made in the ſame manner.

When a piece of work is to be made in the roſe engine, it is firſt turned true to the ſize and figure, and then poliſhed, before it is ornamented: therefore the machine is firſt ſet to turn circular. For this purpoſe, the piece *n*, *fig.* 7, is withdrawn, ſo as to be beyond the reach of the roſette, and a head at 2, *fig.* 6, being turned, it ſhoots a double bolt, which locks the frame G H faſt in its perpendicular poſition; that is, when the point of the back centre-ſcrew L will be exactly in the line of the mandrel, the frame being thus rendered immoveable, the machine will turn the ſame as any common lathe. If the work is of conſiderable length, it muſt be ſupported at the end by the back centre L, at leaſt whilſt it is turned circular, previous to being ornamented.

The back puppet, L, is made of caſt-iron, and is fitted upon the caſt-iron bearers, on which it can be fixed at the required diſtance from the mandrel by a vertical ſcrew underneath, and a nut, which comes in contact with a horizontal plate or waſher below the ſaid bearers. Its centre-ſcrew has a ſharp conical point to ſupport the work, and there is a clamp-ſcrew at top to faſten the centre-ſcrew, to prevent it from running back.

The methods of fixing the work to the end of the mandrel whilſt it is turned are very numerous, and vary in almoſt every inſtance: in general, it is held in a piece of wood, I, called a chuck, which is ſcrewed upon the noſe of the mandrel T, and being bored, or turned out in the manner of a cup, the piece of wood or ivory which is to be turned is driven into it by a mallet till it is firmly fixed: the wood is, of courſe, cut nearly to a circular figure, before it is fixed in the chuck; it is then wrought with a ſharp triangular pointed tool, *h*, which being fixed in the reſt, and advanced to the work by the ſcrew *i*, cuts ſmall contiguous grooves on the ſurface, till it has broken the grain of the wood, and removed all exuberances. The tool being gradually advanced by its ſcrews *d* and *i*, as is required, the work is reduced at length nearly to its intended ſize and figure, but will be wholly covered with ſmall grooves: to remove theſe, and render the work even, another tool is next uſed; this is formed like a narrow chiſſel, but made very thick, and with an obtuſe edge, which is only bevelled on the under ſide: its edge will remove the eminences between the grooves left by the firſt tool. The work is then ſmoothed, by applying to it the edge of a piece of the blade of a broken knife bevelled away; this is held in the hand, and the work is followed up with it, that its ſharp edge may ſcrape away any roughneſs left by the tools. To poliſh the wood, a piece of ſeal-ſkin, Dutch reed, or glaſs paper, is held by the hand upon the work as it runs round, and it cuts away a fine powder, making the work ſmooth enough to receive a poliſh. This is raiſed by firſt applying a piece of bees-wax, till the work is ſlightly covered with it, then afterwards burniſhing or poliſhing it, by holding a flat piece of hard wood upon it. The finiſh can be given by the friction of a coarſe woollen rag, lightly ſmeared with olive oil.

Ivory is turned nearly in the ſame manner, but is poliſhed with chalk and water, and afterwards by the friction of a woollen cloth; or, if it is firſt touched with an oily rag, and rubbed off with a dry woollen cloth, it will have a very fine ſurface.

This is only the ſame proceſs as is uſed for ordinary turning; but when the work is finiſhed in this manner, the ornamenting is began by releaſing the bolt, 2, of the mandrel-frame G H, and chuſing the roſette beſt adapted to the pattern which is required. The piece, *n*, is ſet upon the triangular bar, to be in contact with its wave, and will thus give the oſcillating motion, as before deſcribed; ſo that when the tool is applied to the work, it will produce a waved or indented ſurface, or outline, correſponding with the figure of the roſette, inſtead of the circular figure produced by the common lathe.

If the ornamenting is to be performed upon a flat ſurface, ſuch, for inſtance, as the lid or top of a box, it is chucked, as ſhewn in *fig.* 6, and the point of the tool being applied to it, will cut a waved line. To do this more conveniently, the ſlider, *g*, is advanced to the work, by preſſing it with the hand inſtead of the ſcrew *i*; for, by lifting up a ſmall ſpring catch, of which the tail is ſeen plainly at 3, *fig.* 6, the ſlider is releaſed from the nut of the ſcrew *i*, which has no other attachment to the ſlider than by a tooth on this catch entering into a notch in the nut, and it is preſſed into the notch by a ſcrew *l*. Now, by releaſing the ſcrew *l*, lifting up the catch 3, and drawing back the ſlider, the tooth of the catch falls behind the nut of the ſcrew, inſtead of being in the notch; it will, therefore, form a ſtop, to check the advance of the tool, though it allows it to be drawn back to clear the work, and alſo to be puſhed up towards it by the hand, to cut the line, the ſtop regulating the depth of the line, as the hand can advance the ſlider no farther when it meets the nut.

In this manner, a waved line is engraved round the edge of it, ſuch as is ſhewn in *fig.* 9, the breadth of the line being determined by the depth to which the point of the tool is regulated to penetrate, by turning the ſcrew *i*. The outer line being thus finiſhed, the tool is now withdrawn to clear the work, and the ſcrew, *d*, of the great ſlider being turned a ſmall quantity, the point of the tool is brought nearer to the centre of the work; here, by puſhing up the tool, another line is deſcribed; then a third within the ſecond, and ſo on, at equal diſtances, until they reach the centre: this makes a very pretty ornament, as in *fig.* 9. It ſhould be obſerved, that as each line has the ſame number of waves, or indentations, they will neceſſarily grow very fine as they approach towards the centre; but at the ſame time as the deviation from the circular figure is equal in the ſmalleſt as well as the largeſt rings, it follows, that the curves of the waves of each ring, or line, will vary in a very gradual and pleaſing manner, being ſlightly curved at the circumference, and more rapidly towards the centre. This pattern admits of great variety, by employing different roſettes, fine or coarſe, concave or convex; but it will always have the waves included in ſtraight lines directed to the centre. A very pretty variation is made by turning the roſette round upon the mandrel a very ſmall quantity every time before a freſh line is deſcribed. For this purpoſe, the roſettes are not fixed faſt upon the mandrel, but are fitted thereupon, ſo as to admit of turning round, being moved by a ſmall ſcrew at the end towards H. As an example of the uſe of this movement, *fig.* 10. is given, which conſiſts of a roſe of twenty-four waves. In this, after drawing the exterior line, in the ſame manner as the former, when the ſlider is ſet for the ſecond, the roſette is turned round upon the mandrel a quantity equal to one-fourth of a wave, or one-ninty-ſixth part of the whole circle: the circle is now deſcribed, and its waves will not fall exactly within thoſe of the former, but a little advanced therefrom. The next time a circle is to be drawn, the roſette is again ſhifted, and ſo on. As this is a quantity equal to one-fourth of the ſpace between the waves, it is plain that at every fourth line the waves will fall in lines drawn towards the centre. Still this will not affect the appearance, which will be totally different from the former, (*fig.* 9.) and very ſuperior to it. The concentric lines, in either of theſe patterns, are made exactly at equal diſtances, by means of the diviſions before-mentioned, upon the ſlider K, or otherwiſe by diviſions made upon a head, which is fitted upon the end of the ſcrew *d*; and the roſettes are ſet exactly to the quantity they are intended to be turned round, by means of diviſions made upon the edge of a circular plate, which is fixed faſt upon the mandrel, towards the end H, and a line or mark upon the laſt roſette applies to it. The ſcrew which effects the movement is ſupported in bearings upon this plate, and acts in the teeth of a wheel, fixed within the hollow of the laſt roſette. By this means, when the ſcrew is turned round by a key, it cauſes all the roſettes to turn round together any quantity which the diviſions on the circle indicate. On this principle, great varieties of patterns may be made, and they may be greatly diverſified by ſhifting the roſettes alter-

nately in contrary directions: thus, after eight, twelve, or any other number of rings have been drawn, by gradually ſhifting them each time, as before deſcribed. By reverſing the ſhifting movement to the oppoſite direction, a total change will be produced; and continuing in this manner for eight or twelve more circles, the roſettes are again to be advanced in the firſt-mentioned direction, and continued for eight or twelve. This method produces a curious effect, and admits of much variety in the patterns.

After having drawn a waved line, the roſette may be advanced half a diviſion, and then another line drawn, without altering the ſlide-reſt. By this means, the two waved lines will interſect each other, and make a number of loops like a chain of beads. A number of concentric lines of this ſort, drawn upon a circle, is very handſome.

We have now ſhewn the principal diſtinctions of the patterns which can be deſcribed upon a flat ſurface; but it is evident, that from the number of the roſettes, a very numerous ſuit of curious combinations can be made. An elliptical and an excentric chuck are adapted to this machine, to ſcrew on at T: a new field is thus opened, which is ſo extenſive as to exerciſe conſtantly the taſte and fancy of the operator, in producing new combinations, and renders the machine a ſource of the moſt intereſting amuſement. The elliptical and excentric chucks, when applied to a common lathe, will form a great many intereſting patterns, but are vaſtly more extenſive with the roſe engine. Their conſtruction will be deſcribed under TURNING. It is ſufficient here to ſay, that by the elliptical chuck, the waved lines may be drawn in ellipſes, inſtead of circles; and by the excentric, ſeveral ſmall waved circles, or ellipſes, can be arranged round the circumference of a larger circle, and their interſections produce a very pretty effect.

Another ſpecies of roſe-turning is performed upon the ſurface of a cylinder, globe, or cone; whereas that which we have deſcribed is only upon the flat ſurface of a circular piece, or end of the cylinder. To ornament the ſurface of the cylinder, the ſlide-reſt is turned round one-fourth of a circle, as before deſcribed, for forming the cylinder; ſo that the long ſlider becomes parallel to the mandrel. In this way the whole ſurface of the cylinder may be waved; but great care muſt be taken to advance the tool very gradually, becauſe it will not cut ſo readily as when turning circular work. By dividing the length of the cylinder into ſmall equal portions, and by ſhifting the roſettes every time one of theſe is finiſhed, the waves may be made to follow each other in a ſpiral direction round the cylinder; or, by a proper roſette uſed in this manner, very elegant patterns of baſket-work may be formed.

There is another movement of the roſe lathe, which we have not yet deſcribed: this is called the pumping. It is principally uſed for deſcribing waved lines upon the ſurface of a cylinder; that is, the ſurface is left cylindrical, but the lines are waved in the direction of the length of the cylinder, or alternately towards its ends. This is effected by making the mandrel move end-ways in its bearings: for which purpoſe, the necks upon which it turns are made exactly cylindrical, and fitted very correctly to ſteel collars, which are fixed into the ſtandards, G, H. It has, therefore, liberty to ſlide end-ways in its collars, when the pumping motion is required. This is given by roſettes waved upon the edge or ſide, and acting againſt the ſide of a piece of ſteel, ſuch as *n*, *fig.* 7. A ſpring, *p*, *fig.* 6, is fixed at the end of the frame, and acts againſt the ſhoulder of the mandrel, to force it end-ways, and keep the roſette always in contact with the piece of ſteel. The roſettes, M, are cut in a waved manner upon their ſides, as well as upon their circumferences; and thus a variety of pumping roſettes are obtained. By this means, curious waving lines may be drawn round a cylinder; or, if the motions firſt deſcribed are uſed in combination with the pumping, the ſurface of the cylinder may be waved, at the ſame time that waved lines are drawn upon it. In this caſe, the two roſettes employed muſt have the ſame number of waves. When the pumping motion is uſed upon face or flat work, ſuch as is ſhewn in *fig.* 6, it produces very agreeable effects, by rendering the waves of the line, which the tool cuts, alternately deeper and ſhallower, ſo as to give fine and ſtrong ſtrokes alternately, in the manner of fine writing: or, if the tool is not ſet ſo deep, they will only be cut on one ſide of the wave, and diminiſhing gradually, will not be ſeen on the other, and thus produce a number of new patterns; as the waved lines will conſiſt of detached ſtrokes, cut fine at each end, and deep in the middle.

Many patterns may be cut very expeditiouſly in the roſe engine by means of ſcrew tools: theſe tools are formed like a broad chiſſel, but the edge is cut with notches, ſo as to preſent a number of points inſtead of one continued edge. Theſe points are very exactly equidiſtant, being intended to cut ſcrews; and therefore the teeth are of the proper figure to form the threads thereof. By a tool of this kind ſix or eight lines may be cut at one operation, inſtead of the trouble of altering the ſlide-reſt, and cutting each ſeparately; and there will be a greater certainty of cutting them all to the ſame depth, and exactly equidiſtant. The mode of cutting ſcrews by this tool is called cutting flying, and is thus performed in the roſe, or in any common lathe, without a ſlide-reſt. The intended ſcrew being turned cylindrical, the points of the tool are applied to its ſurface, ſo that they will cut, and the tool is regularly advanced up towards the mandrel as it turns round: its teeth will, therefore, inſtead of deſcribing circles, trace the ſpirals of a ſcrew on the work; and if the advancement is timed ſo exactly that in one revolution the tool is advanced the exact quantity of a ſpace between two adjacent teeth, then the ſecond tooth will, at the end of a revolution, fall into the ſpiral cut by the firſt tooth, and one complete ſpiral being thus obtained, it guides the whole tool, by means of the ſecond tooth, regularly along, the firſt tooth continuing to cut the ſpiral forwards till a third tooth lays hold, then a fourth, and ſo on, till the required length of a ſcrew is cut. The trace of a ſcrew being thus made, the tool is preſſed deeper, till the threads are fully formed, the turner taking care, every time, that the end-tooth of the tool gets to the end of the ſcrew, to diſengage it, and draw it back, for as it could not advance any further than the ſhoulder, it would ſpoil all the threads by cutting them to circular rings.

This method requires great habit and dexterity to give the motion ſo exactly that it will cauſe the teeth to fall properly into the ſpirals cut by their predeceſſors, and that without any ſudden advance at the place, for the ſcrew would then be what is called drunken, that is, its threads would be more inclined at one part of its revolution than at another, and ſuch a ſcrew can never be fitted exactly with its fellow. The habit of cutting ſcrews accurately with the ſcrew-tool, can only be acquired by practice and experience, the only precaution which is taken being to get the lathe-wheel into a regular motion, and at ſuch a rate as has been found, by experience, will be proper for the ſize of the thread intended to be cut. The roſe engine before us has a very complete apparatus for cutting ſcrews, which deſerves a particular deſcription. A tube is fitted on the end of the mandrel at *o*, its circumference being cut with a ſpiral, or ſcrew-thread of the degree of fineneſs required: this is called the regulator ſcrew.

H is a ſlider, fitted to the ſtandard H, and moved by a ſcrew: *r* is a wheel fixed to this ſlider, and having ſeveral half-circle cavities cut in it, which embrace the ſcrew, as ſhewn in *fig.* 10: each cavity or ſocket has a thread in it, correſponding with the regulator ſcrew. The mandrel being made, as before-mentioned, with cylindrical collars at each end, is at liberty to ſlide endways by the movement of the regulator, when the ſcrew H draws up the ſocket *r*; therefore, every thing being prepared for cutting the thread, the ſcrew H is turned; this raiſes up the ſlider, and ſocket *r*, to touch the regulator; the tool is then applied by the ſlide-reſt, and the lathe being put in motion, the mandrel will move along endways, and alſo the work with it, ſo that the tool will cut a ſcrew, although it is held faſt by the reſt. In this caſe the ſcrew may be cut by a ſingle pointed tool, but it will be better to uſe a ſcrew tool which is of exactly the ſame thread as the regulator. The turner ſhould be provided with a variety of ſets of ſcrew tools, and as many regulators, *o*, correſponding to them, which are made like a tube, and fitted on the mandrel, being held by a nut. The ſocket *r*, which is made like a wheel, *fig.* 10, can be turned round on its centre, and has ſix different half-circle notches cut in it, each adapted to a particular regulator; therefore, by turning this wheel, *r*, any of the notches can be applied to the regulator *o*, when the ſlider is raiſed up by the ſcrew H. This ſcrew regulator may be ſometimes uſed to advantage when ornamenting the circumference of a cylinder of wood or ivory, as contiguous circles, or waved lines, may then be cut in a ſpiral direction, without moving the ſlide-reſt to cut each one ſeparately.

Another part of the roſe engine is for the purpoſe of turning ſwaſh work; this is circular work, but the mouldings or other lines traced round the cylinder are inclined to the axis. An inſtance is ſeen in the baluſtrades of old-faſhioned ſtair-caſes, where the mouldings are made to ſuit the inclination of the ſtairs. To turn this kind of work, a ſteel circle, or hoop, V, is fitted on the end roſette of the mandrel, ſo that it can be inclined from the perpendicular thereto at pleaſure: by this means it forms a guide for the pumping motion, which will ſo regulate it as to turn any work of this kind, *viz.* with the mouldings, or other ornaments, arranged in lines round the cylinder, but theſe lines will incline to the axis of the cylinder inſtead of being perpendicular to it.

ROSE, in *Geography*, a town of Naples, in Calabria Citra; nine miles N.N.E. of Coſenza.—Alſo, a town of Virginia; 20 miles S.W. of Charlotteville.

ROSE *Iſlands*, *Great* and *Little*, two ſmall iſlands among the Bahamas; 12 miles N. of Providence.

ROSE *Iſland*, an iſland in the North Pacific ocean, near the W. coaſt of America. N. lat. 59° 35′. W. long. 146° 30′.

ROSEA, a name given by ſome authors to the eryſipelas, or St. Anthony's fire.

ROSEAU, in *Geography*, now "Charlotte-town," the capital of the iſland of Dominica, ſituated in St. George's pariſh; about ſeven leagues from Prince Rupert's bay; on a point of land on the S.W. ſide of the iſland, which forms two bays, *viz.* Woodbridge's bay N., and Charlotteville bay S. Roſeau is about half a mile in length from Charlotteville to Roſeau, and moſtly two furlongs in length, but of an irregular ſhape. It contains more than 500 houſes, beſides cottages occupied by negroes. N. lat. 15° 25′. W. long. 61° 27′.

ROSECK, a town of the duchy of Carniola; eight miles E. of Gottſchee.

ROSEHEARTY, a fiſhing town and ſea-port of Scotland, in Aberdeenſhire, with a tolerable harbour; for the improvement of which lord Gardenſtone bequeathed by will a conſiderable ſum of money; four miles W. of Fraſerburgh. N. lat. 57° 38′. W. long. 2°.

ROSEINGRAVE, THOMAS, in *Biography*, an enthuſiaſtic, ingenious, and worthy muſician, of conſiderable eminence in his youth for his performance on the harpſichord and organ, both as a ſightſman and voluntary player. His intellects, in the latter part of his life, being ſomewhat deranged, rendered his character ſo ſingular, that he merits ſome notice for his eccentricities, as well as profeſſional abilities.

He was the ſon of Daniel Roſeingrave, who having been brought up in the king's chapel at the ſame time with Purcell, was firſt promoted to the place of organiſt of Saliſbury cathedral, and afterwards of St. Patrick's, Dublin. Daniel had two ſons, both muſicians: one of them, Ralph, ſucceeded his father at St. Patrick's; the other, Thomas, being regarded as a young man of uncommon diſpoſitions for the ſtudy of his art, was honoured by the chapter of St. Patrick's with a penſion, to enable him to travel for improvement; and about the year 1710 he ſet off for Italy. Being arrived at Venice in his way to Rome, as he himſelf ſays, he was invited, as a ſtranger and a virtuoſo, to an academia at the houſe of a nobleman, where, among others, he was requeſted to ſit down to the harpſichord, and favour the company with a toccata, as a ſpecimen *della ſua virtù*. And, ſays he, "finding myſelf rather better in courage and finger than uſual, I exerted myſelf, my dear friend, and fancied, by the applauſe I received, that my performance had made ſome impreſſion on the company." After a cantata had been ſung by a ſcholar of Fr. Gaſparini, who was there to accompany her, a grave young man dreſſed in black, and in a black wig, who had ſtood in one corner of the room, very quiet and attentive while Roſeingrave played, being aſked to ſit down to the harpſichord, when he began to play, Roſy ſaid, he thought ten hundred d—ls had been at the inſtrument; he never had heard ſuch paſſages of execution and effect before. The performance ſo far ſurpaſſed his own, and every degree of perfection to which he thought it poſſible he ſhould ever arrive, that, if he had been in ſight of any inſtrument with which to have done the deed, he ſhould have cut off his own fingers. Upon inquiring the name of this extraordinary performer, he was told that it was Domenico Scarlatti, ſon of the celebrated cavalier Aleſſandro Scarlatti. Roſeingrave declared, he did not touch an inſtrument himſelf for a month. After this rencontre, however, he became very intimate with the young Scarlatti, followed him to Rome and Naples, and hardly ever quitted him while he remained in Italy, which was not till after the peace of Utrecht, as appears by an anthem which he compoſed at Venice in 1713, and which Dr. Tudway has inſerted in the fifth volume of his Manuſcript Collection of Engliſh Muſic, p. 149: "Ariſe, ſhine, for thy light is come," Iſaiah, chap. lx. There is much fire and ſpirit in the introductory ſymphony of a very modern caſt. Roſeingrave is here erroneouſly called a ſtudent of Chriſt-church, Oxford, inſtead of Dublin, whence he had his exhibition.

On his return from Italy in 1720, he ſettled in London, and brought on the ſtage and conducted the performance of the opera of "Narciſo," or "Narciſſus," ſet by his friend Domenico Scarlatti; being the third opera that was performed in our lyric theatre, after the eſtabliſhment of the Royal Academy of Muſic. He compoſed ſeveral additional ſongs for this opera, in which the ſingers were ſignor Benedetto Baldaſſarri, Mr. Gordon, ſignora Duraſtanti, Mrs. Anaſtaſia Robinſon, Mrs. Turner Robinſon, daughter of Dr. Turner, and wife of Mr. Robinſon, organiſt of

Weſt minſter-Abbey. Roſeingrave's additional ſongs were compoſed in the ſtyle of his friend Mimo Scarlatti, in whoſe muſic of Narciſſus, though there were many new and pleaſing paſſages and effects, yet thoſe acquainted with the original and happy freaks of this compoſer in his harpſichord pieces, would be ſurpriſed at the ſobriety and almoſt dulneſs of his ſongs. His genius was not yet expanded, and he was was not ſo much uſed to write for the voice as his father, who was the greateſt vocal compoſer of his time, as the ſon afterwards became the moſt original and wonderful performer on the harpſichord, as well as compoſer for that inſtrument. But it ſeems impoſſible for any individual to be equally great in any two things of difficult attainment.

Roſeingrave was likewiſe the editor of the firſt edition of Scarlatti's Harpſichord Leſſons, in 2 vols. long 4to.

His election to the place of organiſt of St. George's, Hanover-ſquare, was attended with very honourable circumſtances. The pariſhioners, conſiſting chiefly of perſons of rank and fortune, being very deſirous of having a good organiſt, and unwilling to truſt to their own judgment, or be teazed by the ſolicitations of candidates of mean abilities, requeſted Mr. Handel, Dr. Pepuſch, Dr. Greene, and Mr. Galliard, to hear the competitors play, and determine their degree of merit.

The candidates were allowed half an hour each to manifeſt their abilities on the organ, in whatever way they pleaſed, and then were ſeverally required to play *extempore* on ſubjects given by the judges. Mr. Handel did not attend in perſon, but ſent his ſubject. Among the numerous candidates for this place there were ſeveral who acquitted themſelves very well, during the half-hour of free-agency, by playing with great neatneſs pieces they had probably ſtudied for the occaſion; but when ſubjects of fugue were preſented to them for extemporaneous treatment, they neither knew how nor when to bring in the anſwer, or even to find harmony for the themes with either hand when they were brought in. Roſeingrave, on the contrary, whoſe ſtyle, though too crude and learned for the generality of hearers, when left to himſelf, treated the ſubjects given with ſuch ſcience and dexterity, inverting the order of notes, augmenting and diminiſhing their value, introducing counter-ſubjects, and turning the themes to ſo many ingenious purpoſes, that the judges were unanimous in declaring him the victorious candidate. The late Dr. Arne and Mr. Mich. Chriſt. Feſting, who were both preſent at this contention, informed us of theſe particulars, which happened in the year 1726, and ſpoke with wonder of Roſeingrave as an extempore fughiſt; but confirmed the general cenſure of his crude harmony and extravagant modulation, which indeed his printed compoſitions imply.

Roſeingrave having, a few years after this election, fixed his affections on a lady of no dove-like conſtancy, was rejected by her at the time he thought himſelf moſt ſecure of being united to her for ever. This diſappointment was ſo ſeverely felt by the unfortunate lover, as to occaſion a temporary and whimſical inſanity. He uſed to ſay, that the lady's cruelty had ſo literally and completely broke his heart, that he heard the ſtrings of it *crack* at the time he received his ſentence; and on that account ever after called the diſorder of his intellects his *crepation*, from the Italian verb *crepare, to crack*. After this misfortune, poor Roſeingrave was never able to bear any kind of noiſe, without great emotion. If, during his performance on the organ at church, any one near him coughed, ſneezed, or blew his noſe with violence, he would inſtantly quit the inſtrument, and run out of church, ſeemingly in the greateſt pain and terror, crying out that it was *old ſcratch* who tormented him, and played on his *crepation*.

About the year 1737, on account of his occaſional inſanity, he was ſuperſeded at St. George's church by the late Mr. Keeble, an excellent organiſt, intelligent teacher, and a worthy man, who, during the life of Roſeingrave, divided with him the ſalary. We prevailed on him once to touch an organ at Byfield's, the organ-builder; but his nerves were then ſo unſtrung, that he could execute but few of the learned ideas which his mental diſorder had left him. His ſweetneſs of temper and willingneſs to inſtruct young perſons, who were eager in the purſuit of knowledge, tempted us frequently to viſit him at Mrs. Bray's, Hampſtead, where he reſided. His converſation was very entertaining and inſtructive, particularly on muſical ſubjects. Indeed, his paſſion for the art never quitted him to the time of his death, which happened in Ireland about the year 1750. The inſtrument on which he had exerciſed himſelf, in the moſt enthuſiaſtic part of his life, bore very uncommon marks of diligence and perſeverance; for he had worn the ivory covering of many of the keys quite through to the wood. In his younger days, when he enjoyed the *mens ſana in corpore ſano*, he was regarded as having a power of ſeizing the parts and ſpirit of a ſcore, and executing the moſt difficult muſic at ſight beyond any muſician in Europe. Indeed, it was ſaid that he could read a muſic-book, if turned topſy-turvy; but this ſeems exaggeration of praiſe. which few can believe, who know the difficulty, without ocular and auricular demonſtration. The harmony in the voluntaries, which Roſeingrave publiſhed, is rendered intolerably harſh and ungrateful by a licentious and extravagant modulation, and a more frequent uſe of the ſharp third and flat ſixth than any compoſer with whoſe works we are at all acquainted, not excepting Dr. Blow; and his double fugues are ſo confuſed by the too cloſe ſucceſſion of unmarked ſubjects, that it is impoſſible, at the end of the performance, to remember what they are. His cantatas, which he publiſhed by ſubſcription, being compoſed on the model of the elder Scarlatti, are the moſt pleaſing of his works; but they were ſtill-born, and never lived to ſpeak in public.

ROSELLE, in *Geography*, a town of Etruria; two miles N. of Groſſeto.

ROSEMARKIE, a royal borough town in a pariſh of the ſame name, in the county of Roſs, Scotland, is ſituated on the northern ſhore of the Moray-frith, nearly oppoſite to fort George. It was conſtituted a royal burgh by Alexander II. king of Scotland; but in the reign of king James II. it was united with the town of Chanonry, (ſo called from its having been the chanonry of Roſs, and the reſidence of the biſhop,) and re-incorporated by charter under the name of Fortroſs, ſince ſoftened to Fortroſe. For ſome further particulars reſpecting this town, ſee FORTROSE. Carliſle's Topographical Dictionary of Scotland, 4to. 1813.

ROSEMARY, in *Botany*. See ROSMARINUS.

ROSEMARY, *Poet's*. See OSYRIS.

ROSEMARY, *Wild, Marſh Ciſtus*. See LEDUM.

ROSEMARY, in the *Materia Medica*. Roſemary has a fragrant aromatic ſmell, and a bitteriſh pungent taſte. The leaves and tops of this plant are the ſtrongeſt with regard to their ſenſible qualities; the flowers are not to be ſeparated from their calyces or cups, as the active matter principally, if not wholly, reſides in the latter.

Roſemary gives out its virtues completely to rectified ſpirit, but only partially to water. The leaves and tops, diſtilled with water, yield a thin, light, pale-coloured eſſential oil

oil of great fragrancy, though not quite ſo agreeable as the roſemary itſelf; from one hundred pounds of the herb in flower were obtained eight ounces of oil; the decoction, thus diveſted of the aromatic part of the plant, yields, on being inſpiſſated, an unpleaſant bitteriſh extract. Rectified ſpirit likewiſe, diſtilled from roſemary leaves, becomes conſiderably impregnated with their fragrance, leaving, however, in the extract the greateſt ſhare both of their flavour and pungency. The active matter of the flowers is ſomewhat more volatile than that of the leaves, the greateſt part of it ariſing with ſpirit. Tournefort obſerves, that thoſe ſorts of roſemary, which produce neither flowers nor ſeeds, and which have very hard ſhrubby ſtalks, and long narrow leaves, ſmell ſtrongly like camphor, and yield on diſtilling a large quantity, for the purpoſe of obtaining their oil, a portion alſo of real camphor.

Roſemary is reckoned one of the moſt powerful of thoſe plants which ſtimulate and corroborate the nervous ſyſtem; it has, therefore, been recommended in various affections, ſuppoſed to proceed from debilities, or defective excitement of the brain and nerves; as in certain head-aches, deafneſſes, giddineſſes, palſies, &c. and in ſome hyſterical and dyſpeptic ſymptoms. Dr. Cullen ſuppoſes the ſtimulant power of roſemary inſufficient to reach the ſanguiferous ſyſtem; it has however the character of being an emmenagogue, and the only diſeaſe, in which Bergius ſtates it to be uſeful, is the chloroſis. In diſorders of this kind it has been given in the form of infuſion; but it is now ſcarcely ever preſcribed, unleſs as an odorous additament to ſternutatory powders. The doſe in ſubſtance may be from grs. x to ℈ij, and from ʒj to ʒiſs in infuſion. The officinal preparations are the "oleum roſmarini," and "ſpiritus roſmarini." It is alſo a principal ingredient in what is known by the name of HUNGARY *Water;* which ſee.

ROSEMARY, *Oil of*, Oleum roſmarini, Lond.; Oleum ſummitatum florentium roriſmarini officinalis, Edinb.; Oleum herbæ floreſcentis roris marini, Dub., is prepared by diſtilling twenty-four pounds of the plant, which yield one ounce of a fluid colourleſs oil, the odour of which is leſs agreeable than that of the plant. It depoſits cryſtals of camphor when long kept. Its ſpecific gravity is .934. (See OIL.) This oil is ſtimulant; and frequently enters into the compoſition of liniments. The doſe, as an internal remedy, may be from ♏ij to ♏vi; but it is ſcarcely ever ordered.

ROSEMARY, *Spirit of*, Spiritus roſmarini (Lond.) is obtained by macerating two pounds of freſh roſemary tops in a gallon of proof ſpirit, with water ſufficient for preventing empyreuma, for twenty-four hours, and then diſtilling a gallon in a gentle heat. Spiritus roriſmarini officinalis (Edinb.) is prepared by taking two pounds of freſh roſemary tops and eight pounds of alcohol (ſpec. grav. .335), and drawing off ſeven pounds by diſtillation in a water bath. Spiritus roriſmarini (Dub.) is obtained by diſtilling with a moderate fire five pints from a pound and a half of freſh roſemary tops and a gallon of proof ſpirit. Oil of roſemary is ſufficiently volatile to riſe in diſtillation with rectified ſpirit, which the Edinb. college has, therefore, directed to be uſed. It is a fragrant perfume; and is chiefly uſed in the compound ſoap liniment or the compound ſpirit of lavender. Lewis Mat. Med. Woodv. Med. Bot. Thomſon's Diſp.

ROSEMBERG, in *Geography*, a town of Pomerelia; 10 miles S. of Dantzic.

ROSENAU, a town of Pruſſia, in Oberland; 16 miles E. of Marienwerder.—Alſo, a town of Moravia, in the circle of Prerau; eight miles E. of Meſeritſch.—Alſo, a town of Hungary, near which are mines of gold, copper, quickſilver, and cinnabar; 24 miles W. of Caſchau.

ROSENBERG, a town of Pruſſia, in the province of Oberland; 17 miles E. of Marienwerder. N. lat. 53° 39′. E. long. 19° 10′.—Alſo, a town of Hungary, on the Waag, trading chiefly in ſalt; 18 miles N. of Libeten.—Alſo, a town of Bohemia, in the circle of Bechin; 37 miles S. of Bechin. N. lat. 48° 40′. E. long. 14° 18′.

ROSENBERG, or *Oleſno*, a town of Sileſia, in the principality of Oppeln; 26 miles N.E. of Oppeln. N. lat. 50° 52′. E. long. 18° 28′.

ROSENBURG, a town of the duchy of Magdeburg; 24 miles S. of Magdeburg.—Alſo, a ſmall Dutch iſland, at the mouth of the Meuſe; three miles E. of Briel.

ROSENDAL, a town of Brabant; 15 miles W. of Breda.

ROSENDORF, a town of Bohemia, in the circle of Leitmeritz; ſix miles W. of Kamnitz.

ROSENEATH, a town of Scotland, in Dumbartonſhire; nine miles W.N.W. of Dumbarton.

ROSENESS, a cape on the S. coaſt of the iſland of Pomona. N. lat. 58° 45′. W. long. 2° 42′.

ROSENFELD, a town of Wurtemberg; eight miles S.E. of Sulz. N. lat. 48° 14′. E. long. 8° 43′.

ROSENGAT, a town of Germany, oppoſite to Worms.

ROSENHEIM, a town of Bavaria, at the conflux of the Inn and the Manguald; 38 miles W. of Salzburg.

ROSENHOF, a town of the duchy of Holſtein; five miles N. of Ciſmar.

ROSENIA, in *Botany*, ſo called by Thunberg, in honour of two brothers of the name of Roſen, both eminent as phyſicians and botaniſts, one of whom is well known as the determined and jealous rival of the early fame of Linnæus, though afterwards his friend. (See LINNÆUS.) This gentleman, who died in 1773, aged 67, was profeſſor of Medicine at Upſal: the other at Lund. They were natives of Sweden, and knights of the Polar Star.—Thunb. Prodr. præf. n. 59. Nov. Gen. diſſ. 12. 161. Willd. Sp. Pl. v. 3. 2134.—Claſs and order, *Syngeneſia Polygamia Superflua.* Nat. Ord. *Compoſitæ Diſcoideæ*, Linn. *Corymbiferæ*, Juſſ.

Gen. Ch. *Common calyx* of many leaves, imbricated; ſcales ovate, obtuſe, undivided, ſmooth, tranſparent, with a brown, opaque, longitudinal line. *Cor.* compound, radiated; *florets* of the diſk perfect, tubular, five-cleft; thoſe of the radius female, ligulate, convolute, arched. *Stam.* (in the perfect florets) Filaments five, very ſhort; anthers united into a cylindrical tube. *Piſt.* (both in the diſk and radius) Germen ſmall, ſtyle thread-ſhaped; ſtigma cloven. *Peric.* none, except the unchanged calyx. *Seed* (in both kinds of florets) angular, ſmooth; down, of two kinds of capillary ſcales; the two innermoſt of the radius generally ſetaceous and longeſt; the outermoſt capillary, united at the baſe into ſeveral parcels. *Recept.* compoſed of lanceolate, membranaceous ſcales.

Eſſ. Ch. Receptacle chaffy. Seed-down of two kinds, chaffy. Corolla radiated. Calyx ſcarioſe.

1. R. *glanduloſa.* Thunb. and Willd.—Native of the interior of the Cape of Good Hope. For all that is known of this ſolitary ſpecies of *Roſenia*, we are indebted to the following deſcription of Thunberg. "*Stem* ſhrubby, round, ſmooth, wavy, erect, much branched, generally more than two feet high. *Branches* and *branchlets* alternate, three or four together, in a cluſter, ſpreading, ſtriated: the branchlets lateral, very ſhort, leafy. *Leaves* ſomewhat cluſtered, approximating, ſeſſile, ovate, obtuſe, undivided, ſlightly concave.

cave, chiefly glandular at the margin, downy, thickiſh, imbricated, half as long as the nail. *Flowers* capitate, terminal."

ROSENOU, in *Geography*, a town of Pomerania; eight miles S.S.E. of Coſslin.

ROSENTHAL, a town of the principality of Heſſe; eight miles N.N.W. of Marburg.—Alſo, a town of Weſtphalia, in the biſhopric of Hildeſheim; three miles S.W. of Peina.—Alſo, a town of Pruſſia, in the palatinate of Culm; eight miles N.E. of Bretchen.—Alſo, a town of Bohemia, in the circle of Bechin; three miles N. of Roſenberg.

ROSEOLA, in *Medicine*, a term appropriated, in the nomenclature of cutaneous diſeaſes deviſed by the late Dr. Willan, to a roſe-coloured raſh or efflorescence upon the ſkin, which is variouſly figured, without any elevation of the ſurface, and not communicable by contagion.

This raſh is of little importance in a practical view, becauſe it is moſtly a mere concomitant of different febrile complaints, and requires no deviation from the treatment adapted to their relief; but as it is ſometimes miſtaken both for ſcarlet fever and meaſles, which are contagious and often dangerous diſeaſes, ſo it ought to be known, and its varieties diſcriminated. The appellation of roſeola is to be found in the works of ſome of the early modern writers; but it was applied ſomewhat indiſcriminately to every red raſh, to ſcarlet fever, meaſles, &c. Fuller, in his Exanthematologia, p. 128, ſpeaks of a ſort of roſe-raſh, as a fluſhing all over the body, like fine crimſon, which, he ſays, is void of danger, and "rather a ludicrous ſpectacle, than an ill ſymptom."

Seven varieties of roſeola were diſtinguiſhed by Dr. Willan under the following appellations.

1. The roſeola *æſtiva*, ſo called from its uſual occurrence in ſummer, is ſometimes preceded for a few days by ſlight feveriſh ſymptoms, ſuch as pains in the head and limbs, laſſitude, and liſtleſsneſs. The raſh appears firſt on the face and neck, and, in the courſe of a day or two, is diſtributed over the reſt of the body, producing a conſiderable degree of itching and tingling. The mode of diſtribution is into ſeparate ſmall patches of various figure, but of larger and more irregular forms than in the meaſles, with numerous interſtices of the natural ſkin. It is at firſt red, but ſoon aſſumes the deep roſeate hue peculiar to it. The fauces are tinged with the ſame colour, and a ſlight roughneſs of the tonſils is felt in ſwallowing. The raſh continues vivid through the ſecond day; after which it declines in brightneſs, ſlight ſpecks only of a dark red hue remaining on the fourth day, which, together with the conſtitutional affection, wholly diſappear on the fifth.

Not unfrequently, however, the raſh is partial, extending only over portions of the face, neck, and upper part of the breaſt and ſhoulders, in patches, very ſlightly elevated, and itching conſiderably. In this form the complaint continues a week or longer, the raſh appearing and diſappearing ſeveral times; ſometimes without any apparent cauſe, and ſometimes from ſudden mental emotions, or from taking wine, ſpices, or warm liquors. The retroceſſion of the raſh is uſually accompanied with diſorder of the ſtomach, head-ache, and faintneſs, which are immediately relieved on its re-appearance.

This ſpecies of roſeola uſually occurs in the ſummer ſeaſon, and particularly in females of an irritable conſtitution. The patients commonly aſcribe it to ſudden alternations of heat and cold, and eſpecially to having drank cold liquors, when perſpiring after exerciſe. Sometimes it occurs in connection with bilious diarrhœa, cholera, dyſentery, or other bowel complaints of the hot ſeaſon; and ſometimes it appears after much fatigue.

Very little medical treatment is required for this eruption, which is generally alleviated by moderate diet, from which every thing heating is excluded; and by the uſe of acidulated drinks, with occaſional laxative medicines. The complaint is never dangerous, except from the ſudden repulſion of the eruption, in conſequence of expoſure to very chill air, or of the application of cold water; in which caſe violent diſorder has taken place in the head, ſtomach, or bowels of the patient, as happens under ſimilar circumſtances in other eruptive diſeaſes, ſuch as meaſles, the red gum, &c.

2. The roſeola *autumnalis* is not uncommon in children of five, or from that to ten years of age, in the autumn. It occurs in diſtinct patches, of an oval or circular ſhape, which occaſion no elevation of the cuticle, and gradually increaſe to about the ſize of a ſhilling. Their hue is of a dark damaſk red; ſo that at a diſtance the ſkin appears as if ſtained with the juice of black cherries or mulberries. They are uſually diffuſed over the arms, ſeldom on the face and body; and they continue about a week, being ſometimes, but not always, ſucceeded by deſquamation. This eruption is not accompanied by much itching or tingling, nor is there any ſymptom of general diſorder, except a whiteneſs of the tongue. It is generally removed in a ſhort time by the exhibition of the diluted ſulphuric acid internally.

3. The roſeola *annulata* appears on almoſt every part of the ſurface of the body in roſe-coloured rings, which have central areas of the uſual colour of the ſkin; and it likewiſe ſlightly affects the throat. The rings are at firſt from a line to two lines in diameter; but they gradually dilate, leaving a larger central ſpace, ſometimes to the diameter of half an inch; and excite, eſpecially in the night, a troubleſome ſenſation of heat, and of itching or prickling. The duration of the eruption is very uncertain; in ſome caſes it commences with ſhivering ſucceeded by heat, and is attended with head-ache, fluſhing of the face, ſickneſs at the ſtomach, and pains in the limbs; it then continues four or five days, and diſappears as the febrile ſymptoms decline. In other caſes, which are without fever, the complaint is of long duration; the efflorescence uſually fades in the morning, and returns in the evening or night, the rings becoming vivid, and ſometimes a little elevated. If the rings ſhould diſappear, or be very faint in colour for ſeveral ſucceſſive days, the patient becomes affected with pain in the ſtomach, ſickneſs, vomiting of bile, great languor, giddineſs and aching in the limbs. Theſe ſymptoms are alleviated or removed by the uſe of the warm bath, after which the efflorescence generally returns. Sea-bathing and the mineral acids afford much relief to the more chronic forms of this ſpecies of roſeola.

The annular roſeola appears to be ſometimes connected with an irregular ſtate of the catamenia in women, and with gouty and rheumatic complaints in both ſexes. It ſometimes ſucceeds to a fit of the gout, and we have ſeen it appear as the precurſor of a fit, which immediately followed its diſappearance.

4. The roſeola *infantilis* affects children during the period of teething, in fevers, and in diſorders of the bowels, and the raſh is uſually ſo cloſe and full as to leave very ſmall interſtices of the natural hue of the ſkin. It is very irregular, however, in its appearance and progreſs, ſometimes continuing only for a night; ſometimes appearing and diſappearing for ſeveral ſucceſſive days, being attended with ſymptoms of violent irritation; and ſometimes ariſing in ſingle,

ſingle, but numerous and coaleſcing, patches, of about the ſize of a ſixpence, which continue for ſeveral days, and terminate in ſcurf. This raſh, where it is pretty generally diffuſed, is often miſtaken, as Dr. Underwood has remarked, for meaſles and ſcarlet fever. Whence it is neceſſary, that its character ſhould be well known to medical practitioners; although it requires no ſpecific treatment, but uſually diſappears under the employment of remedies calculated to relieve the bowel complaints, painful dentition, and other febrile affections, with which it is ſo frequently connected.

5. The roſeola *varioloſa* occurs previous to the eruption of the ſmall-pox, when produced by an inoculation, in the proportion of about *one* caſe in *fifteen*, according to obſervations made at the Small-Pox Hoſpital. It uſually appears on the ſecond day of the eruptive fever, which is generally the ninth or tenth after inoculation, and is deemed by inoculators a certain prognoſtic of a ſmall and favourable eruption of the ſmall-pox. It does alſo occaſionally occur in the natural ſmall-pox, on the third or fourth day, and with a moderate and favourable eruption of puſtules; but it is much more rare than in the inoculated diſeaſe.

This raſh is firſt obſervable on the arms, breaſt, and face: on the following day it extends over the trunk of the body and the extremities. Its diſtribution is various; ſometimes in contiguous ſemicircles; ſometimes in longitudinal irregular patches, with ſmall diſtinct dots intermixed; and in a few caſes, all theſe appearances being combined, it forms an almoſt continuous redneſs over the body, and is in ſeveral parts ſlightly elevated above the ſurface, as in the meaſles. It is not eaſily repelled by cold air, or cold drinks, as the early inoculators apprehended; and is aggravated by the confinement and ſudorific medicines which they recommended.

Theſe roſeolous efflorescences, antecedent to the eruption of ſmall-pox, were occaſionally obſerved by the firſt writers on the diſeaſe; and both by them and ſubſequent authors were deemed to be meaſles, which were ſaid to be converted into ſmall-pox.

6. Roſeola *vaccina*. An efflorescence which is ſomewhat diffuſe, like the variolous raſh, but appears generally in congeries of dots and ſmall patches, a little elevated, takes place in ſome children on the ninth and tenth day of *vaccination*, at the place of inoculation, and at the ſame time with the areola that is formed round the veſicle; and from thence it ſpreads irregularly over the whole ſurface of the body. But this does not occur nearly ſo often as after variolous inoculation. It does not continue vivid above forty-eight hours; and is uſually attended with a very quick pulſe, a white tongue, and great reſtleſsneſs. Some vaccinators attach little importance to it; others think it a favourable circumſtance, as denoting that the ſkin and conſtitution have been fully affected by the cow-pock.

7. Roſeola *miliaris*. This raſh often accompanies an eruption of miliary veſicles, with fever, where much heat and ſweating have been excited. (See Miliary *Fever*.) It occurs occaſionally, however, in the continued fevers of this country, where neither a miliary eruption nor profuſe ſweating had preceded it, and does not appear to be an unfavourable ſymptom. See Willan on Cutaneous Diſeaſes, p. 433, et ſeq., and Bateman's Pract. Synopſis of Cutan. Diſ. p. 96. 3d edit. See alſo Underwood, on the Diſ. of Children, vol. i. p. 87.

ROSES, *Iſlands of Two*, in *Geography*, two ſmall iſlands in the Indian ſea, near the coaſt of Africa. S. lat. 17°.

Roses. See Rosas.

ROSETO, a river of Naples, which runs into the gulf of Tarento, N. lat. 40° 2′. E. long. 16° 40′.

ROSETTA, Rossetta, or *Raſchid*, a town of Egypt, of conſiderable ſize and population, founded in the eighth century, as ſome have ſaid; though Elmacin informs us, that it was built during the reign of Elmetouakkel, caliph of Bagdad, towards the year 870 of our era, and under the pontificate of Coſma, patriarch of the Jacobites at Alexandria. Others date its foundation at a much later period; and Belon, who travelled in Egypt in 1530, ſays that this town was much ſmaller than Faöué, but at preſent it is much larger. It has borne the Arabic name Raſchid ever ſince the time of Edriſſi the geographer, in 1153, and of this the Europeans have made Roſetta or Roſſetta. Some have erroneouſly aſſerted, that it was built on the ſpot where Canopus was ſituated; whereas the Canopic branch of the Nile is the lagoon of Maadié, and the ruins of Canopus are at Aboukir. Roſetta affords no trace of antiquity; nevertheleſs it is certain, ſays Sonnini, that it cannot be far from the place where ſtood Metelis or Metilis, of which Strabo and Ptolemy make mention, and which was on the weſtern bank, and near the mouth of the Bolbitic branch of the Nile. The heaps of ſand, which this river is continually accumulating, no longer permit veſſels to reach as far as Faoué. Although Roſetta was built at the mouth of the river, it is already two leagues from it. According to Abulfeda it was very inconſiderable in the 13th century; nor was it much increaſed for 200 years after this time. But when the Ottomans added Egypt to their conqueſts, they neglected the ſupport of the canals. Thus, the canal of Faoué ceaſing to be navigable, Roſetta became the emporium of the merchandize of Alexandria and Cairo. Commerce ſoon made it flouriſh, and it is at this day one of the handſomeſt towns in Egypt. It extends along the weſtern bank of the Nile, and is above a league in length, by a quarter of a mile in breadth. Although it has no remarkable place, nor any one ſtreet quite regular, yet all the houſes, being built with terraces, and well diſpoſed, have, by Savary's deſcription of it, an air of cleanlineſs and elegance, which is very agreeable; to which Sonnini adds, that here are ſeen long ſtreets formed by two rows of ſhops, in which are found all ſorts of goods; the neceſſaries of life being very plentiful, and procured at a low price. Within the houſes are ſpacious apartments, well ventilated by a great number of windows, which are always open. The blinds and tranſparent linen, which they ſtretch over them, keep out the rays of the ſun, afford a moderate light, and mitigate the exceſſive heats. The only public buildings worthy of notice are the moſques, with their lofty minarets, of light architecture, and conſtructed with much boldneſs. They thus produce a very picturesque effect in a town where all the roofs are flat, and throw great variety into the picture. The houſes in general have a view of the Nile, and of the Delta, which form a moſt magnificent ſpectacle. The river is always covered with veſſels, mounting and deſcending with oars, or under ſail. The tumult of the harbour, the joy of the mariners, their noiſy muſic, exhibit a moving and animated ſcene. The Delta, that immenſe garden, where the earth is never weary of production, furniſhes the whole year a ſucceſſion of harveſts, of vegetables, of flowers, and of fruits; various ſpecies of cucumbers and delicious melons, the fig, the orange, the banana, the pomegranate, of the moſt exquiſite flavour. To the north of the town are gardens, where lemon and orange trees, date trees, and ſycamore trees, are planted at random; by their foliage affording an arch impenetrable to the rays of

of the ſun, and by their flowers rendering the ſhade of theſe groves delightful. The houſes of Roſetta, ſays Sonnini, are much better built, in general, than thoſe of Cairo: its ſituation upon the banks of the river; the view of the Delta, which preſents, as Savary deſcribes it, the delightful proſpect of the moſt beautiful culture, the perfumed groves in its neighbourhood, and its pure and wholeſome air, have moſt deſervedly procured for it the name of the "garden of Egypt." Commerce conſtitutes the principal wealth of the inhabitants of Roſetta. The importation of foreign merchandize to Cairo, and of the productions of Egypt into the port of Alexandria, employs a great number of mariners. (See Boghass and Scherm.) The bar of the Nile is totally ſhut during two months of the year, and the commerce of Alexandria is interrupted. But if all the ſhips in Egypt were to periſh, the Ottoman government, ſays Savary, would not remove one inch of ground of the canal of Faoué to render it navigable. It ſuffers every thing to go to ruin, and repairs nothing.

In the town of Roſetta a profound ſilence reigns, uninterrupted by the noiſe of any carriage. The inhabitants move with gravity through the ſtreets, clad in long robes which hang down to their heels. Their heads are covered with heavy turbans, or bound round with a ſchale or ſhawl, which is a long piece of ſtuff made of ſilk or wool. The girdle is made uſe of by both ſexes. The citizen is armed with a knife, the ſoldier with a ſabre, and a pair of piſtols. The women of the lower claſs, whoſe dreſs conſiſts of a large blue ſhift, and a long pair of drawers, have their faces covered with a piece of linen, with holes oppoſite to the eyes. The rich wear a large white veil, with a cloak of black ſilk, that wraps up their whole body. But though they are thus maſked, they are not ſcrupulous in making ſigns, nor in ogling.

The moſt ordinary paſtime here is ſmoking and drinking coffee. From morning to night the inhabitants have their pipes in their mouths; at home, in each other's houſes, in the ſtreets, on horſeback, they keep their pipe lighted, and the tobacco-bag is hung at their waiſt. If the inhabitants of Roſetta be leſs barbarous, ſays Sonnini, than thoſe of the other parts of Egypt, they are not leſs ignorant, leſs ſuperſtitious, nor leſs intolerant. We find among them, although with ſhades more ſoftened down, the ſame roughneſs of character, the ſame implacable averſion towards the nations of Europe, and diſpoſition to inſult both Chriſtians and Jews, the ſame revengeful diſpoſition, in a word, the ſame treachery; and they are addicted to the ſame ſhameful vices, ſome of which we cannot name.

The country round Roſetta is an immenſe ſurface, without a mountain or hill, interſected by innumerable canals, covered with harveſt and a variety of trees, which winter never ſtrips of their leaves. The ſoil is a black mould, the fertility of which is inexhauſtible. The chief article of cultivation is rice, called in the vicinity of Roſetta "ſultani," which is ſown from the month of March to that of May, tranſplanted on the banks of the Nile, and on the borders of the canals at the end of July, and cut in November. (See Egypt.) Rice forms a principal article of exportation, which they dry by ſpreading upon the terraces of the houſes and in the public ſquares; and to this operation is attributed the multitude of gnats, with which the town and the inſide of the houſes are filled at the time when it is performed.

Roſetta, beſides being the great emporium of the trade that is carried on between Cairo and Alexandria, has ſome branches of commerce peculiar to itſelf; ſuch as ſpun-cotton, dyed red, which is drawn from the adjacent diſtricts; dreſſed flax, linen cloths, ſilk dyes for the eaſtern dreſſes, &c. The flax of the country, which is long, ſoft, and ſilky, would make beautiful linen, if they knew how to employ it; but the ſpinſters are very inexpert, and the thread they make is clumſy, hard, and uneven. The linens they bleach ſerve for the table; the reſt, dyed blue, is employed for the clothing of the people. In Roſetta there are ſtore-houſes of natron, and manufactories where it is uſed. (See Natron.) Moſt of the merchants of this town are Turks or Syrians, and ſome from Barbary. The Copts are numerous, together with ſome Arabs. The command of the town is veſted in an officer of the Mamlouks, who bears the title of Aga. About a league from the ſea, northward of Roſetta, are two caſtles, one on the weſtern bank of the Nile, and the other on the oppoſite bank of the river, conſtructed to defend the entrance of the river. The former, which is aſcribed to St. Lewis in the time of the cruſades, is almoſt entirely demoliſhed; and the few cannon which remain in it are unfit for ſervice. Theſe two forts, though inconſiderable, and in a ruinous ſtate, would be ſufficient to ſtop veſſels from entering the river, if the Turks knew how to make uſe of cannon; but here they have no occaſion for it; as nature has guarded the mouth of the Nile, by raiſing a dangerous bar, called the *Boghaſs* or *Bogaz*, which is the terror of mariners. About half a league to the ſouth of Roſetta is a tower, called the tower of Canopus, from the erroneous ſuppoſition that Roſetta is on the ſcite of the ancient Canopus. This tower has been built, in modern times, upon a hillock of ſand, which at this place forms the W. bank of the Nile. It is ſquare, and partly demoliſhed. In the lower part the inhabitants of this diſtrict ſhew the opening of a ſubterraneous paſſage, which, as they ſay, led to Alexandria. Near the top of the ſame is preſented a general view of the country, having no bounds except thoſe which nature has preſcribed; and near its foot, cloſe to the edge of the Nile, ſtands a moſque, conſecrated to a holy Muſſulman, called "Abou-Mandour," which ſignifies father of the light. This ſaint, if he be the father of the light, is alſo the terror of the ſands, as, but for him, they would long ago have overwhelmed Roſetta, and added it to their dreary domain. Oppoſite to this moſque, upon the E. bank of the Nile, are two or three houſes, called Maadée, becauſe they ſtand at the place facing the uſual paſſage to the Delta. On the weſt bank, at a ſhort diſtance above Abou-Mandour, is Dgeddiè, a conſiderable village, in the environs of which a great number of vine-plants grow in the ſand; from hence Roſetta and Alexandria are ſupplied with grapes.

At the foot of the tower above-mentioned, a large ſemicircular baſon announces a port, which has been choaked up by the ſand. In digging at the bottom of this hillock, twenty beautiful marble pillars were diſcovered by a Turkiſh merchant, who was ſtripped of his fortune by the Beys, from an imagination that he had carried off a treaſure from this place. M. d'Anville ſuſpects that the ancient Bolbitina muſt have been at a very ſmall diſtance from the ſpot on which Roſetta now ſtands. The ruins now mentioned ſeem to confirm his conjecture; as they are at the extremity of a town, and can only belong to the Bolbitina ſpoken of by Steph. Byz. and which gives its name to one of the branches of the Nile. This place is very pictureſque; the tower, falling into ruins, is ſurrounded by tombs, and to the weſtward is a deſart plain, whoſe burning extent the eye cannot look over without horror; but on the E. the contraſt is very ſtriking, preſenting a majeſtic river, and the Delta, uniting

uniting moſt profuſely the graces of the ſpring, the beauty of the ſummer, and the rich luxuriance of the autumn.

Sir R. Wilſon has given us a picture of Roſetta, very different from that which we have above exhibited. He ſays, it is built of a dingy red brick, and that a great part of the town is in ruins, many of the houſes having been pulled down by the French for fuel. The ſtreets are not more than two yards wide, and full of wretches, which the pride of civilization revolts at acknowledging to be human. The number of blind perſons is prodigious; nearly every fifth inhabitant having either loſt, or having ſome humour in, his eye. The eryſipelas, the dropſy, the leproſy, the elephantiaſis, and luſi naturæ, conſtantly offend the ſight. Filth, moſquitos of the moſt dreadful ſort, vermin of every kind, women ſo ugly, that, fortunately for Europeans, their faces are concealed by a black cloth veil, in which are cut two eye-holes; ſtench intolerable; houſes almoſt uninhabitable:—theſe form the charms of Roſetta, and Savary's garden of Eden. The quay, however, is allowed to be a handſome object, and might be made noble. The baths are repreſented as horridly diſguſting. Dr. Wittman, cited alſo by Crutwell, obſerves, that though it contains but few ſtriking public edifices, Roſetta muſt be conſidered as a handſome place by thoſe who have been accuſtomed to mud walls and ſandy deſarts; the moſques and their minarets, as well as their houſes, built with bricks, plaſtered over and white-waſhed. The population he eſtimates at 8 or 10,000, but from the number of empty houſes, it appeared capable of containing at leaſt treble that number. In 1807, the Britiſh were defeated here, with conſiderable loſs, by the Turks; 90 miles N.W. of Cairo. N. lat. 31° 24′. E. long. 30° 40′. Savary. Sonnini. Niebuhr.

ROSETTE, in *Military Language*, an ornamental branch of ribbands, or cut leather, which is worn both by officers and ſoldiers in the Britiſh ſervice, on the upper part of their cues.

Rosettes, two ſmall bunches of ribbands that are attached to the loops by which the gorget of an officer is ſuſpended upon his cheſt. The colour of the ribband muſt correſpond with the facing of the uniform. The French uſe the ſame term.

ROSETTI, Donato, in *Biography*, an ingenious Italian, who flouriſhed in the 17th century, but of whoſe perſonal hiſtory little is known. He was a native of Leghorn, where he was probably educated, and was ſo ſucceſsful in the cultivation of the ſciences, that at a very early age he was conſidered as completely qualified to teach mathematics and the elements of philoſophy in different univerſities. While he was profeſſor of logic at Piſa, he publiſhed a treatiſe relating to the ſyſtem of the earth, which was well received. The title of this work was "Antignome fiſico Mathematiche con il nuovo Orbe e Syſtema terreſtre." This was followed by "A Collection of phyſico-mathematical Inſtructions;" "A Treatiſe on the Compoſition of Dutch Glaſſes, and Glaſs Drops;" "A Collection of phyſico-mathematical Demonſtrations" of propoſitions which he had undertaken to prove. In his "Antignome," he maintained that the number of ſenſes was eleven; this increaſe he made out by conſidering the different modes in which we touch bodies as ſo many different ſenſes, and endeavouring to ſhew that the perceptions ariſing from them cannot properly be aſcribed to the ſenſe of feeling in general. He was the author of another treatiſe, entitled "Poliſta fedele," intended to explain the inclination of bodies to unite at their poles, and various phenomena reſpecting their hardneſs, their elaſticity, their extenſion, and the cauſes which convert ſolids into fluids. It is not known when this philoſopher died: he was living at Piſa in the year 1678.

Rosetti, Antonio, chapel-maſter to the duke of Mecklenburg Schwerin, born, according to Gerber, at Milan, in 1744; but we have better authority to ſay that he was a native of Bohemia, and a diſciple of the great Haydn at Vienna, where, in 1755, he was a violiniſt in the imperial chapel, and afterwards in the ſervice of count Althan, 1780. Since that time he has been a voluminous publiſher at Hamburgh and Leipſic, of pieces for the piano-forte, with and without a violin accompaniment, of ſymphonies for a full orcheſtra, on the plan of his maſter Haydn, flute concertos, &c. Some of his ſymphonies, when performed at the concerts in England, while Haydn was in this country, we thought written with force, and abounding with fire and new paſſages.

ROSEWAY Port, in *Geography*, a populous ſea-port town on the S E. coaſt of Nova Scotia, N.E. by E. of cape Negro and Harbour.

Roseway *Iſland*, an iſland that lies at the mouth of Port Wager, on the S.E. coaſt of Nova Scotia.

ROSEWELL, Thomas, in *Biography*, a Preſbyterian divine, was born in Somerſetſhire about the year 1630, and was educated at Oxford. After leaving the univerſity, he was preſented to the living of Strode, in his native county, from which he was ejected in the year 1662, by the Bartholomew act. In 1674 he officiated with a Non-conformiſt congregation at Rotherhithe; and in the year 1684 he was arreſted on a charge of high treaſon: on this charge he was tried in the court of king's bench, November 8th, before the infamous Jefferies. The indictment was on words ſaid to have been delivered from the pulpit, and the witneſſes were three women of abandoned characters, of whom the chief was afterwards ſet in the pillory for perjury. The trial laſted ſeven hours, and Mr. Roſewell behaved with all the decency and reſpect that could have been expected, and made a defence that was applauded by all who heard him. The women, ſays biſhop Burnet, could not prove, by any circumſtance, that they were even preſent at the meeting, and the words to which they ſwore were ſo groſs, that it was not to be imagined that any man in his wits would have made uſe of them in a mixed aſſembly; yet Jefferies urged the matter with his uſual vehemence. He laid it down as an axiom, concerning which there could be no controverſy, that all preaching at conventicles, as he was pleaſed to call diſſenting places of worſhip, was treaſonable, and that this ought to diſpoſe the jury to believe any evidence upon that head. The jury accordingly found the priſoner guilty. As ſoon, however, as the trial was over, ſir John Talbot, who was preſent at it, went to the king, and urged it on his majeſty, that if ſuch evidence was admitted, as had appeared againſt Mr. Roſewell, no one of his ſubjects would be ſafe. Upon this, when Jeffries ſoon after came into the royal preſence, with an air of exultation and triumph, to congratulate his majeſty on the conviction of a traitor, the king afforded him a cool reception, which mortified him exceedingly, but at the ſame time it gave a complete turn to the bent of his mind; ſo that when the court met to hear Mr. Roſewell's counſel, who moved for an arreſt of judgment, this judge, who was as mean as he was corrupt and cruel, aſſumed a tone of moderation, and ſtrongly recommended to the king's counſel caution and deliberation where the life of a man was depending. The priſoner was, in the end, pardoned. He died in 1691. Neal's Hiſt. vol. iv.

ROSHAN, or Roshawn, in *Geography*, a country of Aſia, ſituated between Meckley and Arracan, between

92° and 95° E. long., and 21° and 23° N. lat.; about 120 miles in length, and 80 in breadth. See ARRACAN.

ROSHEIM, a town of France, in the department of the Lower Rhine, and chief place of a canton, in the diſtrict of Barr; 15 miles S.W. of Straſburgh. The place contains 3355, and the canton 12,017 inhabitants, on a territory of 227½ kiliometres, in 15 communes.

ROSHOVER, a townſhip of Pennſylvania, in Weſtminſter county, containing 1786 inhabitants.

ROSICRUCIANS. See ROSYCRUCIANS.

ROSIENNE, in *Geography*, a town of Samogitia, in which the diet and court of judicature are held; 76 miles S. of Mittaw. N. lat. 55° 30′. E. long. 41° 57′.

ROSIERE, LA, a ſmall iſland near the S.W. coaſt of the iſland of Jerſey; 1 mile E.S.E. of Noirmont Point.

ROSIERE, a town of France, in the department of the Somme, and chief place of a canton, in the diſtrict of Montdidier. The place contains 2760, and the canton 13,812 inhabitants, on a territory of 120 kiliometres, in 21 communes.

ROSIERES *aux Salines*, a town of France, in the department of the Meurte, on the Meurte, formerly celebrated for its ſalt-works; 6 miles W. of Luneville.

ROSIERS, a town of France, in the department of the Mayne and Loire, on the Loire; 7 miles N.W. of Saumur.

ROSIERS, *Cape*, the S. limit of the mouth of the river St. Lawrence; being the eaſternmoſt point of the diſtrict of Gaſpee, in Lower Canada. N. lat. 48° 56′. W. long. 63° 40′.

ROSIGNANA, a town of Etruria; 13 miles S.E. of Piſa.

ROSIL, in *Rural Economy*, a term applied to ſuch land as is neither light nor heavy, being a medium between ſand and clay; it is ſometimes written *roſills*.

ROSILLY BAY, in *Geography*, a bay on the S. coaſt of Wales. N. lat. 51° 32′. W. long. 4° 16′.

ROSIN, JOHN, in *Biography*, an antiquary, was born at Eiſnach in 1551, and died of the plague in 1626. He was author of "Antiquitatum Romanarum," a work of high reputation, of which the beſt edition is that of Utrecht, in 1701.

ROSIN, *Reſina*, in *Pharmacy*. See RESIN.

ROSIN is particularly uſed for a reſinous matter prepared from the juice of the pine-tree; in ordinary uſe for the making of ointments, plaſters, and for other purpoſes.

For the method of procuring it, ſee PINE, and TURPENTINE.

ROSITO, in *Geography*, a town of Naples, in Calabria Citra; 16 miles N.E. of Caſſano.

ROSITO, *Cape*, a cape on the eaſt coaſt of Calabria. N. lat. 40° 5′. E. long. 16° 40′.

ROSKOPF, a mountain of Auſtrian Swabia; 1 mile S.E. of Schonau.

ROSLAND, in our *Old Writers*, heathy land, or ground full of ling: alſo watery and mooriſh land.

ROSLAVL, in *Geography*, a town of Ruſſia, in the government of Smolenſk. N. lat. 54°. E. long. 32° 50′.

ROSLAW, a river of Saxony, which runs into the Elbe, oppoſite to Deſſau.

ROSLDORF, a town of Auſtria; 6 miles S.W. of Ehrnſprunn.

ROSLYN, ROSLIN, *Roſelyn*, or *Roſkelyn*, a village in the pariſh of Laſwade, and county of Midlothian, Scotland, is about ſix miles S.S.W. from Edinburgh. This place is much celebrated on account of its caſtle and chapel, and for the romantic character of the ſcenery in its immediate vicinity. An excurſion to Roſlyn is one of the favourite ſummer recreations of the inhabitants of the northern metropolis; and no traveller of taſte leaves that part of the kingdom, without contemplating its beauties. The caſtle is ſeated on a bold and lofty rock, overhanging the river North-Eſk, which daſhes over a rugged channel at the baſe, in a ſemicircular ſweep; and the precipitous banks are covered with a profuſion of wood. Only a very ſmall portion of the ancient building is now ſtanding; but a modern manſion has been erected on part of the old walls. It is uncertain when this caſtle was built; but that event moſt probably occurred about the commencement of the 12th century, when William de Sancto-Clere (ſon to Waldernus de St. Clere, who came to England with William the Conqueror) obtained a grant of the barony of Roſlyn from the Scottiſh king, Malcolm Canmore. No mention of it is made in hiſtory, however, till the reign of James II. of Scotland, when ſir William Hamilton is ſtated to have been confined here, for joining the rebellious ſtandard of earl Douglas. In 1554 it was ſet fire to, and in great part demoliſhed, by the forces of king Henry VIII. The St. Clere family, or, as the name is now ſpelt, St. Clair, was anciently of great note in Scotland. Their poſſeſſions were very extenſive, and their titles numerous, being earls of Caithneſs and Orkney, lords of Nithſdale, and barons of Pentland, Couſlande, Cardain, Saint-Clair, Herbertſhire, Hertfoord, Grahamſhaw, Kirkton, Cavers, Newborough, and Roxburgh. Their affluence and power exceeded that of moſt contemporary nobles, either in England or Scotland; and they lived in a ſtyle of magnificence and ſplendour, which even the Scottiſh monarchs were ſcarcely able to rival. James II. conferred upon them the honour of being hereditary patrons and grand maſters of maſonry in Scotland; privileges which they continued to enjoy for ſeveral generations.

The chapel of Roſlyn occupies the ſummit of a hill above the caſtle. It was founded in the year 1446, by William Saint Clair, earl of Caithneſs and Orkney, for a provoſt, ſix prebendaries, and two ſinging boys; and was endowed by him with conſiderable landed poſſeſſions. He did not, however, live to complete his undertaking, notwithſtanding he ſpared neither trouble nor expence to effect this purpoſe before his death, which happened in 1479. From a manuſcript memoir of the houſe of Douglas, depoſited in the library of the Faculty of Advocates at Edinburgh, we learn many curious particulars relative to the building of this chapel. It is there ſaid, that the founder "cauſed artificers to be brought from other regions and forraigne kingdomes, and cauſd dayly to be abundance of all kinde of workemen preſent;" and it is ſubſequently added, "and to the end the worke might be more rare, he cauſd the draughts to be drawn upon Eaſtland boords, and made the carpenters to carve them according to the draughts, and then gave them for patterns to the maſons, that they might thereby cut the like in ſtone." The preſent building is generally ſuppoſed to have been intended only for the choir of a large collegiate church, which, according to tradition and probability, it was the deſign of the founder to have erected. Though in a mutilated ſtate, its architecture is unique, and combines, according to Mr. Gandy, "the Egyptian, Grecian, Roman, and Saracenic ſtyles;" and exhibits the arch "in all its poſſible forms and principles." This ſtructure meaſures in the interior 68 feet in length, and 35 in breadth. The exterior is ſupported by 21 buttreſſes, ſurmounted by pinnacles, each differing from the others in its ornaments. Two of theſe buttreſſes have double pinnacles, the outer ſhafts of which are ſmaller than the inner, with which they are connected by flying abutments. Similar

members alſo unite the larger pinnacles with the upper part of the chapel. The eaſtern end diſplays five buttreſſes, with four pointed windows intervening, all of uniform ſize and ſtyle, though varying ſomewhat in the tracery work with which they are ornamented. Each window is divided by a ſtone mullion, faced, both internally and externally, with double columns; and the tranſom of the arch is decorated with half figures of perſons in the attitude of ſupplication, and with different kinds of foliage. On the north and ſouth ſides of the chapel, in the lower compartment, are five windows of a ſimilar kind; alſo a pointed arched door-way, receſſed under a larger ſemicircular arch, above which is an irregular triangular window, highly ornamented. Another tier of windows, on each ſide, gives light to the upper part of the building; but theſe are now much mutilated, having loſt their mullions, tracery, &c. Between every two windows are two canopied niches, and a bracket, which appear to have been deſigned for ſtatues. This portion of the building is ſupported by two oppoſite ranges of five arches each, ſeparating the body of the chapel from the ſide aiſles; beyond which, at the eaſt end, there are two columns, and two more in the centre between them, all of them ſupporting ſtone beams, exhibiting a great variety of ſculptural ornaments. One of the centre pillars is wreathed, and is popularly called the apprentice's pillar, from a tradition reſpecting its execution by an apprentice of the maſter maſon of the ſtructure; who, it is ſaid, finding himſelf unable to underſtand the model furniſhed to him, went abroad for inſtructions, during which time the work was accompliſhed by the apprentice. It is ſingular that a ſimilar ſtory is told of ſome of the beſt ſculptures in Melroſe abbey; and we believe, alſo, of a much later production of art, the ſtatue of king Charles II. in the Parliament-ſquare at Edinburgh. Two heads in the chapel are ſaid to repreſent the maſter and the apprentice. The former is ſhewn as frowning, and the latter with a ſcar or indention on the forehead, to denote that he was murdered by his maſter, through envy of his ſuperior genius. At the eaſt end of the chapel are four altars, dedicated to different ſaints. "Of arches," ſays Mr. Britton, in his Architectural Antiquities, "there are more than thirteen varieties to be found in this building. A flat or ſegment beneath the roof of the aiſles, and over the door to the ſub-chapel; ſemicircular in the vault of the roof, and over the entrance doors; groined, acutely pointed over the weſtern aiſle; flat pointed between the centre and ſide aiſles; ſharp pointed in the lower windows; ogee to the piſcinas; flattened, and lateſt of the pointed ſtyle, inſide of the door-way, ſouth ſide; half ſegment in the flying buttreſſes; counter arch in the triangular windows; flat arch and ſegment joined in a door in the vault; ſeveral arches of various forms in the windows, niches, and canopies, alſo in the battlements." The vault above-mentioned is the burying-place of the family of the Sinclairs. The ſoil of it is ſo dry, that bodies have been found entire 80 years after their interment. They were formerly buried in armour, and without a coffin. "The late Roſlin," ſays father Hay, in his MS. memoirs, "was the firſt that was buried in a coffine, contrary to the ſentiments of James VII., who was then in Scotland;" and he adds, "that the great expence my mother was at in burying her huſband, occaſioned the ſumptuary acts that were made in the next parliament." There was formerly a ſuperſtitious ſtory relative to this chapel current among the common people in the neighbourhood. They believed that, previous to the death of any member of the Saint Clair family, the chapel was to be ſeen in flames, without ſuſtaining any injury. This ſuperſtition is alluded to by Mr. Scott, in his "Lay of the Minſtrel," in the following beautiful lines:

"Seem'd all on fire that chapel proud,
Where Roſlin's chiefs uncoffin'd lie,
Each baron, for his ſable ſhroud,
Sheath'd in his iron panoply.
Seem'd all on fire, within, around,
Deep ſacriſty, and altar's pale;
Shone every pillar foliage bound,
And glimmer'd all the dead men's mail.
Blaz'd battlement and pinnet high,
Blaz'd every roſe-carv'd buttreſs fair,
So ſtill the blaze, when fate is nigh,
The lordly line of high St. Clair."

The village of Roſlyn was anciently a place of conſiderable importance. King James II. conſtituted it a burgh of barony in the year 1456, and granted to the inhabitants a weekly market and a fair; but theſe privileges are now abandoned. The fields immediately contiguous are celebrated in hiſtory as the ſcene of three ſanguinary engagements betwixt the Engliſh and Scotch; all fought on the ſame day, the 24th of February, 1303. The particulars are thus narrated by the Scottiſh hiſtorians. During a truce, Ralph Confroy, treaſurer to Edward I., invaded Scotland at the head of thirty thouſand men. With a view to plunder, he divided his forces into three bodies; and having reached the vicinity of Roſlyn, encamped them in three diſtant ſtations. On being appriſed of this invaſion, ſir John Cumming and ſir Simon Frazer marched with 10,000 men to watch the motions of the enemy; and finding the firſt diviſion unprepared, attacked and routed it with great ſlaughter. The ſecond diviſion coming up immediately after the battle, ſhared the ſame fate; as did likewiſe the third diviſion, which appeared in a ſimilar manner at the cloſe of the ſecond action. This engagement excited much intereſt both at home and abroad; and is ranked among the nobleſt efforts of Scottiſh bravery. About half a mile lower down the Eſk, is ſituated the houſe of Hawthornden, remarkable not only for its having belonged to Drummond, the celebrated poet and hiſtorian, but alſo for the caves under it. There are various conjectures as to the original intention of theſe ſubterraneous cavities. Stukeley has given credit to a fabulous tradition, that they were ſtrong holds of the Pictiſh kings; and accordingly one cave is called the king's gallery, another the king's bed-chamber, and a third the guard-room. Setting aſide this groundleſs tradition, the moſt probable opinion is, that they were reſorted to as places of refuge during the deſtructive wars between the Engliſh and Scotch. Detached from the principal caves is a ſmaller one, called the Cypreſs grove, where Drummond is ſaid to have compoſed many of his poems. It was in theſe caverns that the famous ſir Alexander Ramſay, one of the anceſtors of the Dalhouſie family, who performed ſuch exploits of valour in the conteſt for the crown between Bruce and Baliol, uſed to conceal himſelf. Here he was reſorted to by the young warriors of his day, who conſidered it as a neceſſary part of military education to have been of his band. From thence he ſallied forth, as occaſion preſented itſelf, and attacked the Engliſh, then in poſſeſſion of Edinburgh. The Statiſtical Account of Scotland, by ſir John Sinclair. Architectural Antiquities of Great Britain, vol. iii. 4to. by John Britton, F.S.A. A Companion and uſeful Guide to the Beauties of Scotland and the Hebrides, &c. by the Hon. Mrs. Murray Auſt, of Kenſington, 2 vols. 8vo. Lond. 1810.

ROSMA-

ROSMARILHAL, a town of Portugal, in the province of Beira, on the borders of Spain; 8 miles W. of Alcantara, in Spain. N. lat. 39° 33′. W. long. 6° 50′.

ROSMARINUS, in *Botany*, so called from *ros*, *dew*, and *marinus*, alluding to its situation on the sea-shore. Those who have observed it mantling the rocks of the Mediterranean in winter, with its grey flowers glittering with dew, cannot but be struck with the elegant propriety of the name.—Linn. Gen. 16. Schreb. 22. Willd. Sp. Pl. v. 1. 126. Mart. Mill. Dict. v. 4. Sm. Prodr. Fl. Græc. Sibth. v. 1. 12. Ait. Hort. Kew. v. 1. 52. Tournef. t. 92. Juss. 111. Lamarck Illustr. t. 19.—Class and order, *Diandria Monogynia*. Nat. Ord. *Verticillatæ*, Linn. *Labiatæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, compressed at the upper part, with an erect mouth; upper lip undivided; lower cloven. *Cor.* unequal; tube longer than the calyx; limb gaping; upper lip divided into two parts, erect, shorter, acute, with reflexed margins; lower reflexed, trifid; the middle segment very large, concave, narrow at the base; the lateral ones narrow, acute. *Stam.* Filaments two, awl-shaped, simple, with a tooth at one side, inclined towards the upper lip, and exceeding it in length; anthers simple. *Pist.* Germen superior, four-cleft; style resembling the stamens; stigma simple, acute. *Peric.* none, except the permanent calyx, which contains four ovate *seeds* in its bottom.

Obs. This genus approaches very near to *Salvia*, from which however it differs in having the stamens simply furnished with a lateral tooth.

Ess. Ch. Corolla unequal, its upper lip cloven. Filaments longer than the corolla, curved, simple with a tooth. Calyx campanulate, trifid. Seeds four, naked.

1. R. *officinalis*. Common Rosemary. Linn. Sp. Pl. 33. Sm. Fl. Græc. Sibth. t. 14. Woodv. Med. Bot. t. 87.—Leaves sessile.—Native of the south of Europe, the Levant, and occasionally in the Grecian islands; common in gardens, flowering from January to May.—An erect, evergreen *shrub*, four feet high, very much branched; *branches* obscurely quadrangular, downy, leafy on all sides. *Leaves* opposite, spreading in a recurved manner, linear-oblong, obtuse, revolute, entire; smooth, dark green, and shining above; downy and veined beneath. *Flowering branches* axillary, opposite, short, very leafy. *Flowers* axillary, terminal, on very short stalks, erect, of a bright blue colour, variegated with purple and white, having, like the leaves, a strong aromatic fragrance, resembling camphor. This is the Λιβανωτις of Dioscorides and other ancient authors. Rosemary, when wild, has broader leaves, larger flowers, and a stronger scent than when cultivated in our gardens; indeed Miller, following the old writers, regarded this as a sufficient ground to make them distinct species; the former being subject to a variety whose leaves are striped with yellow, and hence called *Gold-striped Rosemary*; the latter varying with a white stripe, and thence named *Silver-striped Rosemary*. The silver variety is very tender. From an old opinion of Rosemary-juice having the property of strengthening the memory, this plant has been poetically made an emblem of remembrance or fidelity; and this was probably the origin of its being worn or used at funerals and weddings.

2. R. *chilensis*. Chili Rosemary. Willd. n. 2. Ait. Hort. Kew. v. 1. 52.—Leaves on stalks.—Native of Chili, and flowering in July. This *shrub* is only known from Molina's Natural History of Chili, who describes it as having stalked *leaves*. Future observation must determine whether or not it be really a *Rosmarinus*.

ROSMARINUS, in *Gardening*, contains plants of the hardy, shrubby, evergreen kind, of which the species cultivated is the officinal rosemary (R. officinalis).

There are varieties of this with narrow leaves; with broad leaves; with silver-striped leaves, and with gold-striped leaves.

Method of Culture.—In all the sorts it may be effected by planting slips or cuttings in the early spring months, as from March to May, as well as by layers; in performing the first methods of which a quantity of young shoots should be cut, or stripped off, from about five or six to eight or ten inches long, stripping off the lower leaves, and then planting them in a border of light earth, in rows a foot asunder, giving a good watering, and repeating it frequently till they are rooted, which they effect in a short time; in the same year they shoot at top, and become tolerable little plants by autumn; when about the beginning or middle of September, or in the spring following, they may be transplanted where they are designed to remain for growth.

The layers should be laid down in any of the convenient lower young branches, into the earth, in the spring, summer, or autumn, and they will be well rooted by autumn following, when they may be taken off, and planted out where they are to remain for plants.

Almost all the varieties are moderately hardy ever-green plants, though the common green sorts are the most so; the striped kinds being liable to suffer by hard frosts, if much exposed, or planted in wet ground; of course they, as well as all the sorts, should have a warm situation and dry soil: some of the variegated kinds should also be potted, in order to have the shelter of a green-house in winter. They are most durable in dry poor soils. In regard to the uses of these plants, the common green sorts are generally made use of for different medicinal purposes, the leaves as well as the flowers being employed, and both these and the striped kinds are planted out as shrubs for the sake of affording a more full variety. They all afford variety of course in the borders, clumps, and other parts of gardens and shrubberies.

ROSMARINUS, in the *Materia Medica*. See ROSEMARY.

ROSMARUS, in *Zoology*, the name of an animal called also by some the sea-horse, and more usually known by the name of *morse*.

ROSMITHAL, in *Geography*, a town of Bohemia, in the circle of Prachatitz; 11 miles N. of Blatna.

ROSNAY, a town of France, in the department of the Indre; 8 miles N.E. of Le Blanc.

ROSNY, a town of France, in the department of the Seine and Oise; 3 miles W. of Mantes.—Also, a town of France; 5 miles E. of Paris.

ROSOLIS, or ROS-SOLIS, popularly *Rosa-solis*, *sun-dew*, an agreeable spirituous liquor, formerly much in repute, chiefly taken after meals, by way of a drachm, to aid digestion; being composed of burnt brandy, sugar, cinnamon, and milk-water, and sometimes perfumed with a little musk.

It had its name, because anciently prepared wholly of the distilled water of the plant Ros *solis*, which see; but that plant was at length neglected in the composition.

The best was that of Turin. The French have now a particular kind, not called *ros solis*, but *du roy*; because used with good effect by Louis XIV. It is composed of Spanish wine, in which are infused anise, fennel, aneth, coriander, &c. for three weeks.

ROSOMACHA, or ROSOMAK, in *Zoology*, a name given by the Russians to the glutton. They are, says Olaus, taken by the hunters chiefly on account of their skins,

members alſo unite the larger pinnacles with the upper part of the chapel. The eaſtern end diſplays five buttreſſes, with four pointed windows intervening, all of uniform ſize and ſtyle, though varying ſomewhat in the tracery work with which they are ornamented. Each window is divided by a ſtone mullion, faced, both internally and externally, with double columns; and the tranſom of the arch is decorated with half figures of perſons in the attitude of ſupplication, and with different kinds of foliage. On the north and ſouth ſides of the chapel, in the lower compartment, are five windows of a ſimilar kind; alſo a pointed arched door-way, receſſed under a larger ſemicircular arch, above which is an irregular triangular window, highly ornamented. Another tier of windows, on each ſide, gives light to the upper part of the building; but theſe are now much mutilated, having loſt their mullions, tracery, &c. Between every two windows are two canopied niches, and a bracket, which appear to have been deſigned for ſtatues. This portion of the building is ſupported by two oppoſite ranges of five arches each, ſeparating the body of the chapel from the ſide aiſles; beyond which, at the eaſt end, there are two columns, and two more in the centre between them, all of them ſupporting ſtone beams, exhibiting a great variety of ſculptural ornaments. One of the centre pillars is wreathed, and is popularly called the apprentice's pillar, from a tradition reſpecting its execution by an apprentice of the maſter maſon of the ſtructure; who, it is ſaid, finding himſelf unable to underſtand the model furniſhed to him, went abroad for inſtructions, during which time the work was accompliſhed by the apprentice. It is ſingular that a ſimilar ſtory is told of ſome of the beſt ſculptures in Melroſe abbey; and we believe, alſo, of a much later production of art, the ſtatue of king Charles II. in the Parliament-ſquare at Edinburgh. Two heads in the chapel are ſaid to repreſent the maſter and the apprentice. The former is ſhewn as frowning, and the latter with a ſcar or indention on the forehead, to denote that he was murdered by his maſter, through envy of his ſuperior genius. At the eaſt end of the chapel are four altars, dedicated to different ſaints. "Of arches," ſays Mr. Britton, in his Architectural Antiquities, "there are more than thirteen varieties to be found in this building. A flat or ſegment beneath the roof of the aiſles, and over the door to the ſub-chapel; ſemicircular in the vault of the roof, and over the entrance doors; groined, acutely pointed over the weſtern aiſle; flat pointed between the centre and ſide aiſles; ſharp pointed in the lower windows; ogee to the piſcinas; flattened, and lateſt of the pointed ſtyle, inſide of the door-way, ſouth ſide; half ſegment in the flying buttreſſes; counter arch in the triangular windows; flat arch and ſegment joined in a door in the vault; ſeveral arches of various forms in the windows, niches, and canopies, alſo in the battlements." The vault above-mentioned is the burying-place of the family of the Sinclairs. The ſoil of it is ſo dry, that bodies have been found entire 80 years after their interment. They were formerly buried in armour, and without a coffin. "The late Roſlin," ſays father Hay, in his MS. memoirs, "was the firſt that was buried in a coffine, contrary to the ſentiments of James VII., who was then in Scotland;" and he adds, "that the great expence my mother was at in burying her huſband, occaſioned the ſumptuary acts that were made in the next parliament." There was formerly a ſuperſtitious ſtory relative to this chapel current among the common people in the neighbourhood. They believed that, previous to the death of any member of the Saint Clair family, the chapel was to be ſeen in flames, without ſuſtaining any injury. This ſuperſtition is alluded to by Mr. Scott, in his "Lay of the Minſtrel," in the following beautiful lines:

"Seem'd all on fire that chapel proud,
Where Roſlin's chiefs uncoffin'd lie,
Each baron, for his ſable ſhroud,
Sheath'd in his iron panoply.
Seem'd all on fire, within, around,
Deep ſacriſty, and altar's pale;
Shone every pillar foliage bound,
And glimmer'd all the dead men's mail.
Blaz'd battlement and pinnet high,
Blaz'd every roſe-carv'd buttreſs fair,
So ſtill the blaze, when fate is nigh,
The lordly line of high St. Clair."

The village of Roſlyn was anciently a place of conſiderable importance. King James II. conſtituted it a burgh of barony in the year 1456, and granted to the inhabitants a weekly market and a fair; but theſe privileges are now abandoned. The fields immediately contiguous are celebrated in hiſtory as the ſcene of three ſanguinary engagements betwixt the Engliſh and Scotch; all fought on the ſame day, the 24th of February, 1303. The particulars are thus narrated by the Scottiſh hiſtorians. During a truce, Ralph Confroy, treaſurer to Edward I., invaded Scotland at the head of thirty thouſand men. With a view to plunder, he divided his forces into three bodies; and having reached the vicinity of Roſlyn, encamped them in three diſtant ſtations. On being appriſed of this invaſion, ſir John Cumming and ſir Simon Frazer marched with 10,000 men to watch the motions of the enemy; and finding the firſt diviſion unprepared, attacked and routed it with great ſlaughter. The ſecond diviſion coming up immediately after the battle, ſhared the ſame fate; as did likewiſe the third diviſion, which appeared in a ſimilar manner at the cloſe of the ſecond action. This engagement excited much intereſt both at home and abroad; and is ranked among the nobleſt efforts of Scottiſh bravery. About half a mile lower down the Eſk, is ſituated the houſe of Hawthornden, remarkable not only for its having belonged to Drummond, the celebrated poet and hiſtorian, but alſo for the caves under it. There are various conjectures as to the original intention of theſe ſubterraneous cavities. Stukeley has given credit to a fabulous tradition, that they were ſtrong holds of the Pictiſh kings; and accordingly one cave is called the king's gallery, another the king's bed-chamber, and a third the guard-room. Setting aſide this groundleſs tradition, the moſt probable opinion is, that they were reſorted to as places of refuge during the deſtructive wars between the Engliſh and Scotch. Detached from the principal caves is a ſmaller one, called the Cypreſs grove, where Drummond is ſaid to have compoſed many of his poems. It was in theſe caverns that the famous ſir Alexander Ramſay, one of the anceſtors of the Dalhouſie family, who performed ſuch exploits of valour in the conteſt for the crown between Bruce and Baliol, uſed to conceal himſelf. Here he was reſorted to by the young warriors of his day, who conſidered it as a neceſſary part of military education to have been of his band. From thence he ſallied forth, as occaſion preſented itſelf, and attacked the Engliſh, then in poſſeſſion of Edinburgh. The Statiſtical Account of Scotland, by ſir John Sinclair. Architectural Antiquities of Great Britain, vol. iii. 4to. by John Britton, F.S.A. A Companion and uſeful Guide to the Beauties of Scotland and the Hebrides, &c. by the Hon. Mrs. Murray Auſt, of Kenſington, 2 vols. 8vo. Lond. 1810.

ROSMA-

ROSMARILHAL, a town of Portugal, in the province of Beira, on the borders of Spain; 8 miles W. of Alcantara, in Spain. N. lat. 39° 33′. W. long. 6° 50′.

ROSMARINUS, in *Botany*, so called from *ros*, *dew*, and *marinus*, alluding to its situation on the sea-shore. Those who have observed it mantling the rocks of the Mediterranean in winter, with its grey flowers glittering with dew, cannot but be struck with the elegant propriety of the name.—Linn. Gen. 16. Schreb. 22. Willd. Sp. Pl. v. 1. 126. Mart. Mill. Dict. v. 4. Sm. Prodr. Fl. Græc. Sibth. v. 1. 12. Ait. Hort. Kew. v. 1. 52. Tournef. t. 92. Juss. 111. Lamarck Illustr. t. 19.—Class and order, *Diandria Monogynia*. Nat. Ord. *Verticillatæ*, Linn. *Labiatæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, compressed at the upper part, with an erect mouth; upper lip undivided; lower cloven. *Cor.* unequal; tube longer than the calyx; limb gaping; upper lip divided into two parts, erect, shorter, acute, with reflexed margins; lower reflexed, trifid; the middle segment very large, concave, narrow at the base; the lateral ones narrow, acute. *Stam.* Filaments two, awl-shaped, simple, with a tooth at one side, inclined towards the upper lip, and exceeding it in length; anthers simple. *Pist.* Germen superior, four-cleft; style resembling the stamens; stigma simple, acute. *Peric.* none, except the permanent calyx, which contains four ovate *seeds* in its bottom.

Obs. This genus approaches very near to *Salvia*, from which however it differs in having the stamens simply furnished with a lateral tooth.

Ess. Ch. Corolla unequal, its upper lip cloven. Filaments longer than the corolla, curved, simple with a tooth. Calyx campanulate, trifid. Seeds four, naked.

1. R. *officinalis*. Common Rosemary. Linn. Sp. Pl. 33. Sm. Fl. Græc. Sibth. t. 14. Woodv. Med. Bot. t. 87.—Leaves sessile.—Native of the south of Europe, the Levant, and occasionally in the Grecian islands; common in gardens, flowering from January to May.—An erect, evergreen *shrub*, four feet high, very much branched; *branches* obscurely quadrangular, downy, leafy on all sides. *Leaves* opposite, spreading in a recurved manner, linear-oblong, obtuse, revolute, entire; smooth, dark green, and shining above; downy and veined beneath. *Flowering branches* axillary, opposite, short, very leafy. *Flowers* axillary, terminal, on very short stalks, erect, of a bright blue colour, variegated with purple and white, having, like the leaves, a strong aromatic fragrance, resembling camphor. This is the Λιβανωτις of Dioscorides and other ancient authors. Rosemary, when wild, has broader leaves, larger flowers, and a stronger scent than when cultivated in our gardens; indeed Miller, following the old writers, regarded this as a sufficient ground to make them distinct species; the former being subject to a variety whose leaves are striped with yellow, and hence called *Gold-striped Rosemary*; the latter varying with a white stripe, and thence named *Silver-striped Rosemary*. The silver variety is very tender. From an old opinion of Rosemary-juice having the property of strengthening the memory, this plant has been poetically made an emblem of remembrance or fidelity; and this was probably the origin of its being worn or used at funerals and weddings.

2. R. *chilensis*. Chili Rosemary. Willd. n. 2. Ait. Hort. Kew. v. 1. 52.—Leaves on stalks.—Native of Chili, and flowering in July. This *shrub* is only known from Molina's Natural History of Chili, who describes it as having stalked *leaves*. Future observation must determine whether or not it be really a *Rosmarinus*.

ROSMARINUS, in *Gardening*, contains plants of the hardy, shrubby, evergreen kind, of which the species cultivated is the officinal rosemary (R. officinalis).

There are varieties of this with narrow leaves; with broad leaves; with silver-striped leaves, and with gold-striped leaves.

Method of Culture.—In all the sorts it may be effected by planting slips or cuttings in the early spring months, as from March to May, as well as by layers; in performing the first methods of which a quantity of young shoots should be cut, or stripped off, from about five or six to eight or ten inches long, stripping off the lower leaves, and then planting them in a border of light earth, in rows a foot asunder, giving a good watering, and repeating it frequently till they are rooted, which they effect in a short time; in the same year they shoot at top, and become tolerable little plants by autumn; when about the beginning or middle of September, or in the spring following, they may be transplanted where they are designed to remain for growth.

The layers should be laid down in any of the convenient lower young branches, into the earth, in the spring, summer, or autumn, and they will be well rooted by autumn following, when they may be taken off, and planted out where they are to remain for plants.

Almost all the varieties are moderately hardy ever-green plants, though the common green sorts are the most so; the striped kinds being liable to suffer by hard frosts, if much exposed, or planted in wet ground; of course they, as well as all the sorts, should have a warm situation and dry soil: some of the variegated kinds should also be potted, in order to have the shelter of a green-house in winter. They are most durable in dry poor soils. In regard to the uses of these plants, the common green sorts are generally made use of for different medicinal purposes, the leaves as well as the flowers being employed, and both these and the striped kinds are planted out as shrubs for the sake of affording a more full variety. They all afford variety of course in the borders, clumps, and other parts of gardens and shrubberies.

ROSMARINUS, in the *Materia Medica*. See ROSEMARY.

ROSMARUS, in *Zoology*, the name of an animal called also by some the sea-horse, and more usually known by the name of *morse*.

ROSMITHAL, in *Geography*, a town of Bohemia, in the circle of Prachatitz; 11 miles N. of Blatna.

ROSNAY, a town of France, in the department of the Indre; 8 miles N.E. of Le Blanc.

ROSNY, a town of France, in the department of the Seine and Oise; 3 miles W. of Mantes.—Also, a town of France; 5 miles E. of Paris.

ROSOLIS, or ROS-SOLIS, popularly *Rosa-solis*, *sun-dew*, an agreeable spirituous liquor, formerly much in repute, chiefly taken after meals, by way of a drachm, to aid digestion; being composed of burnt brandy, sugar, cinnamon, and milk-water, and sometimes perfumed with a little musk.

It had its name, because anciently prepared wholly of the distilled water of the plant Ros *solis*, which see; but that plant was at length neglected in the composition.

The best was that of Turin. The French have now a particular kind, not called *ros solis*, but *du roy*; because used with good effect by Louis XIV. It is composed of Spanish wine, in which are infused anise, fennel, aneth, coriander, &c. for three weeks.

ROSOMACHA, or ROSOMAK, in *Zoology*, a name given by the Russians to the glutton. They are, says Olaus, taken by the hunters chiefly on account of their skins,

ſkins, which are much eſteemed by people of fortune for robes, as being variegated with very bright colours, reſembling flowers. See URSUS *Gulo*.

ROSOSZE, in *Geography*, a town of Auſtrian Lithuania; 30 miles S.W. of Brzeſk.

ROSOY. See ROZOY.

ROSPORDEN, a town of France, in the department of the Finiſterre, and chief place of a canton, in the diſtrict of Quimper. The place contains 560, and the canton 4413 inhabitants, on a territory of 127½ kiliometres, in four communes.

ROSPUS, a name uſed by ſome authors for the ſtrange fiſh called the *rana piſcatrix*, or frog-fiſh. See SEA-*devil*.

ROSS, ALEXANDER, in *Biography*, was born at Aberdeen, and became maſter of the grammar-ſchool at Southampton, and chaplain to king Charles I. His works are numerous, of which the beſt known is "A View of all Religions:" and a curious performance, called "Virgilius Evangelizans," taken wholly from the Æneid. He died in 1654, aged 61.

ROSS, JOHN, a learned prelate, was born in Herefordſhire, and educated at St. John's college, Cambridge, where he took his degree of D.D. in the year 1756. He had ſome years previouſly to this publiſhed a pamphlet in defence of Dr. Middleton againſt the criticiſms of Dr. Markland, and in 1749 an edition of Cicero's "Epiſtolæ ad Familiares," in two vols. 8vo. He was preſented to the vicarage of Frome, in Somerſetſhire, and in 1778 he was advanced to the biſhopric of Exeter. He died in 1792.

ROSS, JOHN LOCKHART, the fifth ſon of ſir James Lockhart, was born in November 1721, and having manifeſted an inclination for the ſea-ſervice, he was, at the age of 14, placed under captain Oſborn, who then commanded his majeſty's ſhip the Portland of 50 guns, which ſailed in September 1735, for Conſtantinople. He ſerved in ſeveral different ſhips, and under different commanders, till 1743, when he was advanced to the rank of lieutenant. It was not till 1755 that he was appointed to a command, which was in the Savage ſloop of war, of 12 guns and 70 men. In a very ſhort time he took a St. Domingo merchant-man, valued at 30,000*l*. In the following year he was appointed to the command of the Tartar ſloop of 24 guns, and 200 men. War was now declared againſt the French, and on the 20th of September he chaſed and engaged two French frigates of 28 guns, and drove them into Morlaix. Without particularizing the inſtances of his ſucceſs, we may obſerve that, between the 20th of September 1756 and the 19th of October 1758, he took nine privateers, containing 220 guns, and about 2500 men, with the loſs of only five men killed and two wounded in the different engagements. At length the name of captain Lockhart was almoſt ſufficient to terrify the enemy to ſtrike. The following fact, which ſtands upon the moſt indubitable authority, ſhews in what manner he was regarded on the ſeas. A privateer belonging to Briſtol, called the King George, and commanded by a Mr. Read, having fallen in with an enemy's ſhip of far ſuperior force, during the night, and finding that the exigencies of her ſituation demanded the moſt prompt and vigorous exertions to preſerve herſelf from capture, the commander ran with great ſpirit along-ſide, and hailing the enemy, commanded her to ſtrike to the Tartar, captain Lockhart, and was inſtantly obeyed without the ſmalleſt heſitation. Captain Lockhart's conduct in protecting the trade of the country was ſo meritorious, that the magiſtrates of Plymouth, immediately after his return to port, voted him the freedom of their corporation to be preſented him in a gold box. A preſent equally honourable was made him the enſuing year, by the merchants and underwriters of London, which conſiſted of a ſilver cup and ſalver, curiouſly chaſed, and emboſſed with his arms, and the repreſentation of the Tartar, and the ſeveral privateers which had been captured by him.

In 1759 he was promoted to the Chatham of 50 guns, and had two ſmaller veſſels put under his command. In a ſhort cruiſe he took the Arethuſa, a French frigate of 32 guns. In the following year he was promoted to the Bedford, a third rate, but did not long retain the command. In the ſame year, by the death of a brother, he changed his name to Roſs, and was elected a repreſentative in parliament. It was not till 1777 that he was called again to ſerve his country in the ſea-ſervice. In that year he was employed under the orders of admiral Keppel, in the famous battle on the 27th of July. (See KEPPEL.) In 1779 he was raiſed to the rank of rear-admiral of the blue, and appointed fourth in command of the Channel fleet, having hoiſted his flag on board the Royal George of 100 guns. About this period he ſucceeded his brother to the dignity of a baronet. He next accompanied ſir George Rodney on his fortunate expedition, undertaken for the relief of Gibraltar. After his return he went but little to ſea; but in 1787 he was advanced to the rank of vice-admiral of the blue; and here cloſed the profeſſional career of ſir John Lockhart Roſs, who, conſidering his great zeal and activity in the proſecution of the duties of his profeſſion, and the vaſt benefits which the commercial intereſts of his country reaped from his exertions, muſt be allowed to rank very high in his profeſſion. His coolneſs and intrepidity in the hour of battle were never ſurpaſſed; and, in the courſe of a very long ſervice, to fight and to conquer were alike habitual to him. He died in June 1790, after a lingering and painful illneſs; and his remains were interred in the Roſs aiſle, forming the eaſt end of the church of Fearn, which had been the burying-place of all the reſpectable families of the name of Roſs for many ages. Stockdale's edition of Campbell's Lives of the Admirals, vol. vi. Charnock's Biographia Navalis, vol. vi.

ROSS, in *Geography*, a borough and market-town in the lower diviſion of the hundred of Greytree, county of Hereford, England, is ſeated on a commanding eminence, overhanging the river Wye, at the diſtance of 15 miles S.E. by E. from the city of Hereford, and 121 W. by N. from London. This town was made a free borough by king Henry III., and ſeems to have been a place of more importance formerly than at preſent. In the time of Camden it was famous for its cyder, and for the manufacture of iron wares. Its celebrity for cyder yet continues, but the laſt-mentioned branch of trade has much declined. According to the parliamentary returns for 1811, Roſs contained 558 houſes, and a population of 2261 perſons. The market-day is Thurſday, weekly; and the fairs are on Holy Thurſday, Corpus Chriſti, 20th July, Thurſday after 10th October, and 11th December. The petty ſeſſions for the hundred of Greytree are held here. The government of this borough is veſted in a ſerjeant and four conſtables, but their powers are extremely limited. Here are two charity ſchools, and an alms-houſe; the latter of which owed its eſtabliſhment to John Kyrle, whom Pope has characterized and inveſted with deathleſs and truly merited fame, by the name of "the Man of Roſs." This truly benevolent character was born at White Houſe, in the pariſh of Dymock, Herefordſhire, in 1637; ſerved the office of ſheriff for the county in 1683, and died in 1724. Though poſſeſſed only of an annual income of 500*l*., he not only lived in happineſs and reſpectability himſelf, but diffuſed around him innumerable

merable benefits to the poor and the unfortunate. Among other advantages conferred by him on Rofs, he raifed the church fpire above 100 feet in height, and inclofed a piece of ground with a wall, and funk a refervoir in the centre of it, for the ufe of the inhabitants. He likewife conftructed a fine broad caufeway at the weftern extremity of the town. The houfe in which Mr. Kyrle refided was afterwards the King's Arms, fituated near the entrance of the town from Glouceftcr, but is no longer an inn.

The ftreets of Rofs are moftly fituated on the top and flope of a hill, and are extremely narrow. The market-houfe, though erected fo late as the reign of Charles II., is in a very decayed ftate. It is conftructed of ftone, and difplays the heterogeneous mode of building prevalent in the reign of his predeceffor, James I. The church is a handfome ftructure, having a tower, furmounted by a lofty fpire at its weftern end. In the window over the altar here, among other fragments of painted glafs, is one reprefenting a bifhop, with the infcription, "Thomas Herefordenfis," written beneath in black letter. This bifhop had probably been a benefactor to the church. The views from the furrounding cemetery, and from the contiguous profpect ground, are much celebrated. Immediately below, the river Wye forms a fine femicircle, at one of the extremities of which are the ruins of Wilton caftle; and beyond it an extenfive vale, terminated by diftant mountains. Near the church-yard is a fpot called Bifhop's-Court, from the circumftance of its having been anciently the fcite of a palace, belonging to the bifhops of Hereford.

The ruins of Wilton caftle above-mentioned ftand on the weftern bank of the Wye. This manfion was for feveral centuries the refidence of the Greys, of the fouth, who derived from it their original baronial title, in the reign of Edward I. foon after they acquired poffeffion of it. Its prefent ruinous condition is to be attributed to the royalift governors of Hereford, by whofe orders the whole interior was confumed by fire. The feats and objects of antiquarian intereft in this vicinity are numerous. On the fummit of Eaton-hill, about two miles to the north of Rofs, is a large encampment, probably of Roman origin. The intrenchments are in a very perfect ftate, and are of great depth. A farm-houfe here difplays veftiges of an ancient manfion, and the furrounding grounds are ftill defignated the Park of Eaton; but the hiftory of the place is entirely loft. At a hamlet called Hole-in-the-Wall, about a mile further to the north, are fome foundations of walls, which bear the appearance of great antiquity. What occafioned the appellation by which their fcite is diftinguifhed, is an excavation formed in the rocky bank of a neighbouring garden, which, when complete, led by a flight of fteps downwards into a cavity, whofe roof was fupported by a fingle column. Afcending the hill towards Old Gore is a hollow fpace extending about 100 paces, in which a number of celts were difcovered a few years ago. Thefe inftruments were nearly of the fame fize, and had evidently been caft, as the marks of the mould were vifible. On the oppofite fide of the river from Hole-in-the-Wall, ftands Kingfton-houfe, long the property of the Hofkyns' family; one of whom, ferjeant Hofkyns, is faid to have entertained here James I. with a morrice-dance, performed by ten perfons whofe united ages exceeded one thoufand years. Above this manfion is Fawley-Court, anciently the feat of fir John Kyrle, progenitor to the "Man of Rofs," and now the property of a gentleman named Money, a defcendant from the family by the female line. Goodrich caftle is fituated about four miles to the fouth of Rofs, on a finely wooded promontory, round which the river Wye forms a femi-circular fweep. This fortrefs was for many years the baronial refidence of the Talbots, earls of Shrewfbury. By whom it was originally founded is unknown, though the near affinity of its name to that of duke Godric, who occurs as a witnefs to two charters granted by king Canute, renders it not an improbable conjecture that he was the perfon. Nothing of its authentic hiftory is recorded till the reign of king John, where we find it mentioned as the property of William Strigul, earl marfhal, who died here in 1246. Subfequently it was conveyed by a female heir to William de Valentia, earl of Pembroke, from whofe family it paffed to the Talbots, afterwards earls of Shrewfbury. Elizabeth, daughter of Gilbert, the feventh earl, carried it by marriage to Henry de Grey, earl of Kent, whofe defcendants held it till the death of Henry, duke of Kent, when it was fold to admiral Griffin, anceftor to the prefent proprietor. Few events of hiftorical note are related refpecting this caftle. In the civil wars between king Charles I. and his parliament, it was at firft garrifoned for the latter, but was captured foon after by the royaliifts, who, in their turn, were compelled to furrender it to the republicans, after a fiege of fix weeks, A.D. 1646. On the 25th of Auguft, in the fame year, the parliament ordered it to be notified to the countefs of Kent, that it was neceffary the caftle fhould be demolifhed. Accordingly it was difmantled in March following; and has fince been gradually falling to decay, but enough of it yet remains to point out its former extent and grandeur. The form of this ftructure is that of a parallelogram 176 feet long, by 152 broad. Each of the four angles is ftrengthened by a round tower, and in the fouth-weft part of the area is a fquare keep, which appears to be of anterior date to the reft of the building. "This keep tower," fays King, in his Munimenta Antiqua, vol. iii. "has every mark in its ftyle of architecture of being coeval with the Saxon age." It confifts of three ftories, the loweft of which was ufed as a prifon. The principal entrance was by a flight of fteps, which is detached from the main building, and conducts to a platform before the door-way into the fecond and principal ftory, which has no interior connection with the dungeon beneath, as happens in moft Norman caftles. The entrance to the prifon-apartments was under a very remarkable fort of pointed arch, formed of "quite flat fides, which feem, from the appearance of the wall around, and from its peculiar ftyle, to have been inferted many ages after the keep was erected, and in the time of Edward III.;—a fufpicion that appears to be moft ftrongly confirmed by the circumftance, that about the twenty-fecond year of the reign of that king, Richard Talbot, its then lord, obtained the royal licence for having in his caftle a prifon for malefactors; having alfo the cognizance of pleas of the crown, &c. within his lordfhip of Irchenfield and Wormilow." The windows in the two upper ftories are faid, by the fame author, to be genuine Saxon; and that in the middle of the higher ftory feems to have continued unaltered from the period of its conftruction. The columns on each fide ftand within the arch, the femicircular part of which is ornamented with zigzag: this window terminates the middle projecting buttrefs that affifts in fupporting the tower; and under it is a zigzag moulding, or band, which is carried round the whole building. The window in the middle ftory is nearly fimilar to that defcribed; but a ftone frame for glafs is inferted in it, apparently of the age of Henry VI., and probably the work of the celebrated earl Talbot, who, according to tradition, had his private chamber in this keep. The other portions of the caftle are of much later erection than the keep. The entrance was very ftrongly fortified. Immediately in front, and

and within the ſpace incloſed by the ſurrounding foſſe, was a very deep pit, hewn out of the ſolid rock, and having a drawbridge thrown acroſs it, which, when drawn up, exactly fitted the ſpace between the towers on each ſide of the gateway, which was further defended by two maſſive gates and portculliſes, and by loop-holes, and machicolations in the vaulting, through which boiling lead and water were poured down on the heads of aſſailants. This paſſage opened into the great inner court, on one ſide of which ſtands the chapel, now in ruin; and near it is a ſmall octagonal watch-tower, which riſes higher than any other building within the caſtle. Adjoining the entrance to the keep is the garriſon tower, which is thirty-ſix feet ſquare at the baſe; "but the three outward angles diminiſh as they aſcend and form triangular buttreſſes, ſo that the upper part of the tower is circular." From the keep a wall formerly extended to the weſt, or Great tower, which is circular in its outward form, but octangular within. Between this and the north, or Ladies' tower, were ranged the ſtate apartments. The hall was a magnificent room, 65 feet long and 28 broad, and appears, from the pointed ſtyle of its windows, to have been erected in the reign of Edward I. or II. It communicated, towards the north, with a kind of anti-chamber, whence a paſſage led into the great ſtate-room; the northern end of which exhibits two moſt beautiful pointed arches, of a later date than the reſt of the apartments. The Ladies' tower occupies a high and ſteep precipice to the north of this building, and is hence the moſt defenſible part of the caſtle. Its name clearly indicates its appropriation as the reſidence of the female part of the garriſon. See a plan and views of Goodrich caſtle, in Bonner's Perſpective Itinerary; with hiſtorical and deſcriptive accounts.

Three miles eaſtward from Roſs is Roſe, or Bury-hill, where ſome antiquaries have placed the Ariconium of Antoninus, which Camden had fixed erroneouſly at Kencheſter. The ſcite of this ſtation is ſtrongly marked by the colour of the ſoil, which is extremely black within its area, while all around it is inclined to red. About ſixty years ago, the ground here was covered with rubbiſh, and overgrown with briars, &c. but the then proprietor ſoon afterwards incloſed and levelled it. In the courſe of that operation, many Roman antiquities were diſcovered by the workmen; ſuch as fibulæ, lares, lachrymatories, rings, coins, fragments of pillars, and of teſſellated pavements, innumerable pieces of red pottery, and ſome foundations of buildings. A field near this ſtation retains the name of Kill-Dane-Field, but the particulars of the event to which it alludes is unknown. About a mile to the ſouth-weſt is the ſcite of Eccleſwall caſtle, now occupied by a modern manſion; and ſtill more to the ſouth, and ſomewhat nearer to Roſs, are the remains of Penyard caſtle, which appears to have been conſtructed for the defence of the narrow paſs through the woods from the county of Glouceſter, into thoſe of Monmouth and the principality. This fortreſs was demoliſhed during the civil wars. It had formerly a park and chace attached; and the latter appellation is ſtill given to an eminence which riſes to the weſtward of the caſtle. Beauties of England and Wales, vol. vi. by E. W. Brayley, and John Britton, 8vo. 1805. King's Munimenta Antiqua, vol. iii. fol.

Ross, a biſhopric in Ireland, united with Cork by queen Elizabeth in 1586. It contains 124,000 acres, all in the county of Cork, in 33 pariſhes.

Ross, a poſt-town of Ireland, in the county of Cork, diſtinguiſhed by the name of "Roſs Carbery." It is ſituated on a bay or harbour, to which it gives its name, but which is choaked up with ſand. The town is ſituated on a rocky eminence projecting to the ſouth, and nearly ſurrounded by a ſtrand. In the centre of the town is a pretty large ſquare, with four narrow ſtreets diverging from its angles. It is chiefly inhabited by weavers, and a good deal of linen yarn is ſold here. In former times a ſchool was founded here by St. Fachnan, which was much frequented. It is 155 miles S.W. from Dublin, and 32 from Cork.

Ross, *New*, a ſea-port and poſt-town of Ireland, in the county of Wexford. This, according to Mr. Wakefield, appears to be a ſpot well adapted for becoming a place of great commercial importance. It is ſituated at a conſiderable diſtance from the coaſt on the river Barrow, which has a ſufficient depth of water to allow veſſels of large ſize to unload at the quay. Not far remote is the junction of this river with the Nore, the latter of which conveys merchandize to Thomaſtown, within a few miles of Kilkenny, while the former affords a communication by canal to Dublin. The Barrow is alſo united to the Suire, which is navigable to Clonmell. Notwithſtanding theſe advantages, Mr. W. ſtates Roſs to be in a ſtate of inactivity, *without trade or capital.* Other writers ſpeak of it as a flouriſhing place, the buildings numerous and elegant, and the population rapidly increaſing. Roſs is a corporate town, and one of the ſtaple ports for the exportation of wool. To the former circumſtance Mr. Wakefield attributes its decline. It ſends a member to parliament, under the influence of the marquis of Ely. There is a charter ſchool for 60 boys. It is called New Roſs, to diſtinguiſh it from another, now a mere village, a few miles diſtant. New Roſs is 67¼ miles S.S.W. from Dublin.

Ross, a county of the ſtate of Ohio, divided into 11 townſhips, and containing 15,514 inhabitants.—Alſo, a town of Waſhington county, Pennſylvania, containing 1327 inhabitants.

Ross, a ſmall iſland near the W. coaſt of Scotland, and county of Argyle; 6 miles N.N.E. of Cambeltown.

Ross-*Iſland*, lies in the lake of Killarney, county of Kerry, Ireland, in which is a rich vein of grey copper ore, with copper pyrites, galena, and blende, the working of which has been prevented by an influx of the waters of the lake. A caſtle on this iſland has a military governor.

Ross's *Iſland*, a ſmall iſland in the Mergui Archipelago. N. lat. 10° 44′.

Ross *of Balmangar*, a cape of Scotland, on the S. coaſt of the county of Kircudbright, at the mouth of the Dee; 4 miles S. of Kircudbright.

ROSSA, a ſmall iſland near the W. coaſt of the iſland of Corſica; 10 miles N.E. of Calvi.—Alſo, a ſmall iſland in the Mediterranean, near the N. coaſt of Sardinia. N. lat. 41° 15′. E. long. 9° 25′.

ROSSAL Point, a cape of England, on the coaſt of Lancaſhire; 2 miles W. from the mouth of the river Wyre.

ROSSANO, a city of Naples, in Calabria Citra, the ſee of an archbiſhop, formerly the moſt celebrated rendezvous of Baſilian monks in Italy; 27 miles N.N.E. of Coſenza. N. lat. 39° 38′. E. long. 16° 44′.

ROSSARNO, a town of Naples, in Calabria Ultra, on the Metrano; 4 miles S.E. of Nicotera.

ROSSBACH, a town of Saxony, in Thuringia, near which Frederic II. king of Pruſſia, gained, in the year 1557, a glorious victory over the combined armies of France and Auſtria; 5 miles N.W. of Weiſſenfels.

Rossbach, *Ober*, a town of Upper Heſſe; 2 miles S.W. of Fridberg.

Rossbach, *Nider*, a town of Upper Heſſe, near Ober Roſsbach.

ROSS-

ROSSCHOCHA, a river of Ruſſia, which runs into the Indigirka, N. lat. 67° 50′. E. long. 140° 14′.

ROSSDEOGHAN, a ſmall iſland on the W. coaſt of Ireland, in Kenmare river; 10 miles N.E. of Lamb's Head.

ROSSDORF, a town of Bavaria; 12 miles N.E. of Bamberg.—Alſo, a town of Germany, in the county of Henneberg; 10 miles N.W. of Meinungen.

ROSSE, in *Ichthyology*, the name given by Bellonius to that kind of cyprinus of Artedi, which we call the roach.

ROSSEL, in *Geography*, a town of Pruſſia, in the province of Ermeland; 50 miles S.S.E. of Königſberg. N. lat. 53° 57′. E. long. 21° 11′.

ROSSELARE, a town of France, in the department of the Lys; 3 miles N. of Grammont.

ROSSENAW, a town of Auſtria; 2 miles N.W. of Zwetl.

ROSSENBURG, a town of the margraviate of Anſpach; 8 miles N. of Anſpach.

ROSSENDORF, a town of the margraviate of Anſpach; 2 miles N.W. of Cadolzburg.

ROSSI, Gian-Vittorio, in *Biography*, an Italian man of letters, was born of a good family at Rome, in 1577. He was educated under the Jeſuits of the Roman college, where he joined the ſtudies of the law and philoſophy to that of polite literature, but being diſappointed in his expectations with reſpect to the firſt of theſe purſuits, he limited his attention to the laſt. He became a member of the academy degli Umoriſti, of which he was one of the moſt zealous promoters, and gave ſuch proofs of ability in its exerciſes, that ſeveral advantageous offers of employment were made to him. He, at length, accepted the poſt of ſecretary to the cardinal Andrea Peretti, with whom he reſided twenty years. After the death of that prelate he retired to a ſolitary villa on mount Sant' Onofrio, where he lived in tranquillity to himſelf, and engaged in his ſtudies, till he died in 1647, at the age of 70. He was much eſteemed by the men of letters at Rome, as well as by many perſons of rank, among whom was the cardinal Chigi, afterwards pope Alexander VII. Roſſi, who is better known by his claſſical name, Erythreus, was author of ſeveral works. His firſt publication was a kind of ſatire on the corrupt manners of the Romans, entitled "Eudemiæ Lib. X." He alſo publiſhed two volumes of "Epiſtles," addreſſed to cardinal Chigi, under the name of Tyrrhenus, and two others to different perſons; alſo various dialogues on moral topics, orations, and other tracts, which are all in the Latin language. His chief work is entitled "Pinnotheca Imaginum illuſtrium Virorum," being eulogies or biographical accounts of many learned men his contemporaries. Gen Biog.

Rossi, Pasquale, called *Paſqualino of Vicenza*, by long practice after the beſt Venetian and Roman pictures, acquired, without a maſter, a conſiderable power of deſign and colour. Few of his public works remain; one of the beſt is a St. Gregorio in the dome of Matelica. In galleries we meet with his cabinet pictures, repreſenting converſations, gaming parties, concerts, and ſimilar capricci, highly elaborate, and of Flemiſh finiſh.

Rossi, Lemme, publiſhed in 1666, at Perugia, in quarto, a work entitled "Siſtema Muſico," or Speculative Muſic, explaining the moſt celebrated ſyſtem of the ancients in all the genera. This is one of the cleareſt and beſt digeſted treatiſes on harmonics that was produced in Italy during the 17th century.

Rossi, Michael Angelo, a dilettante or gentleman-performer on the violin, who, in the part of Apollo, in 1632, accompanied himſelf on that inſtrument in a muſical drama at Rome, entitled "Il Ritorno di Angelica nell' Indie," to the great delight of the audience. It appears that Stradella, who ſung in his own oratorio of St. John the Baptiſt at Rome, led the band, and accompanied his own voice on the violin.

Rossi. See Luigi.

Rossi, la Pasqua, a female ſinger in the conſervatorio of the Incurabili at Venice in 1770, who performed in a motet by Galuppi under his own direction, in a very ſuperior manner. Italian Tour.

Rossi, Francesco di Puglia, an excellent muſical compoſer of the old ſchool, who produced the following three operas, that were much admired in their day: "Sejano moderno della Tracia," 1636; "La pena degl' Occhi," 1688; and "La Corilda, o l'Amor trionfante della Verdetta."

ROSSIGLIONE, Alto, in *Geography*, a town of the Ligurian republic; 17 miles N.W. of Genoa.

Rossiglione, *Baſſo*, a town of the Ligurian republic; 15 miles N.W. of Genoa.

ROSSIGNOL, a conſiderable lake of Nova Scotia, between Liverpool and Annapolis, ſaid by the Indians to be the main ſource of the Liverpool and Petit rivers.—Alſo, a port on the S. coaſt of Nova Scotia, S.W. of Port de l'Heve.

Rossignol, in *Ornithology*. See Motacilla *Lucinia* and *Phœnicurus*.

ROSSINA, in *Geography*, a town of the duchy of Parma; 14 miles S.S.E. of Parma.

ROSSITA, a river of European Turkey, which runs into the Jantra, near Nicop, in Bulgaria.

ROSSITTEN, a town of Pruſſia, in the province of Samland, on the Kuritſch Nerung; 18 miles N. of Königſberg.

ROSSITZ, a town of Bohemia, in the circle of Chrudim; 8 miles N.N.W. of Chrudim.

ROSSLA, a town of Germany, in the principality of Weimar; 6 miles N.E. of Weimar.

ROSSLEBEN, or Rossel, a town of Saxony, in Thuringia; 3 miles N.N.E. of Wiehe.

ROSSLYN, *Earl of*, in *Biography*. See Wedderburne.

ROSSMORE, in *Geography*, an iſland in Kenmare river, county of Kerry, Ireland, about 6 miles W. of Kenmare town.

ROSSO, Cape, a cape on the E. coaſt of the iſland of Metelin. N. lat. 39° 18′.

ROSSOCKEN, a town of Pruſſia, in the province of Oberland; 25 miles S.W. of Ortelſburg.

ROSSOMAKA, in *Zoology*. See Ursus *Gulo*.

ROSS-SHIRE, a county or diſtrict of Scotland, including the ſmall diſperſed county of Cromarty, which united, form one ſheriffdom, though ſeparated lieutenancies, is ſituated between 57° 7′ 40″ and 58° 7′ 20″ north latitude. It is one of the largeſt ſhires in North Britain, and extends about eighty miles in length, and ſeventy-eight in breadth. The whole comprehends 3799 Britiſh ſquare miles, of which 562 are in the iſle of Lewis, and 344 in Cromarty. Roſsſhire ſtretches acroſs the whole of Scotland, from the northern to the weſtern ocean, and has annexed to it, beſides the iſles of Lewis, Barra, and Rona, the Suliſker-rock, and the Flannan and Shaint iſles, which will be found to be noticed under their reſpective names. It is bounded on the north by the county of Sutherland, on the eaſt by the Moray and Cromarty friths, on the ſouth by the county of Inverneſs, and on the weſt by the Atlantic ocean.

 According

According to the population returns of 1811, the united counties contain 13,280 houſes, and 60,853 inhabitants.

Hiſtorical Events—Roſsſhire, in very remote times, conſtituted part of the Pictiſh kingdom. At a later period, when the Norwegians obtained poſſeſſion of the Orkneys, and ſubdued the neighbouring counties of Caithneſs and Sutherland, it ſeems to have ſhared the uſual fate of frontier provinces, and to have belonged alternately to the Norwegians and to the Scotch. According to the Icelandic writers, it made part of the dominions of the earls of Orkney; but in the "Deſcriptio Albaniæ," both the counties of Roſs and Moray are mentioned as comprehended within Scotland; and other accounts ſtate that part of Roſsſhire was poſſeſſed by the princes of the Hebrides, or lords of the Iſles. The truth probably is, that, favoured by their peninſular ſituation, the inhabitants of Roſs paid little reſpect to the authority of any of their powerful neighbours. Roſsſhire formed a comitatus, or earldom, as early as the 11th century; but of the hiſtory of its firſt earls ſcarcely any authentic document exiſts. What is remarkable, however, contrary to the cuſtom in moſt other feodal poſſeſſions, this earldom ſeems to have deſcended to heirs female as well as to heirs male. Hugh, one of the earls of Roſs, was ſlain at the battle of Halidon-hill, in 1333. William, his ſon, ſucceeded, who appears to have had ſome claim to the Weſtern iſles, as in a variety of charters, yet extant, he is ſtyled earl of Roſs, and lord of Skye. This nobleman ſlew Raynold of the Iſles in a fray at Perth; but in endeavouring to eſtabliſh a right to his poſſeſſions by force, he was completely thwarted. William left iſſue an only daughter, who married Walter Leſlie, and thereby gave him a title to the earldom. His ſon and ſucceſſor, Alexander, eſpouſed one of the daughters of the regent of Scotland, Robert, duke of Albany, and had by her a daughter, Euphemia, who, while a child, was induced to reſign her rights to the regent's ſon, who thereby became earl of Roſs and Buchan. He did not, however, long enjoy his honours and poſſeſſions in quiet, for on the death of Euphemia, as is generally believed by poiſon, Donald, lord of the Iſles, aſſerted his title to the earldom of Roſs, and being received by the inhabitants, not only ſucceeded in obtaining poſſeſſion of the diſtrict, but extended his dominions as far ſouthwards as the Grampian hills, and tranſmitted them to his poſterity. John, his ſon and ſucceſſor, who lived in the middle of the 15th century, was one of the moſt powerful chieftains of his age. He uſed the ſtyle of an independent prince, made treaties with Edward IV. of England, &c.; and, indeed, the extent of his territories might well juſtify ſuch conduct, as his ſway was acknowledged over at leaſt a fourth part of the whole kingdom of Scotland.

General Aſpect.—On the eaſtern coaſt of Roſsſhire, to a ſhort diſtance from the ſea, the country is comparatively flat, and being chiefly inhabited by perſons ſpeaking the Engliſh language, has been long conſidered to be part of the lowlands of Scotland. This tract is extremely fertile and well cultivated, and abounds with ſeats belonging to opulent and reſpectable proprietors, by whoſe exertions it has been greatly improved of late years. The climate is more favourable to agricultural purſuits than in moſt of the northern diſtricts of our iſland; ſo likewiſe is the ſoil, which, in many pariſhes, is a deep loam, capable of yielding very large crops of wheat. In ſhort, ſuch are the natural advantages of this narrow tract, that it is conſidered little inferior to Fifeſhire, either in point of ſoil or climate. Unfortunately, however, the portion of it ſuſceptible of arable culture, though nearly ſixty miles in length, rarely exceeds a mile and a half in breadth, except in the pariſhes of Nigg and Tarbet. The ſoils here are, of courſe, various. In the pariſhes of Fodderty, Dingwall, Kiltearn, Nigg, and Eaſtern Fern, a rich deep loam prevails. About Contin, and in the pariſhes of Alneſs, Roſekeen, and Kilmuir, the ſoil is light, but ſufficiently favourable for general crops. The other portions conſiſt of a conſtant ſucceſſion of lofty mountains. The central diſtrict, however, may be juſtly deſcribed as a beautiful Highland country, the hills being covered with a profuſion of graſs, and every where interſected by ſtraths, or valleys, many of them extremely rich and fertile; but on approaching the weſtern coaſt the general aſpect is uninviting. The traveller who climbs a mountain beholds around him a proſpect exhibiting a deſolate and dreary region, where nothing can be ſeen but vaſt rocky mountains, with ſummits broken, ſerrated, and ſpringing into various forms. Yet amidſt theſe hills, ſo dreary to the ſight, and producing little but heath, ſome valleys, at once beautiful and fertile, intervene, which might be cultivated with advantage, did not the climate to which they are ſubjected deter the inhabitants. During March and April, the weather is commonly friendly to the operations of the huſbandman. In the autumnal months rain falls in ſuch quantities, as to lay the ripening corn flat upon the fields, and to ſwell every trifling ſtream into a torrent, by which the lands are ſtripped of their produce, and ſand and ſtones are ſubſtituted. The fair days in this diſtrict, according to a regiſter kept at Lochalſh, are eſtimated at 143 in number annually; but in the months of Auguſt, September, October, and November, not more than five days in thirty are free from rain. The ſoils in the valleys, both here and in the middle diſtrict, are moſtly alluvial, and partake, in general, of thoſe of the nature of the ſurrounding mountains. At the head of the bay of Applecroſs the ſoil is ſandy; and on its ſouthern ſide reſts on lime-ſtone. At Keeſhorn it is of the ſame deſcription, and very fertile. The ſoil of Terridon is light and gravelly, with the exception of a few patches of moſs; which have lately been brought into a ſtate of cultivation. At loch Carron, a great variety of ſoil may be obſerved within a very limited ſpace. On the flat ſpots along the ſhore the ſoil is light and ſtony; on the higher and ſloping grounds, a ſandy loam; and at the head of the loch it is of a looſe clayey conſiſtence.

Mineralogy.—The mineral products of theſe counties are but very little known, becauſe the ſubterranean contents have hitherto been but little inveſtigated. Coal is indicated in every part of the Black iſle, in Cromarty, and throughout all the eaſtern parts of Roſsſhire. Lime-ſtone is abundant on the weſtern coaſt, where it is leaſt wanted, and is likewiſe partially found at Kirkan, and in the eaſtern diſtrict, particularly in the vicinity of Geanies and Cadboll. Copper has been wrought in primary lime-ſtone near Keeſhorn; but the mine is for the preſent abandoned. In the pariſh of Kiltearn, ſmall quantities of lead-ore have been diſcovered; and a vein of the ſame metal, very rich in ſilver, appears in the pariſh of Alneſs. Here alſo is a ſtratum of iron-ſtone, which is plentiful in moſt parts of the eaſtern diſtrict. At Poolew yet remain the ruins of a large ſmelting-furnace, the exiſtence of which ſhews the manufacture of iron to have been once an important buſineſs in that part of the country. Marle has been found in large quantities in the ſame diſtrict, particularly at Culrain, near the ſea; and on the weſt coaſt, in the pariſh of Lochalſh, is an immenſe bank of ſhell-ſand, the right of property in which has been for many years a ſubject of litigation between Mr. Innes of Lochalſh, and the clergyman of the pariſh, Mr. Downie, the former contending that it belongs to him as proprietor of the eſtate of Lochalſh, and the latter, that it lies within

within ſea-mark, and is therefore *inter regalia*. In the pariſh of Kincardine ſtands one of the loftieſt mountains in Roſsſhire, called Carnchuinaig, on which ſtones have been found perfectly ſimilar to thoſe known by the name of Cairngorums.

Knockirny, another hill on the borders of the ſame pariſh, produces excellent marble, both white and particoloured. The other loftieſt mountains in Roſsſhire are, Tulloch-Ard, in the diſtrict of Kintail; Ben-Uaiſh, in the pariſh of Kiltearn; and Sculm-a-bharra, in the pariſh of Kincardine. That of Tulloch-Ard claims particular attention on account of its importance in remote times. "Like the temple of Janus of ancient Rome, it indicated peace or war; for when war commenced, a barrel of burning tar, on the higheſt peak, was the ſignal; and in twenty-four hours all the tenants and vaſſals of Seaforth appeared at the caſtle of St. Donan, armed *pro aris et focis*. This mountain is the creſt of Seaforth's arms."

Lochs and Rivers.—The eaſtern coaſt of the united counties of Roſs and Cromarty is waſhed by three large arms of the ſea, the Dornoch, Cromarty, and Murray friths.

On the weſtern coaſt there are eight arms of the ſea, ſtretching for many miles up the country. Theſe are, loch Broom, Little loch Broom, loch Greinord, loch Ew, loch Torbidon, loch Carron, loch Daich, and the Gairloch; all of them the uſual reſort of vaſt ſhoals of herrings. Gairloch has likewiſe been celebrated, during ſeveral centuries, for the cod-fiſhing. One proprietor, only, ſends on an average 40,000 fiſh of this kind to market annually. The principal freſh-water lakes are loch Maree, and loch Tannich, the former about fifteen miles long, and the latter ſeven; beſides which there are above twenty leſs conſiderable lakes, and a great number of ſmall ones. Theſe abound with fine trout and pike, and in ſome are charrs. In loch Maree is found that ſpecies of trout called the gizzard trout. This loch is adorned with twenty-four ſmall iſlands, planted with fir-trees, and other kinds of wood. The largeſt rivers on the weſtern coaſt are the Ew, the Carron, and the Broom, which fall into the reſpective lochs of the ſame names. The firſt-mentioned of theſe is frequented by prodigious numbers of ſalmon, and is perhaps the beſt angling ſtream in Britain. Salmon are likewiſe plentiful in the Carron, and at Ullapool. On the eaſtern coaſt the chief rivers are the Conan, the (eaſt) Carron, the Alneſs, and the Oikel. The Conan and Alneſs fall into the Cromarty frith, which alſo receives ſeveral minor ſtreams. The Carron empties itſelf into the Dornoch frith, as does likewiſe the Oikel, which forms the boundary between the counties of Roſs and Sutherland. The ſalmon fiſheries on all theſe rivers are very productive. The river Beaulie, which flows into the Murray frith, is the boundary of the county for ſeveral miles on the Inverneſsſhire ſide.

There is a variety of ſulphureous and chalybeate ſprings in Roſsſhire. The ſpring at Strathpeffer, which is ſulphureous, is moſt remarkable, on account of the very great reſort of Highhlanders and ſtrangers to drink its waters from a belief in their medicinal qualities for the cure of cutaneous diſorders, and of barrenneſs in women.

State of Property.—The value of land in theſe counties, as in moſt parts of Great Britain, has vaſtly increaſed within the laſt twenty years. Numerous farms, which, at the commencement of that period, were rented at little more than 200*l.* *per annum*, have been leaſed ſince 1805, as high as 800*l.* or 1000*l.*; and their monied price, when they have been brought to market, has held a proportional elevation. Landlords, truſting to ignorant ſurveyors, when about to let their lands, generally put a value on them, which experience has woefully ſhewn to be far beyond their intrinſic worth. Hence diſtreſs aroſe among the farmers, even when food was at its higheſt pitch, and moſt of them were conſequently compelled to throw up their leaſes, or to obtain a conſiderable reduction of rent.

Moſt of the eſtates in Roſs and Cromarty ſhires are held directly under the crown, vice the earls and biſhops of Roſs. The few duties formerly paid to the earls and biſhops are now levied for the government; and being payable chiefly in kind, convertible at the fair price of corn, they have become a very heavy burthen on the eſtates from which they are taken. Until lately almoſt every extenſive proprietor committed the management of his eſtate to a factor, but the evils of this practice have at length begun to operate a cure. "There can be no doubt," obſerves ſir George Mackenzie, in his "General View of the Agriculture" of theſe counties, "but that the crowded population of the Highlands, and their conſequent ſlow improvement, muſt be attributed, in a great meaſure, to the extenſive power given to factors." The late factor of the proprietor of Lochalſh, by his injudicious conduct, involved his employer in numerous litigations with the miniſter of the pariſh, and with his tenants, ſome of which have been depending for upwards of nine years. The principal landholders are the heirs of the late lord Seaforth, Mr. Innes of Lochalſh, ſir Hugh Monro of Fowlis caſtle, ſir Alexander Munro of Novar houſe, ſir Hector Mackenzie of Conanſide, ſir Roderick Mackenzie of Roſehaugh, ſir Charles Roſs of Balnagown caſtle, and Alexander Roſs, eſq. of Cromarty houſe. This manſion is by far the moſt elegant, and the beſt laid out building of any in this part of the united kingdom, but the pleaſure-grounds have been much neglected.

Agriculture.—The proprietors of the eaſtern diſtrict of theſe counties are very ſpirited in improving, and follow every ſpecies of good huſbandry practiſed in the ſouth. Farmers of the ſuperior claſs begin to imitate their example; but the ſmaller tenants are far behind. The uſual grains cultivated on the arable lands are bear, oats, potatoes, peaſe and beans, and, along the ſhore, wheat. Every rotation cuſtomary in the ſouth has been tried; but the want of markets within the county has induced many to lay their farms down with graſs. The graſſes generally ſown, both for hay and paſturage, are red and white clover, with a mixture of rye-graſs and rib-graſs. The ordinary rotation practiſed by the ſmall tenants, and which they have uniformly purſued for centuries, is bear, or bigg, with manure, followed by two crops of oats, or ſometimes peaſe, and always a quantity of potatoes; on which root their families are chiefly maintained during nine months of the year. The gentlemen, and more extenſive farmers, uſe lime, marle, and ſhelly-ſand, as manure. The ſmaller tenants make a compoſt at the rate of one load of dung to three of earth, which they depoſit for ſome time in pits, and then ſpread in February on the ſtubble land. The manure is then ploughed down, and another ploughing is given towards the end of April, when they ſow their bear, or bigg. The ſhelly-ſand on the weſt coaſt is reckoned a very valuable manure; it laſts from twelve to fifteen years, and has the effect of converting a light brown inſipid ſoil into rich black loam. The ſize of farms here is various. The native farmers occupy from ſeven to thirty-ſeven acres of arable land; and, in ſome inſtances, have ſmall grazings contiguous to their arable fields; but, for the moſt part, the horſes and cattle employed in the labour of the farms are ſent, as ſoon as ſeed-time is over, to graze during ſummer on ſome hill paſture, for which five or ſix ſhillings *per* head are paid. The gentlemen, and better ſort of farmers, poſſeſs from 300 to 800

 acres,

acres, which are in general inclofed; but the reft of the country is almoft entirely open field. Among the fmaller tenants leafes ufually run from five to feven years, at the end of which an increafe of rent is moft frequently demanded. This limitation of leafes greatly retards improvement; for the tenant can reap but little benefit from his labour in fo fhort a fpace of time; and if he has done any thing more than his neighbours, his farm is coveted, and he muft either give a greater increafe of rent than it can properly bear, or remove. There are fome eftates, however, in the leafing of which a different practice has been adopted, to the mutual advantage of the landholder and the tenant.

The central and weftern diftricts of Rofsfhire may be confidered as exclufively devoted to pafturage; the fmall quantities of arable lands in the vallies bearing but a very infignificant proportion to the extent of the country. Till within the laft thirty years thefe diftricts were inhabited by a number of fmall farmers who maintained themfelves and their families from the produce of the little fpots they had to cultivate, and who, in favourable feafons, were enabled to pay the trifling rent impofed by the landlord, from the profit of the cattle they poffeffed. Thefe extenfive diftricts, particularly the central diftrict, are now converted from cattle into fheep farms; and there is no queftion of their fuperior adaptation to the latter fpecies of ftock. For every pound of beef which a Highland cattle grazier can fend to market, a fhepherd can at leaft bring three pounds of mutton. The wool alfo furnifhes the ftaple for a ufeful and important branch of manufacture. Hence the fhepherd can afford a double rent with eafe; and there can hardly exift a doubt that property in the Highlands will, in procefs of time, be tripled, or even quadrupled, by fheep farming. The refult, however, upon the population of the country is becoming more and more evident. In proportion as capital is acquired, farms augment in magnitude, and a fmaller number of people find employment and fupport within a given fpace.

Live-Stock.—The cattle reared in the low parts of thefe counties are chiefly intended for the dairy, and are a mixed breed. The oxen and old cows are commonly fattened for the butchers of Invernefs and Fort George. The breeds of fheep kept are various. The pure Cheviots, a mixture of that breed with the Leicefter, and a mixture of the latter with the old white-faced horned breed of the country, are frequently met with, and alfo the pure Leicefter. Some gentlemen have introduced the South Down and the Merino, and have fuccefsfully attempted croffes of thefe with the Cheviot breed. The mountain breed is not larger than ponies, but by care and attention in breeding, the fize and utility might be greatly augmented. The breed of hogs kept by gentlemen for their tables, is that of China; but the country people chiefly rear the large common fow. Turkies, ducks, pea fowls, Guinea fowls, and common fowls, are reared by moft of the families refiding in the country, but only to fupply their own confumption. Pigeon-houfes are very frequent; and bees are beginning to attract confiderable attention.

Roads.—Through the cultivated parts of the county the roads have been long noted for their excellence, though there were no other means for making or repairing than the ordinary ftatute labour. About feven years ago, however, a bill for converting the ftatute labour into money was prefented to parliament, and paffed into a law. By this act, the poft-road from the borders of the county of Rofs, near Beauly, to its termination at the Frith of Dornoch, is to be made turnpike; and authority is given for the erection of toll-gates every fix miles. The materials for making roads are every where found in great abundance; but the number of bridges required renders road-making very expenfive. The roads forming by government, and the Highland counties conjointly, will coft, on an average, 250*l.* *per* mile; though their breadth be only fifteen feet. The roads in the mountainous diftricts, if roads they can be called, are very bad; but moft of them are in progrefs of amelioration. The road from Contin to Lochcarron is confiderably advanced.

Towns and Villages.—In the united counties of Rofs and Cromarty there are three royal boroughs, all of them fituated in the eaftern diftrict. Thefe are Tain, on the fouthern fide of the Frith of Dornoch; Dingwall, at the inland extremity of the Frith of Cromarty; and Fortrofe, on the northern fide of the Moray Frith. Of the villages, the moft worthy of notice are Cromarty, Ullapool, Fairntofh, and Lochalfh: the laft has lately been conftituted a burgh of barony. Fairntofh is remarkable for the fingular privilege it enjoyed for nearly a century, of exemption from excife, on condition of an annual payment of 400 marks Scots. This right was refumed by government in 1786, and the fum of 20,000*l.* was granted as a compenfation to the proprietor. Before that period, Fairntofh whifkey was proverbial for its purity and excellence; and even yet, the appellation of real Fairntofh is ufed to denote the beft famples of that favourite Highland beverage. Fairs, markets, and "tryfts" for cattle, are held at various places throughout the country; fome of them eftablifhed by cuftom, and others by acts of parliament.

Manufactures and Commerce.—The only manufacture which has been eftablifhed in thefe counties is that of bifcuit and cotton-bagging at Cromarty, with branches at Invergordon and Port-Mahomack. This is carried on to a confiderable extent. The bagging made at thefe places, and at Invernefs, obtains a decided preference, under the name of Invernefs bagging, where it is principally fold. Many years ago, a flax manufactory was attempted to be eftablifhed, but without fuccefs. With refpect to commerce, it may be obferved, that the chief exports are black cattle, fheep, and wool, and a confiderable quantity of wheat and oats.

Antiquities.—Rofsfhire contains a confiderable number of remains of antiquity, which are not unworthy of notice. Thefe confift chiefly of Druidical temples, and Pictifh or Danifh forts, called Duns, and of the caftles of the ancient chieftains. In the parifh of Kiltearn, in the eaftern diftrict, is a Druidical temple, confifting of a row of twelve large ftones, fo difpofed as to form two conjoined ovals. The area of each oval is 13 feet long and 10 feet broad in the centre. At the weftern extremity of one of them is a ftone, which rifes eight feet above the furface of the ground; but the other ftones do not exceed fix feet in length. In the middle of the weftern oval is a flat ftone, which was probably the altar; and at the diftance of three paces from the eaftern oval is a circular hollow, faid to have been a well of confiderable depth, but it is now filled up. Thefe ovals occupy the fummit of an eminence, round which are drawn three concentric circular ditches; and at the diftance of half a mile to the weftward is a cairn, 30 paces in diameter, containing in the centre a grave $3\frac{1}{2}$ feet long, 18 inches broad, and 14 deep, lined by four flat ftones, and covered by another. Cairns are alfo numerous on the adjoining hill. In the parifh of Nigg, on the the fame coaft, ftands a large obelifk, on one fide of which are cut the figures of different animals, and on the other a crofs. The former is fuppofed to be a much older work than the latter; and the tradition is, that the ftone was erected in memory of a fhipwreck, by which three

three ſons of one of the Daniſh monarchs are ſaid to have loſt their lives, and their bodies buried under the obeliſk. The rock oppoſite, where the veſſel ſtruck, is from this circumſtance ſtill called the King's-Sons. Another obeliſk, ſimilar to the above, formerly ſtood in Nigg church-yard, but the baſe of it alone remains. Near Dunſkeath, on the ledge of a rock over-hanging the Moray frith, are the remains of a caſtle, built in 1179, by William, ſurnamed the Lion, king of Scotland. In the pariſh of Kincardine is Craigchenican, where the gallant marquis of Montroſe fought his laſt battle. He ſwam to Kyle, and lay ſome time concealed in Aſſint; but being diſcovered and apprehended he was ſent priſoner to Invernſs. The ground where the battle took place received its preſent name from the event of that memorable day. Near the church, in the ſame pariſh, is an alley, walled in, and terminating in a large ſemicircle, appropriated to the military exerciſe and diſcipline, diſtinguiſhed by the name of Weapon-ſhawing; and in the cemetery is a ſtone ſculptured with an imperial crown, and a man on horſe-back, in the act of darting a lance. Tradition reports it to be the upper part of a ſtone coffin, in which the remains of a prince of Loellin, who died of his wounds in the neighbourhood, were depoſited. In the ſame neighbourhood are alſo ſeveral Druidical circles, and likewiſe ſome of the round buildings which were formerly mentioned under the denomination of Picts-houſes. Near Avoch, the foundations ſtill remain of a large old caſtle, or fortalice. To this ruin tradition gives the name of Douglas caſtle. It is about 350 feet long and 160 feet broad, divided into numerous apartments, which appear to have been conſtructed of coarſe red quarry-ſtone and lime; and was defended on one ſide by a deep foſſe, and on another by baſtions. Throughout every part of the eaſtern diſtrict are abundance of places where battles with the Danes and Norwegians, or between rival clans, are ſaid to have been fought. Numbers of cairns point out the ſpots where the aſhes of the dead have been depoſited, though concerning moſt of them tradition is ſilent. In the pariſh of Eddertoun, however, on a plain to the weſt of the church, tradition ſays a great battle was fought againſt the Danes, one of whoſe princes, who fell in action, lies buried in the centre of a large circular barrow in the immediate vicinity. In the pariſh of Fearn are ſeveral Druidical temples; but the moſt intereſting monuments of antiquity here are the abbey and caſtle of Lochlin. The abbey-church was long uſed for divine ſervice, but is now in a ſtate of ruin. The caſtle occupies the ſummit of a very loſty eminence, and is one of the moſt conſpicuous objects in the country. It is built in the form of two ſquares, joined together at the corners. Another very ancient caſtle was ſituated at Cadboll, whence it derived its name. Few remains of it now exiſt, except the vaults under ground; but it deſerves notice on account of a ſingular tradition concerning it, which is fully credited by the vulgar, *viz.* that though it was inhabited for many centuries, no perſon ever died in it; in ſhort, that it poſſeſſed a magical charm againſt death, though not againſt diſeaſe, or the evils attendant on extreme old age. Hence many of the inhabitants, it is ſaid, when they became weary of life, requeſted to be carried out of the caſtle, that they might obtain relief. The caſtle of Craighouſe, in the pariſh of Kirk-Michael, ſtands cloſe to the ſhore, incloſed on the land ſide by a ditch and high wall. All the apartments of that portion of the manſion now moſt entire are vaulted with ſtone. This caſtle was long the property of the family of Williamſon, who emigrated to Germany; it afterwards became the occaſional reſidence of the biſhops of Roſs. In this vicinity is a great number of ancient encampments, likewiſe various tumuli and cairns. In Killernan pariſh are two ancient ſtructures, Killcoy and Redcaſtle, of conſiderable ſtrength. The latter was anciently of ſome importance. It was annexed to the crown in 1455, and was conſtituted a borough of barony, and a free-port, with the right of holding weekly markets, and levying toll and anchorage dues. Rory Mackenzie, the proprietor of Redcaſtle in 1646, having joined the rebellious ſtandard of the gallant marquis of Montroſe, was taken priſoner near Balveny, in Morayſhire, and ſuffered the death of a traitor. During his abſence the caſtle was garriſoned by his ſons and dependants, but was ſoon after ſtormed and taken by a party of royaliſts, who put the garriſon to the ſword and ſet fire to the buildings. In the mountainous peninſula of Kintail, on the weſt coaſt, ſtand the ruins of the caſtle of Donan, which was built by Alexander III. of Scotland, to reſiſt the depredations of the Danes. Colin Fitzgerald, anceſtor to the late earl of Seaforth, was made conſtable of the caſtle, for his bravery at the battle of Largs, fought in 1263. In 1715 it was taken from the king's forces by ſtratagem; but two years afterwards, having been attacked on the ſea ſide, by a line of battle ſhip, it was demoliſhed. In the front of a clergyman's houſe, in Kintail, ſtands Donan-Diarmed, or the fort of Diarmed. It is of a circular form, twenty feet in diameter, and of the ſame height. Diarmed's tomb is on the north-eaſt ſide of the fort.

Such parts of Roſsſhire as are included in the Hebrides, the reader will find noticed under their reſpective names, and alſo under the words Western Islands. Beauties of Scotland, vol. v. Lond. 8vo. 1808. A General View of the Agriculture, &c. of the Counties of Roſs and Cromarty, by ſir George Stuart Mackenzie, bart. Lond. 8vo. 1810.

ROST, John Christopher, in *Biography*, a German poet, was born at Leipſic in the year 1717. He received a good education, and as he advanced in life he ſtudied, with the utmoſt aſſiduity, juriſprudence, antiquities, and the belles lettres. His chief inſtructor was Erneſti, but he ſtudied philoſophy alſo under Hoffman, and attended the lectures of Gottſched, to whoſe praiſe he devoted the firſt fruits of his muſe, though he afterwards wrote againſt him a ſatirical poem, which was publiſhed in 1743. This is ſaid to be the beſt of his productions, and to abound with genuine and delicate wit. He attempted paſtorals in the German language, which were printed at Berlin in 1742, but the morality of them is exceedingly lax, and vice is exhibited too frequently under the captivating form of innocence. A new edition of them appeared at Dreſden in 1744, entitled "An Attempt at Paſtoral Poetry, with other poetical Pieces," and a third was publiſhed in 1768. In 1746, Roſt was appointed ſecretary and librarian to count Bruhl, and died in 1765, in the 48th year of his age. His miſcellaneous poems were publiſhed after his death, in 1769. Gen. Biog.

Rost, in *Metallurgy*, a term uſed by the miners at Chremnitz to expreſs the ore of gold after it has been waſhed and powdered, and melted firſt with lime-ſtone, and afterwards burnt with charcoal alone. See Lech.

ROSTAD, in *Geography*, a town of Norway; 70 miles N. of Drontheim.

ROSTAK, a town of Arabia, in the province of Oman, the ſeat of a ſovereign prince, at ſome diſtance from the ſea; 70 miles W. of Maſcat.

Rostak, a town of Perſia, in the province of Lariſtan; 90 miles S. of Mar.

ROSTAL, a town of Germany, in the principality of Anſpach; 7 miles N.N.W. of Schwabach.

ROSTAN, a town of Syria, in the pachalic of Damaſcus; 45 miles N.N.E. of Damaſcus.

ROSTAYN, a town of Bohemia, in the circle of Boleſlau; 4 miles N. of Aycha.

ROSTEN, in the *Materia Medica* of earlier ages, a name given to crab's eyes.

ROSTER, in *Military Language*, a plan, or table, by which the duty of officers, entire battalions, and ſquadrons, is regulated.

ROSTGAARD, Frederick, in *Biography*, a learned Daniſh writer, was born at Kraagerup, in Seland, in the year 1671. He was educated at Copenhagen, and in 1690 he undertook a tour through Europe; in the courſe of which he paid a viſit to the moſt celebrated univerſities of Germany, Holland, England, France, and Italy. After his return in 1669, he was made private keeper of the records to his Daniſh majeſty, and in 1702 was ennobled and appointed a counſellor of juſtice. In 1721 he became chief ſecretary in the Daniſh chancery, and after receiving a conſiderable penſion, he was nominated in 1735 a counſellor of conference. He died in 1745, and bequeathed to the library of the univerſity of Copenhagen a great many manuſcripts and ſeveral printed books, conſiſting moſtly of hiſtorical works, with a large fount of Arabic and Perſian types. He was author of a great number of works, among which the following may be enumerated: "Deliciæ Poetarum Danorum;" "A Daniſh Tranſlation of Corneille's Cid;" "Projèt d'une nouvelle Methodé pour dreſſer le Catalogue d'une Bibliothéque ſelon les Matières avec le Plan;" "Enchiridion ſtudioſi, Arabicè cum Verſione Latina, edit. ab Hadrino Relando." He collected, with great care, and at a conſiderable expence, in various parts of France and Italy, manuſcripts of "Libanii Epiſtolæ," from which the edition of J. C. Wolfius of Hamburgh was publiſhed. It was through the exertions of Roſtgaard that the "Fragmentum Theotiſcum Iſidori Hiſpalenſis" was diſcovered and publiſhed in the ſecond volume of the Daniſh Bibliotheque. He was the author of many Latin and Daniſh poems, and was employed for ſeveral years on a Daniſh Lexicon, as well as in collecting rare Arabic and Greek manuſcripts, and heraldic documents relating to the Daniſh nobility. Gen. Biog.

ROSTOCK, in *Geography*, a ſea-port town of Germany, in the circle of Lower Saxony, and duchy of Mecklenburg, on a lake which communicates with the Baltic. It contains three churches and an univerſity, jointly founded by the dukes and the town in the year 1419, and privileged by a bull of pope Martin V. afterwards confirmed by the emperor Ferdinand I. But in 1437, the town fell under the ban both of the emperor and pope, and the profeſſors removed to Grieſwalde, whence they returned again in 1443. In 1487, on account of a miſunderſtanding between the dukes and the town, the univerſity was removed to Lubeck, but again reſtored in 1492. The place has thrice ſuffered from the peſtilence, and at the commencement of the reformation was deſerted by its profeſſors and ſtudents till the year 1530, and in 1560 the emperor Ferdinand afforded it a new charter. In purſuance of a convention made, in 1563, between the dukes and the town, the former nominate and pay fifteen profeſſors, and the town nine. It was alſo agreed that the dukes ſhould annually contribute 3000 florins, and the town 500, towards the ſalaries of the profeſſors. The magiſtracy conſiſts of three burgher-maſters, one ſyndic, twelve aldermen, one ſecretary, and a prothonotary. It poſſeſſes the right of coining copper, ſilver, and gold, and therefore has a mint. Both the civil and criminal juriſdiction are veſted in the magiſtracy, with right of appeal to the two ſupreme courts of juſtice, except in thoſe caſes where no appeal is allowed. The town enjoys other conſiderable privileges; nevertheleſs it is hereditarily ſubject to the dukes, in acknowledgment of which ſubjection it annually pays 55 rixdollars, as an original tribute, and alſo 600 florins, for the grant of an exciſe. The trade of this town is very conſiderable. In the year 1218 it was admitted into the Hanſeatic confederacy; 25 miles N.E. of Weiſmar. N. lat. 54° 10′. E. long. 12° 12′.

ROSTOV, a town of Ruſſia, in the government of Jaroſlavl, ſituated near a lake, to which it gives name: the ſee of a biſhop; 36 miles S. of Jaroſlavl. N. lat. 57°. E. long. 39° 54′.

ROSTRA, in *Antiquity*, a part of the Roman forum, wherein orations, pleadings, funeral harangues, &c. were delivered.

The roſtrum was a kind of chapel, taken out of the forum, and furniſhed with a ſuggeſtum, or eminence, called more particularly the roſtra, where the orators ſtood to ſpeak.

It was adorned, or, as Livy ſays, built, with the beaks of ſhips taken from the people of Antium, in a naval engagement; whence the name.

There were two kinds of roſtra; *roſtra vetera* and *roſtra nova*. The latter was erected by Auguſtus, and decorated with the prows of veſſels which he took at the battle of Actium. The firſt were thoſe already deſcribed.

ROSTRALIS Corona, *Roſtral Crown*. See Crown.

Rostralis *Columna*, *Roſtral Column*. See Column.

ROSTRATA, in *Zoology*. See Toucan.

ROSTRENEN in *Geography*, a town of France, and principal place of a diſtrict, in the department of the North Coaſts; 20 miles S. of Guingamp. N. lat. 48° 14′. W. long. 3° 15′.

ROSTREVOR, a poſt-town of the county of Down, Ireland, ſituate on the bay of Carlingford, and much frequented for ſea-bathing. Mr. Wakefield calls it the Brighton of Ireland, and it has been much admired for its romantic ſcenery. It is a wooded bank, on a ſmall arm of the ſea, and has behind it the Mourne mountains. It is 57½ miles N. from Dublin, and 7½ from Newry.

ROSTRIFORMIS Processus, in *Anatomy*, the ſame as coracoides.

ROSTRUM literally denotes the beak or bill of a bird. This is a hard horny ſubſtance, conſiſting of an upper and under part, extending from the head, and anſwering to the mandibles in quadrupeds. Its edges are generally plain and ſharp, like the edge of a knife, or cultrated; ſometimes ſerrated, or jagged, or pectinated, or denticulated; but always deſtitute of real teeth immerſed in ſockets. See *Anatomy of* Birds.

Hence the word is alſo figuratively applied to the beak, or fore-part, of the head of a ſhip.

The roſtrum, or ſnout, in fiſhes, varies very much in figure, and ſerves as a conſiderable article of diſtinction. It is, 1. In ſome plagioplateous, or depreſſed, as in the pike, &c. 2. In ſome it is conic in ſhape, as in the oxyrynchus, &c. 3. In ſome it is extended into a long and ſharp point, as in the common ones. And, 4. In others it is triangular, or nearly ſo, as in the rays. See Fish.

Rostrum is alſo uſed to ſignify an inſtrument, with which paper is ruled for muſical compoſitions.

Rostrum, in *Chemiſtry*, ſignifies the noſe, or beak, of the common alembic, which conveys the liquor diſtilled into its receiver.

Rostrum is alſo a ſort of crooked ſciſſars, which the ſurgeons,

ſurgeons, in ſome caſes, make uſe of for the dilatation of wounds.

Rostrum *Leporinum*, in *Surgery*, the piece of fleſh ſituated betwixt the margins of a hare-lip.

Rostrum *Seminis*, in *Botany*, the beak of the ſeed, is an elongation of the apex of a naked ſeed, originating either in the baſe of the ſtyle itſelf, remaining in a hardened ſtate (ſee Dichromena); or it conſiſts of an appendage to the whole fruit, compoſed of two naked ſeeds; as in *Scandix*. The ſame term applies to a ſimilar elongation of certain ſeed-veſſels; as in *Geranium* and its allies, whoſe beaks bear a ſtrong analogy to thoſe of *Scandix;* and in *Helleborus*, *Delphinium*, and abundance of other genera, where they originate from the indurated ſtyles.

ROSWEIDE, Heribert, in *Biography*, a learned Dutch Jeſuit, and writer in eccleſiaſtical antiquities, was born at Utrecht in the year 1569. He entered among the diſciples of Loyola, at Doway in Flanders, when he was 20 years of age, and ſoon diſcovered the ſubjects of ſtudy peculiarly adapted to his genius, by ſpending the time which he was allowed to devote to exerciſe and recreation, in examining the libraries of the monaſteries in that city, and reſcuing the ancient manuſcripts contained in them from duſt and oblivion. Having completed his courſe of academical ſtudies, he filled ſucceſſively the chairs of philoſophy and divinity, firſt at Doway and afterwards at Antwerp, with great reputation for ſeveral years. After this he devoted his time to the compoſition and publication of his various works. He died in 1629, at the age of 60. He publiſhed, in 1607, "Faſti Sanctorum quorum Vitæ in Belgicis Bibliothecis Manuſcriptæ aſſervantur," which he intended as a ſpecimen of a larger work, and which was the prototype of the immenſe collection by Bollandus and others, under the title of Acta Sanctorum. He was author of many other works, among which is "An Account of the Hermits of Egypt and Paleſtine," "An Eccleſiaſtical Hiſtory from the Time of Chriſt to Pope Urban VIII." in two vols. folio; and "The Hiſtory of the Belgic Church."

ROSWALD, in *Geography*, a town of Moravia, in the circle of Prerau, inſulated in Sileſia; 6 miles N. of Jagendorf.

ROSWICK, a town of Sweden, in Weſt Bothnia; 10 miles N. of Pitea.

ROSYCRUSIANS, Rosicrucians, *Roſacrucians*, or *Brothers of the Roſy-croſs*, a name aſſumed by a ſect or cabal of hermetical philoſophers, or of *Theoſophiſts;* who aroſe, as it has been ſaid, or at leaſt became firſt taken notice of, in Germany, in the beginning of the 14th century.

They bound themſelves together by a ſolemn ſecret, which they all ſwore inviolably to preſerve; and obliged themſelves, at their admiſſion into the order, to a ſtrict obſervance of certain eſtabliſhed rules.

They pretended to know all ſciences, and chiefly medicine; of which they publiſhed themſelves the reſtorers. They pretended to be maſters of abundance of important ſecrets; and, among others, that of the philoſopher's ſtone; all which they have affirmed to have received by tradition from the ancient Egyptians, Chaldeans, the Magi, and Gymnoſophiſts.

Their chief was a German gentleman, called Chriſtian Roſencruz, educated in a monaſtery, where he learnt the languages. About the cloſe of the 14th century he went to the Holy Land, and viſited the holy ſepulchre; and falling ſick at Damaſcus, he conſulted the Arabs, and other eaſtern philoſophers, by whom he was ſuppoſed to be initiated into this wonderful art. At his return into Germany, he formed a ſociety, to whom he communicated the ſecrets he had brought with him out of the Eaſt, under an inviolable oath of ſecrecy, and finally died in 1484.

This ſociety remained concealed till the beginning of the 17th century, when two books were publiſhed; the one entitled "Fama Fraternitatis laudabilis Ordinis Roſæcruſis," The Report of the laudable Fraternity of Roſicrucians; the other, "Confeſſio Fraternitatis," The Confeſſion of the Fraternity. In theſe works the world was informed, that the fraternity was enabled, by divine revelation, to explain the moſt important ſecrets both of nature and grace; that they were appointed to correct the errors of the learned world, particularly in philoſophy and medicine; that they were poſſeſſed of the philoſopher's ſtone, and underſtood both the art of tranſmuting metals and of prolonging human life; and in fine, that by their means the golden age would return. As ſoon as theſe grand ſecrets were divulged, the whole tribe of the Paracelſiſts, Theoſophiſts, and chemiſts, flocked to the Roſicrucian ſtandard, and every new and unheard-of myſtery was referred to this fraternity. Various were the opinions that were formed of this ſociety; but though its laws and ſtatutes had appeared, no one could tell where the ſociety itſelf was to be found, or who really belonged to it. It was imagined by ſome ſagacious obſervers, that a certain important meaning was concealed under the ſtory of the Roſicrucian fraternity, though they were wholly unable to ſay what it was. One conjectured that ſome chemical myſtery lay hid behind the allegorical tale; another ſuppoſed that it foretold ſome great eccleſiaſtical revolution. At laſt Michael Brele, in the year 1620, had the courage publicly to declare, that he certainly knew the whole ſtory to have been the contrivance of ſome ingenious perſons, who choſe to amuſe themſelves by impoſing upon the public credulity. This declaration raiſed a ſuſpicion againſt the whole ſtory; and as no one undertook to contradict it, this wonderful ſociety daily vaniſhed, and the rumours which had been ſpread concerning it ceaſed. The whole was probably a contrivance to ridicule the pretenders to ſecret wiſdom and wonderful power, particularly the chemiſts, who boaſted that they poſſeſſed the philoſopher's ſtone. It has been conjectured, ſays Brucker, and the ſatirical turn of his writings, and ſeveral particular paſſages in his works, favour the conjecture, that this farce was invented and performed, in part at leaſt, by John Valentine Andrea, a divine of Wartenburg.

We ſhall here ſubjoin ſome further particulars concerning the Roſicrucians.

They have been diſtinguiſhed by ſeveral names, accommodated to the ſeveral branches of their doctrine.

Becauſe they pretend to protract the period of human life, by means of certain noſtrums, and even to reſtore youth, they were called *immortales*.

As they pretended to know all things, they have been called *illuminati:* and becauſe they have made no appearance for ſeveral years, but have kept altogether incognito, they have been called the *inviſible brothers*.

Their ſociety is frequently ſigned by the letters F. R. C., which ſome among them interpret *fratres roris cocti;* it being pretended, that the matter of the philoſopher's ſtone is dew concocted, exalted, &c.

Some, who are no friends to free-maſonry, make the preſent flouriſhing ſociety of free-maſons a branch of Roſicrucians; or rather the Roſicrucians themſelves, under a new name or relation; *viz.* as retainers to building. And it is certain, there are ſome free-maſons who have all the characters of Roſicrucians; but how the era and original of maſonry, as traced by Mr. Anderſon, and that of Roſicrucianiſm,

crucianiſm, here fixed from Naudæus, who has written expreſsly on the ſubject, conſiſt, we leave others to judge.

Notwithſtanding the pretended antiquity of the Roſicrucians, it is probable that the alchemiſts, Paracelſiſts, or *fire philoſophers*, who ſpread themſelves through almoſt all Europe, about the cloſe of the 16th century, aſſumed, about this period, the obſcure and ambiguous title of Roſicrucian brethren, which commanded, at firſt, ſome degree of reſpect, as it ſeemed to be borrowed from the arms of Luther, which were a *croſs* placed upon a *roſe*.

But the denomination evidently appears to be derived from the ſcience of chemiſtry. It is not compounded, ſays Moſheim, as many imagine, of the two words *roſa* and *crux*, which ſignify *roſe* and *croſs*, but of the latter of theſe words, and the Latin word *ros*, which ſignifies *dew*. Of all natural bodies, dew was eſteemed the moſt powerful diſſolvent of gold; and the *croſs*, in the chemical language, is equivalent to *light*, becauſe the figure of a croſs + exhibits, at the ſame time, the three letters of which the word *lux*, or *light*, is compounded. Now *lux* is called, by this ſect, the ſeed or menſtruum of the red dragon, or, in other words, that groſs and corporeal light, which, when properly digeſted and modified, produces gold. Hence it follows, if this etymology be admitted, that a Roſicrucian philoſopher is one, who, by the intervention and aſſiſtance of the dew, ſeeks for light, or, in other words, the ſubſtance called the philoſopher's ſtone.

The true meaning and energy of this denomination did not eſcape the penetration and ſagacity of Gaſſendi, as appears by his Examen Philoſophiæ Fluddanæ, ſect. 15. tom. iii. p. 261. And it was more fully explained by Renaudot, in his Conferences Publiques, tom. iv. p. 87.

At the head of theſe fanatics were Robert Fludd, an Engliſh phyſician, Jacob Behmen, and Michael Mayer. The common principles, which ſerve as a kind of centre of union to the Roſicrucian ſociety, are the following. They all maintain that the diſſolution of bodies, by the power of fire, is the only way by which men can arrive at true wiſdom, and come to diſcern the firſt principles of things. They all acknowledge a certain analogy and harmony between the powers of nature and the doctrines of religion, and believe that the Deity governs the kingdom of grace by the ſame laws with which he rules the kingdom of nature; and hence they are led to uſe chemical denominations to expreſs the truths of religion. They all hold, that there is a ſort of divine energy, or ſoul, diffuſed through the frame of the univerſe, which ſome call the *archeus*, others the *univerſal ſpirit*, and which others mention under different appellations. They all talk in the moſt ſuperſtitious manner of what they call the ſignature of things, of the power of the ſtars over all corporeal beings, and their particular influence upon the human race, of the efficacy of magic, and the various ranks and orders of demons. In fine, they all agree in throwing out the moſt crude incomprehenſible notions and ideas, in the moſt obſcure, quaint, and unuſual expreſſions. Brucker's Hiſt. Philoſ. by Enfield, vol. ii. Moſh. Eccl. Hiſt. vol. iv. Eng. ed. 8vo. See BEHMISTS and THEOSOPHISTS.

ROT, in *Rural Economy*, a ſort of putrid decay, taking place gradually in different ſubſtances, either from the effects of moiſture or other cauſes. Much miſchief is frequently done in this way to different kinds of materials of the farm ſort.

This ſort of decay in materials, whether of the manure or other kinds, is greatly promoted by their being kept in a continued moiſt condition, by the atmoſpheric air being freely admitted to them; and where they are of a ſtrawy, littery, or light nature, by their being thrown together in rather an open manner. The contact of the earth or mould alſo promotes this kind of rot in a very great degree. There is likewiſe a great variety of other cauſes, which have a tendency to bring on and expedite the decay of ſubſtances both of the hard and leſs firm kinds. See PUTREFACTION.

ROT, among ſheep-farmers, a diſeaſe incident to ſheep and other animals, in which both the liver and lungs are affected, and there is often a dropſical tendency. It is moſtly connected with moiſture or moiſt ſituations; but its cauſes are far from being perfectly inveſtigated. Dr. Harriſon of Lincolnſhire has, however, lately done much in this way, and drawn many uſeful and ſcientific concluſions. The diſeaſe is readily known to experienced ſhepherds by a careful examination of the eye, which is done by placing the ſheep between his thighs, and holding the head with both hands. He then proceeds to raiſe the upper, and depreſs the under eye-lid, by which means the blood-veſſels of the tunica albuginea, or white, are brought into view. When they are red, and in great numbers, the ſheep is ſuppoſed to be in good health. The caruncula lacrymalis, or haw and inner ſurface of the eye-lids, ſhould be as red as the veſſels on the eye-ball. If they are pale, and the veins are in ſmall quantities, and faint-coloured, or livid, the ſheep is in a debilitated ſtate, or afflicted with the rot. And in all caſes where the blood-veſſels have entirely diſappeared, the mutton is bad. By frequently examining the eyes in dangerous ſeaſons, ſhepherds may always diſcover the rot before the ſheep begin to ſhrink, and, conſequently, in time to prevent any material injury to their profits.

The above intelligent writer traces the nature and effects of the diſeaſe in the following manner: when in warm, ſultry, and rainy weather, ſheep that are grazing on low and moiſt lands feed rapidly, and ſome of them die ſuddenly, there is reaſon to fear that they have contracted the rot. This ſuſpicion will be further increaſed, if in a few weeks afterwards the ſheep begin to ſhrink, and become flaccid in their loins. By preſſure about the hips at this time, a crackling is ſometimes perceptible. Now, or ſoon afterwards, the countenance looks pale, and upon parting the fleece, the ſkin is found to have exchanged its vermilion tint for a pale red; and the wool is eaſily ſeparated from the pelt. As the diſorder advances, the ſkin becomes dappled with yellow, or black ſpots. About this time the eyes loſe their luſtre, and become white and pearly, from the red veſſels of the tunica adnata, and eye-lids, being contracted or entirely obliterated. To this ſucceed debility and emaciation, which increaſe continually till the ſheep die; or elſe aſcites, and perhaps general dropſy ſupervene, before the fatal termination. Theſe ſymptoms are rendered more ſevere by an obſtinate purging, which comes on at an uncertain period of the diſorder. In the progreſs of the complaint, ſheep become what the graziers call *chockered*, that is, affected with a ſwelling under the chin, which proceeds from a fluid contained in the cellular membrane, under the throat. And he adds, that in five or ſix days after contracting the rot, the thin edge of the ſmall lobe of the liver becomes of a tranſparent white, or blueiſh colour, and this ſpreads along the upper and lower ſides, according to the ſeverity of the complaint. Sometimes it does not extend more than an inch from the margin. In ſevere caſes, the whole peritoneum inveſting the liver is diſeaſed; and then it commonly aſſumes an opaque colour, interſperſed with dark red lines or patches. The upper part of the liver is ſometimes ſpeckled like the body of a toad, to which it is ſaid to bear a ſtriking reſemblance; round the ductus communis choledocus and hepatic veſſels, a jelly-like matter is depoſited, which

which varies according to the ſeverity of the attack, from a table-ſpoonful, or leſs, to five or ſix times that quantity. Upon boiling, the liver loſes its firmneſs, and ſeparates into ſmall pieces in the water, or remains ſoft and flaccid. And it is obſerved, that graziers and butchers having remarked that ſheep are much diſpoſed to feed during the firſt three or four weeks after being tainted, avail themſelves of this circumſtance very commonly to increaſe their profits. When the firſt ſtage is over, flukes begin to appear in the pori biliarii, the ductus communis choledocus, and in the gall-bladder. At firſt the number of theſe creatures is ſmall; but as the diſeaſe advances they increaſe, and before death, are often very numerous. In the laſt part of the complaint, they are ſometimes to be found in the ſtomach as well as in the inteſtines and liver. This, like the viſceral diſorders of the human body, may terminate in reſolution, effuſion, ſuppuration, or ſchirrus. 1ſt. The complaint is ſaid to terminate in reſolution, when the inflammatory action goes off, without deſtroying the ſtate and texture of the parts. However, he is ſtrongly inclined to believe, that every conſiderable inflammation in the human body, and in other animals, although it ends in reſolution, leaves behind it ſome remains, which may be diſcovered by an experienced anatomiſt. When the veſſels are thrown into inflammatory action for a few days only, effuſion commonly takes place, and the coats become thicker, and aſſume a buff-like colour. Theſe changes in the ſanguinary ſyſtem often continue through life, and lay the foundation of many chronic and incurable diſorders. Sheep that recover from the rot exhibit very different appearances after death, according to the ſeverity of the attack; but the taint is ſeldom or never entirely removed. The liver of an old ewe, that lately died fat, and contained fourteen pounds of ſuet in her body, had the following appearances: the back part of the ſmall lobe was dappled with whitiſh ſpots; the coats of the ductus communis and pori biliarii were conſiderably thickened, and more ſolid than uſual. In colour they reſembled the human aorta in old people, and were full of flukes: in other reſpects the liver appeared to be ſound and natural. The butcher aſſerted that the variegated appearance and alteration in the ducts were occaſioned by a ſlight taint of long ſtanding, which had not been conſiderable enough to diſorder the economy, or impair the health of the animal ſufficiently to prevent its feeding.

2dly. That when ſheep die ſuddenly in the firſt ſtage of the diſorder, an effuſion of ſerum, or of wheyiſh-coloured fluid, may be commonly diſcovered in the cavity of the abdomen, and then the peritoneum ſurrounding the liver is generally covered with a membrane or coat of coagulable lymph. This form of the rot has been frequently confounded with the reſp or red water, though it differs from the latter diſorder in the colour of the effuſed liquid, in being much leſs expoſed to putrefaction, and in ſeveral other particulars.

3dly. And that abſceſſes in the liver exhibit another termination of this malady. They are ſeldom conſiderable enough to kill immediately; but, in conſequence of the abſorption of purulent matter from them, the ſheep frequently waſte away, and die hectical or dropſical. When the collections are ſmall, ſheep will recover ſufficiently to bear lambs; for three or four ſeaſons, and afterwards become tolerable mutton. 4thly. That the moſt common termination is in ſchirri, or what the ſhepherds call knots in the liver. The whole ſubſtance of this important viſcus has been found ſo full of ſmall roundiſh lumps, or ſchirrous bodies, that it was difficult to find any ſound part in it. The firſt attack is unfortunately ſo very inſidious, that the diſorder is ſcarcely obſervable before the animal begins to waſte and loſe fleſh. In this advanced ſtate it is ſaid to labour under the rot or pourriture, from overlooking the commencement of the diſorder. And hydatids are obſerved to effect ſchirrous and purulent livers more frequently than others. When livers are much diſeaſed, the butchers carefully conceal them from the public eye. To him it is always matter of ſurpriſe to find the mutton ſaleable in theſe ſevere caſes. It ſhews, in an extraordinary manner, the accommodating power of living matter, which is able to maintain life, and increaſe corpulence, under ſuch unfavourable circumſtances. Shepherds and breeders, who make it a general rule to kill every ſheep that becomes indiſpoſed, from an opinion that very few of them ever recover from any illneſs, would do well to examine the livers and other viſcera of ſlaughtered ſheep. By ſuch a practice they would ſoon be convinced that ſheep are able to endure a great deal.

But in reſpect to the cauſes of the diſeaſe, it has been imputed, 1ſt, to a vitiated dew; 2dly, to a cruſt, which adheres to graſs after wet weather, or the overflowing of running water; 3dly, to the luxuriant and quick growth of plants, in hot, moiſt ſeaſons; 4thly, to grazing certain herbs; 5thly, to faſciolæ hepaticæ, or their ova, being introduced into the ſtomachs of animals, by feeding on ſwampy and low grounds in moiſt weather; 6thly, it has been called the *ſheep-pox* by profeſſor Vibourg, of the veterinary college at Copenhagen; but this is not properly the cauſe of the rot. And, 7thly, it is aſcribed, by Daubenton, to poor diet, and drinking too much water. Theſe different cauſes are objected to, and ſhewn not well founded by the firſt writer, who thinks that, 8thly, it ſeems to be occaſioned by poiſonous effluvia, which, under certain circumſtances, are emitted from marſhy ſoils, in ſupport of which it is ſtated that the following facts afford ſtrong proofs.

His reſidence conſiſts of high and low lands, of a loamy and tenacious nature. While a brook which runs through the farm remains overflowed, and the water continues upon the adjoining flat grounds, his ſheep never ſuffer any inconvenience, though they are frequently obliged to wade for their proviſions. As ſoon as the flood is ſubſided, the ſheep can at any time be tainted in a quarter of an hour, while the land retains its moiſture, and the weather is hot and ſultry. The butchers are ſo well acquainted with the importance of this fact, that when his friend has diſpoſed of any fat ſheep, they are uſually turned upon this rotten ground to make them thrive faſter. But by judicious management he has laid the greateſt part of his farm completely dry, and is now little troubled with the rot, unleſs when he wiſhes to give it to ſome particular animals. His neighbours, who have been leſs provident, are ſtill ſevere ſufferers by it; nor are their misfortunes confined to ſheep alone. Pigs, cows, aſſes, horſes, poultry, hares and rabbits, become rotten in this lordſhip, and have flukes in their livers. Many years ſince, his grandfather removed ninety ſheep from a conſiderable diſtance to his own reſidence. On coming near to a bridge, which is thrown over the Barling's river, one of the drove fell into a ditch, and fractured its fore-leg. The ſhepherd immediately took it in his arms to a neighbouring houſe, and replaced the limb. During this time, which did not occupy more than one hour, the remainder were left to graze in the ditches and lanes. The flock were then driven home, and in a month afterwards, the other ſheep joined its companions. The ſhepherd ſoon diſcovered that all had contracted the rot except the lame ſheep; and as they were never ſeparated upon any other occaſion, it is reaſonable to conclude that the diſorder was acquired by feeding in the road

road and ditch bottoms. And he adds, that a Lincolnſhire farmer purchaſed ſome turnips in Nottinghamſhire, upon which he intended to winter a flock of ſheep. The firſt diviſion, conſiſting of about forty, were detained one night at a village near to the place formerly alluded to, by the overflowing of the Barling's Ean, and were put upon a piece of flat land which leads to the river. The water had not returned to its former channel more than a day or two. Every one of the forty ſheep became rotten; whereas the other diviſion, which ſtopped no where by the way, eſcaped the diſorder, and remained well. Sheep were formerly admitted into ſome adjoining paſtures, in travelling to and from the neighbouring fairs and markets; but ſo many of them contracted the rot, that, for ſome time paſt, the graziers in this county will not ſuffer their flocks to ſtop for a moment near the village. He has repeatedly examined the ſuſpected ditches and paſtures, but never obſerved either flukes, or any of the plants, to which the rot has been attributed: though he muſt candidly acknowledge that he ought to have ſought for them with more care and attention. Theſe ditches communicate with a rivulet, which frequently overflows its banks, and the incloſures are then deluged with water. The ſoil conſiſts chiefly of loam or clay, and the ſurface is ſo flat and level on both ſides of the river, that for want of proper deſcent, the water is a long time detained upon the grounds. He is credibly informed, that in this place the rot affects ſwine, hares, and rabbits, as well as ſheep.

It is further ſtated, that he has likewiſe been informed by Mr. David Wright, that a few years ſince, as a drove of ſheep were paſſing through a long lane in the pariſh of Irby, one of them, being weary, fell down in the middle of the road. The others were permitted to range at large, till their companion was able to travel. They were then driven all together into a paſture, and it was ſoon diſcovered that only the *tired* ſheep had eſcaped the rot. As the flock had never been ſeparated upon any occaſion, we are entitled to conclude that the diſorder was contracted while the tired animal remained upon the road. From theſe and other caſes, the writer thinks himſelf juſtified in aſcribing the rot in ſheep, and other animals, to *paludal* effluvia; but in regard to the nature and conſtitution of which he acknowledges it is very difficult to form any rational opinion, as they have hitherto eluded the moſt ſubtile and delicate inquiries.

In reſpect to the prevention of the diſorder, he ſuggeſts, that where neceſſity requires the paſturage of moiſt grounds in ſummer or autumn, the ſhepherd ought carefully to remove his flock into a dry ſituation before the evening, and provide them with corn, and good hay, or green food. He ſays that a conſiderable farmer of Bohemia kept his ſheep ſound in the wet and fatal year of 1769, by feeding them every night, when turned under a ſhed, or into ſtables, with haſhed ſtraw; and by eating it greedily they were all ſaved. By this judicious practice, the ſheep were removed to ſleep in better air, as well as preſerved in a more vigorous ſtate of body. Sir John Pringle informs us, that perſons have maintained themſelves in good health, during ſickly ſeaſons, by inhabiting the upper ſtories of their houſes; and he has reaſon to believe, that by merely confining ſheep on high grounds through the night, they have eſcaped the rot. He adds, that after the dew is exhaled by the ſun's heat, ſheep may be ſuffered to range in moiſt and ſwampy places, with leſs danger, becauſe the miaſmata, which are formed in the night, and remain entangled among the graſs, or float in the lower part of the atmoſphere, are chiefly diſſipated with the dew. Therefore, unleſs they be very copiouſly produced in the day time, or are unuſually virulent, they will not be ſufficiently concentrated to do much injury to healthy ſheep. While at reſt and aſleep, the operations of the ſyſtem are more feebly performed, and then ſheep are peculiarly expoſed to diſeaſed actions. By conforming to theſe regulations, he has known one flock eſcape entirely, while others have ſuffered materially in the ſame open field.

And it is confidently aſſerted, that decoctions of bitter herbs, with ſalt, have frequently preſerved ſheep from the rot. Salt is ſuppoſed to conſtitute a part of Fleet's celebrated noſtrum; and we know that bitters are deſervedly recommended to prevent intermittents, the dyſentery, and other diſorders, which originate from exhalations. In Oxfordſhire, Dr. Lower has frequently known ſix or ſeven ſpoonsful of ſtrong brine and ſtale urine, with ſoot ſteeped in it, to be given with great ſucceſs. This is done at ſpring and the fall of the year, when the dew is counted moſt dangerous. This courſe of phyſic is continued eight or ten days, or till the ſheep eat their meat heartily; and if they were taken in time, there ſeldom died any in a whole flock. For the ſame purpoſe, Ellis recommends the following medicine in his "Practical Huſbandry." Take a peck or more of malt, and maſh it, as though you would brew it into ale or beer, and make eleven or twelve gallons of liquor; then boil in it a quantity of ſhepherd's purſe, comfrey, ſage, plantain, penny-royal, wormwood, and bloodwort: add yeaſt, and afterwards ſalt the mixture; then turn the liquor into a veſſel. After April comes in, give ſeven or eight ſpoonsful to every ſheep, once in the week, if the weather be wet, and if dry not ſo often.

Some have ſuppoſed that there are various objections to the above notions concerning the nature and cauſes of the rot in ſheep; but eſpecially that of its not being met with in the ſheep of ſome other diſtricts where *marſh miaſmata*, and the diſeaſes which depend upon it, greatly prevail. It has, indeed, been ſtated in the view of eliciting the truth of the matter, by Dr. George Pearſon, that there is an apparent difficulty or objection to the above writer's concluſion—that the rot in theſe animals is occaſioned by the ſame morbific agent which occaſions intermittent and remittent fevers—in the circumſtance that in ſome of the marſhes of the county of Kent, where intermittent fevers affect a great proportion of the inhabitants; and even perſons reſiding in the neighbourhood, although living on dry chalky lands, where ſuch diſeaſes never ſhew themſelves, if at ſome diſtance from the low grounds, unleſs in conſequence of importation; and in Chitney marſh, on the river Medway, near the iſle of Sheppey, one of the moſt prolific ſituations for agues to be found in the kingdom; and which is equally famous for its paſturage, by which very great numbers of ſheep are fed and kept; where the ſallow and indeed cadaverous countenances of the inhabitants, ſhewed that moſt of them were ill, or were recovering from agues; on inquiring into the health of the ſheep, beſides the evidence of the fine healthy condition of the animals, it was found, on the authority of a ſhepherd who had lived thirty-ſix years in the marſh, that he had only ſeen the diſorder once, and that was in the firſt year of his reſidence there; nor is the rot at all common in any part of the county of Kent. The Leiceſter breed of ſheep, he aſſerted, were ſubject to it, but not the ſheep bred in the marſh; nor were theſe animals ſubject to any other diſeaſe more frequently than in other ſituations in general, or particularly in the uplands. On theſe grounds, the doctor thinks, it would appear that one kind of miaſmata of marſhes which produce agues, do not in all ſituations alſo produce the rot. He does not, however, conceive it logically juſt to conclude, from the inſtance which has been given,

given, that miaſmata paludum of a different ſpecies may not occaſion the rot, and alſo agues. It is poſſible alſo, he ſuppoſes, that ſome concomitant agents or circumſtances may render the ſame miaſmata productive of one of the diſeaſes in certain ſituations, but not of the other diſorder.

The ſame circumſtances occur in other ſituations, as there is a prevalence of miaſmata in the Romney Marſh, another great ſheep diſtrict, which frequently produces intermittent and remittent fevers; while the rot is ſcarcely ever known to happen in it. And in Eſſex there are agues in plenty, in many parts, without the rot in the ſheep of them being at all known.

Some of theſe remarks and directions deſerve the notice of the grazing farmer, as by proper attention to them much miſchief may often be prevented. But there are ſome who ſuppoſe that moſt dependence in the cure of this affection is to be placed upon the removal of ſheep into dry ſituations, keeping them warm and ſheltered, and giving them dry food in the yard. In the Report on Agriculture for Lincolnſhire, ſome circumſtances are given that may direct the farmer on this point. It is ſtated, that in rotting years, the ſheep that feed on the ſalt marſhes over which the ſpring-tides come, ſell very high in confidence that they are ſafe. And that a ſhepherd, who when young was ſhepherd's boy to an old man who lived at Netlam, a place noted for the rot, ſays he is perſuaded that ſheep only take the rot in a morning before the dew is off, as by keeping them up till the dew is gone they have been preſerved from the diſeaſe, while others, where this precaution has been neglected, have become diſordered.

Others think that the beſt and ſureſt remedy, in theſe caſes, is that of combining plenty of dry food with the free uſe of ſea-ſalt, and at the ſame time removing the animals to the ſound, rich, dry, paſture lands. The rot is never known to be caught on the South Downs of Suſſex. When the ſheep ſuffer in this way, the diſeaſe is always got while they are keeping in the weald, or other low lands. Such marſhes as are occaſionally overflowed by ſalt-water, are never known to rot ſheep, but are moſt admirable for keeping them ſound and healthy; and ſhould any thing be capable of curing the rot, it is the ſheep feeding on ſuch land. Some have obſerved, that if, after a froſt, even when very early, ſheep be turned into ſuch meadows and brooks as are at other times particularly liable to rot them, they will not, under this circumſtance, ſuffer at all; as it is ſuppoſed the animalculæ which the inſects depoſit in the ſummer among the herbage, are deſtroyed by the froſt. The flounders found in the livers of the animals, are believed to be taken up with their food. It is more probable, however, that it is only the very minute ova of ſuch inſects which are taken into the ſtomachs of ſuch ſheep. The autumnal months, when there is no froſt, are the moſt diſpoſed to bring on the rot in the above diſtrict; but after one ſingle night of hard froſt, the danger is over for that year.

Rotten ſheep have, in a great many inſtances, been cured by feeding them on the herbage growing on a thin ſoil on lime-ſtone rock. Hundreds have been known to have become ſound on lime-ſtone land; their livers being completely healed, and the ſheep healthy in every reſpect.

In the original Agricultural Report of the county of Stafford, it is ſuggeſted, that the rot in ſheep may be removed by the uſe of medicine. The diſeaſe is conceived as perhaps rather ſimilar in its nature to the dropſy, as there is a preternatural abundance of water. The writer remarks, that of ſix rotten ſheep which he had about ſix years before the time of writing, he ſucceeded in curing five of them, but the ſixth died full of water. One of the five which were cured brought him a lamb the following year, which with its mother, continued healthy, and became fat on graſs; the lamb was ſold in the ſummer, and the ewe in the beginning of winter, to a butcher. The other four alſo fattened, but in leſs time, on graſs alone, and were parted with in the like manner. On April the 25th, in the year 1802, he alſo drenched two rotten ewes, one of them in the laſt ſtage of the diſeaſe; they both became ſound, acquired fat, and were ſold, with many others, in October, to the butcher, undiſtinguiſhed from the reſt. Since that time he has repeatedly tried the ſame remedy; and on the whole number of caſes, has not loſt more than one in ſix or ſeven.

His method of performing the cure is this: the rotten ſheep is to be faſted one night, then one table ſpoonful of the ſpirits of turpentine is to be taken, and mixed with two of the ſame ſpoonſful of ſoft cold water; which is to be given to each ſheep for one doſe. The ſheep is then to be kept on dry food for three or four days; at the end of which time, the ſame doſe of the medicine is again to be repeated, and the ſheep continued on dry food for three days longer; at the concluſion of which period ſuch ſheep may be permitted to join the flock. When affected with a conſiderable degree of looſeneſs, ſheep have often been cured in this manner with great facility.

In ſhort, it may be concluded, in regard to the cure of this diſeaſe, which ſeems to be cauſed by a general debility or weakneſs of the whole ſyſtem, accompanied with a local affection of the ſame nature in the liver, that all ſuch foods and remedies as are of a dry nouriſhing quality, and which excite and ſtrengthen the conſtitution, will conſtantly be found of great utility, if not wholly capable of affording a perfect cure of the diſeaſe.

The following receipt was preſented to the Royal Society, by Mr. Boyle, and is preſerved in their regiſter, vol. ii. p. 303. Some time before Allhollantide, the ſheep is to be blooded under the eye, and, if neceſſary, again in the ſpring; and, in October, his gums may be rubbed at three or four different times with Spaniſh ſalt. But the principal remedy conſiſts in this: that about Allhollantide, or ſomewhat ſooner, you take a ſmall handful of the forementioned ſalt, and making the ſheep hold up his head, compel him to ſwallow it, and keep him from drinking any thing for about an hour after.

Rot, *Dry*, in *Rural Economy*, a highly deſtructive vegetable diſeaſe, affecting the timber in the foundations, and other parts of buildings, in particular ſoils and ſituations. It affects the wood, or ligneous parts, in ſuch a manner as to leave it connected by nothing but the ſmall hard fibrous portions, which give it a curious tremulous appearance, but all of which, when touched by the hand in the more advanced ſtages of the diſeaſe, readily moulder into a browniſh ſnuff-like duſt. It is attended with a peculiar earthy ſmell, ſimilar to that which iſſues from freſh dug up wood, which has lain ſome time in the ground in contact with decaying animal matter. It is very materially different from that natural ſort of decay which takes place in wood from the preſence of wetneſs. This has been ſuppoſed to originate from very different cauſes, ſuch as the uſe of wood in too green a ſtate, exceſſive dampneſs in the foundations of the buildings which are affected with it, the want of a free circulation of air in ſuch ſituations, and more lately to be the effect of a plant of the fungus tribe, which has leaves as in the miſletoe, &c. the boletus lachrymans. And on the former ſuppoſitions it has been ſtated to the Society for the Encouragement of Arts, &c. by Mr. Bramley of Leeds, in the thirty-firſt volume of their Tranſactions, that to bring the matter to the teſt by experiments, would require the obſervations of a

long period, and in ſelected ſituations. And that wood uſed for the general purpoſes of man is cut down at different periods; and although it may be felled at the proper ſeaſon, or when moſt free from ſap or moiſture, it is not always to be effected. Nay, even admitting it to have been cut down in the moſt favourable ſituation, it ſtill abounds with ſuch an extra proportion of moiſture, as to require a regular expoſure to the air prior to its being applied to uſe, if we wiſh to guard againſt that ſhrinking which always takes place where this precaution has not been taken. And although the fir kind contains leſs of this watery portion, yet it aſſuredly poſſeſſes a conſiderable ſhare; and it is in this ſpecies, he apprehends, that the evil called the dry rot moſt generally occurs, as from the facility of working the ſame it is moſt generally applied in buildings. But ſuppoſing it to be fir, or any other ſpecies, wood felled when abounding with any extra proportion of ſap, and applied to uſe without the proper ſeaſoning or expoſure to a free current of air, until ſuch extra moiſture has had time to exhale, is moſt liable to the diſeaſe in queſtion; and the cure, or principal prevention againſt it, would be the precaution of felling all wood only at the proper ſeaſon, or when the ſap is not in circulation. The next mode of prevention would be to uſe ſuch wood only as has been for a conſiderable period expoſed to the influence of a free current of air, or, where convenience will admit, to that of air heated to a moderate degree; ſuch air extracting with greater facility the encloſed moiſture, and in a more certain ratio than the irregularity of our atmoſphere will allow, under other circumſtances.

And it is ſuggeſted, that in all rapidly-improving countries, this evil is likely to be an increaſing one, as the current demand for wood generally exceeds the ſupplies laid by in ſtore, ſo as to be applied to uſe in regular ſucceſſion, after being properly ſeaſoned. And that another cauſe that affects all wood moſt materially, when not fully dried, is the application of paint, the nature of which prevents all exhalation, and confines the encloſed moiſture, till it occaſions a fermentation through the whole fibrous ſyſtem of the wood, and brings on a premature ſtate of decompoſition, or the dry rot. It is likewiſe ſuppoſed that a ſimilar evil may be induced, in conſequence of any newly finiſhed building having all the doors and windows ſhut up, and that for ſome length of time, particularly in moiſt weather. The wood, even though unpainted, is thus frequently placed in our atmoſphere more charged with vapour than in its own internal contents, and it is conſequently in an imbibing inſtead of an exhaling ſtate, and tending to decay. Wood placed in dampiſh ſituations, and the ends of timbers near to moiſt walls, ſuffer from ſimilar cauſes, but what particularly attracted his obſervation to the circumſtances was this, that both oak and fir poſts were brought into this premature ſtate of decay, from their having been painted prior to the due evaporation of their moiſture; and then extending the obſervation, and tracing the hiſtory of other wood affected in a ſimilar manner, he is convinced that the evil frequently thus originates, and its prevention would be in uſing timber previouſly well dried and ſeaſoned for ſuch purpoſes.

And it is added, that ſince theſe obſervations were made, having been buſily engaged in draining from 4000 to 5000 acres of ground, further ideas on the ſubject of the dry rot have occurred to him from the work he has been engaged in. Where houſes are troubled with damp walls, near to the earth's ſurface, it is generally, if not univerſally, occaſioned by the percolation of water from the higher adjoining ground, which, thus intercepted in its current, attempts to follow the general hydroſtatic law, of elevating itſelf, by the ſyphon line, to a height equal to that from whence it has its origin. Thus in houſes differently ſituated, we ſee the damp ariſing to varying degrees of height on the walls, and thoſe are probably correſponding to the height at which the moiſture circulates in the adjoining ground. At its firſt entrance to the building, and whilſt the moiſture is in ſmall quantity, the excavated part of the foundation wall, he thinks, may abſorb, and gradually quit ſuch proportion: but the exceſs, as is generally the caſe in moiſt weather, exceeding that power, the foundation ſtones are then ſaturated in a more rapid proportion than the adjoining rarefied internal atmoſphere can evaporate: the watery particles then creep up, in degrees proportionate to the aſcent from which they originally deſcended, excepting when prevented, or driven off by the ſuperior heat of the adjoining rooms, when, in addition to the diſagreeable damp they cauſe, they frequently occaſion conſiderable damage to the pictures, furniture, &c. Drains laid out athwart the aſcending ground, with a very ſlight deſcent or fall, and made of the depth of one yard for each yard of aſcent, and from the foundation until equal the height that ſuch damp ever riſes, would, there is little doubt, completely ſecure the houſe and furniture from the inconveniencies hitherto ſuſtained, and would generally prove an effectual prevention to moſt caſes of the dry rot, where it originates in extreme moiſture. He is of opinion that the fungus which pervades decaying wood is not the firſt cauſe, but a dependent on the peculiar ſtate to which ſuch wood has been reduced by prior cauſes. The diſſeminated ſeeds finding a proper bed, or nidus, like to the muſhroom, toadſtool, &c. fix their abode, and pervade the whole ſubſtance, thus accelerating the general law of Providence, which tends to make all matter reproductive.

Upon theſe grounds cellars, or ſuch other places, ſhould be drained in the manner he has mentioned, by taking off the percolating water prior to its gaining admiſſion to or contact with the walls: and it is probable that, in moſt caſes, a ſingle drain will have complete effect; it would aſſuredly, he thinks, do ſo, if it was not for the variation of the earth's internal ſtrata, which are not eaſily diſcernible. And that if attention to this rule was paid prior to the building any new ſtreets in towns, it would prove eſſentially uſeful in preventing ſuch miſchief.

And it has alſo been ſuggeſted to the above ſociety, that mortar made of lime from burnt chalk is much more deſtructive to timber than ſtone-lime, or that burnt from lime-ſtone. Chalk-lime attracts moiſture; and communicating it to any timber which it touches, occaſions its decay. And further, likewiſe, that ſea-ſand is prejudicial, if made into mortar, from a ſimilar quality of attracting moiſture from the atmoſphere: this, it is ſuppoſed, may in ſome degree be corrected by waſhing the ſand well in freſh water, where good ſand cannot be procured. But that good mortar, where any is required to be in contact with timber, may be made from a mixture of ſtone-lime freſh burnt, and river-ſand, to which a very ſmall quantity of common brown, or yellow iron ochre ſhould be added, and well incorporated therewith in the operation of making it up. See QUICKLIME.

And it has been ſuggeſted by Mr. Johnſon of Ipſwich, in the ſame volume of the Tranſactions of the above ſociety, that ſome time between 1771 and 1773, he went, at the requeſt of a friend, to the chapel at the Lock hoſpital, through curioſity, to examine a pew there that had frequently been repaired for damages by the dry rot. And that after a cloſe inveſtigation, he found it was the operation of a plant, whoſe leaf reſembled that of the vine. Wherever it had touched, the effect of its poiſonous quality got through the wood to the paint, which he has ſeen a mere ſkin. He propoſed to cover

cover the floor with bricks, laid in mortar, which was accordingly done. He called twice ſince, the laſt time about ſeven years ago, and has reaſon to think that it never appeared again. That the next opportunity of examining it carefully was at Mark-hall, in Eſſex, the ſeat of Mr. Montague Burgoyne. In a parlour there were three pillars of about ten inches in diameter, the outwood of which was between two and three inches thick. Two of them were eaten through in leſs than ſeven years, from the baſes, about two feet upward, within the hollow, and were as rotten as if it had been the effect of a hundred years ſtanding. The gardener of this gentleman was a botaniſt; and found the plant where he directed him to ſearch for it, and ſaid it was the boletus lachrymans. And, he adds, that ſome authors call it a paraſitical plant; and it is ſometimes to be found with the willow and ſallow tribe; but this is not to the purpoſe. Till within a few months he has never been without ſome leaves of the plant. For many years they appear exhauſted and dead, and ſoon crumble into duſt; but he ſuſpects that freſh wood attracts a freſh growth from the root.

At another time, he ſaw it in a houſe at Whitehall, built by ſir John Vanbrugh, whoſe nephew then lived in it. The houſe is, he thinks, only two ſtories high; the plant had aſcended to the upper ſtory, committing devaſtation on the wainſcot all the way. It will deſtroy half-inch deal wainſcotting in a year. He has alſo had it twice in houſes he inhabited, one in Suffolk, and the other in Glouceſterſhire. He bore with the firſt; in the other caſe he undertook to ſtop it, and did it effectually.

It is ſuppoſed, that the cauſe is from the floor being laid on the earth, which has been, where he has obſerved it, of a gravelly or ſandy loam nature. The moiſture from a water-courſe at hand, or a north aſpect, where the outer wall ſtands in a garden-bed, ſo that the rain percolates, are great encouragers; it requires moiſture, he ſuſpects. But it never riſes in the middle of the floor; becauſe, if the ſeed were there, it could not germinate for want of air; but it is eaſy to ſuppoſe that after the floor is ſhrunk, an air may be created between that and the vacancy between the wainſcot and the outer wall, ſufficient for the purpoſes of vegetation. He ſays, he ſaw an inſtance laſt ſummer in the houſe of a friend, a ſtudent in botany. He was ſurpriſed when he told him it was a viſit from a plant; but ſo it proved, and always is, and ever was ſo; nor does it originate from any other cauſe.

With the view of removing it in his own caſe, he removed the original ſoil near the part affected, and ſupplied its place with ſand. He then placed pieces of tile; on thoſe he laid mortar, and tiles over them, puſhing them under the wainſcot, ſo that it had no communication with the joiſts or floor. Pillars in like manner ſhould, he thinks, be kept from the earth. And in laying a floor upon the ground, he ſhould take away the earth for a foot in breadth, and four inches in depth, all round the walls, and place the ends of the joiſts in mortar, covering them with tiles preſſed under the floor and wainſcot, quite to the outward wall. Iron or tin plates would do; but are not ſo cheap as mortar and tiles, and probably much leſs durable in ſuch ſituations. It is ſuppoſed that this plant has no adheſive powers, but in contact with wood. If it could paſs over brick and mortar, it might be ſeen to ſpring from the cellars and infect half the houſes in the kingdom. He recommends, in ſhort, that the wainſcot be kept free from contact with the joiſts and floor.

It is obſerved that the leaves of the plant appearing exhauſted and dead, is owing to their having imparted all their juices to the wood, which change it to a fungus, and not to a powder, like rottenneſs from length of time. And that nothing is more eaſy than to prevent the damage from the plant. Beſides what he has ſaid above, he is poſitive that a tile laid cloſe along the walls round the room, would prevent the growth of the plant, even without mortar; and perhaps it is only neceſſary where the walls are next to the air. And charring the ends of the joiſts for a few inches, and the ſide of the wainſcot at bottom next the wall, would, he ſuppoſes, be ſufficient; for the plant cannot adhere to any thing but wood, and that poſſeſſed of its natural juices, to a certain degree; ſo that he queſtions if old dry oak would receive it. But all the white ſoft woods, as beach, poplars, and deals, are for a long time ready to receive it. Repairing the damage with freſh wood, without removing the earth and plant, is only feeding the evil, or extending the diſeaſe. It is ſuppoſed, that as the plant is of the creeping kind, and cannot riſe two inches, the wood, in all caſes, muſt be in contact with the earth to ſupport it. He adds, that a fungus broader than the palm of one's hand, and an inch or more in thickneſs, is commonly ſeen at the bottom of an old poſt, on the ſurface of the earth; but it is not eaſy to diſcern whether the wood or the earth furniſhes the matter.

The writer further remarks, that he had lately a converſation with an old friend, who ſhewed him two parcels of rotten wood, from an oak barn-floor laid about ſixteen years ago. After lying twelve years, it ſhook upon the joiſts. On examination it was found to be rotted in various parts, and the planks, two inches and a half in thickneſs, were nearly eaten through, though the outſide was gloſſy, and without blemiſh. The joiſts, and a large middle beam, were laid at the ends, in brick and mortar, to create a firm level. No earth was near the wood; and, he thinks, that no air could find a paſſage. The rottenneſs was partly an impalpable powder, of the colour of Spaniſh ſnuff, and other parts were black, as if burnt; the reſt was clearly a fungus. And that this gentleman is a perſon of undoubted veracity; but a nice and exact obſervation is neceſſary in ſuch examinations. He thought nothing of any plant, and it is likely there was none of the boletus; ſo that his aſſertion that it was always to be found, was rather too ſyſtematic. He aſked him if the timber was dry when laid down. He could not however ſay that had been particularly adverted to. It had been ſawed from a large oak, and was, as he thought, in all reſpects proper for a barn-floor. As this ſeems not the operation of the boletus, he aſks, how did it happen? We know that the oak, when in vegetation, is ſubject to what we ſhall call an exudation of juices, which produces the fungus, named the agaric of the oak, with which the Druids of old played many tricks. The oak, then, if ſawed into thick quantities, may emit theſe ſame juices, as the progreſſive courſe of nature to its entire decay. It is added that we have all ſeen oaks of vaſt ſize and ancient record, with a great part of the outſide whole, and all the inſide gone; perhaps the work of a century. In all hollow trees fungus is diſcoverable. To uſe a law term, it is a miſnomer to call it dry rot; for the rotting principle is in moiſture. He further ſtates, that he had never ſeen the rot upon ſo large a ſcale in timber, till lately. The prevention then of beams, rafters, large joiſts, and poſts put into the earth, from decay by the rot, is by charring only, which will dry up all the fungus juices of wood in large ſubſtance. Paint, or a bituminous preparation, may probably ſtop up the pores, and prevent the rot in ſlight work, where the treatment he before obſerved, with fire, might be incom-

incommodious, as to half-inch wainſcot, &c. The incorruptibility of charcoal is proved by a variety of indiſputable facts.

A great many uſeful facts on this ſubject have been ſtated by Mr. Batſon, of Limehouſe, in the twelfth volume of the ſame Tranſactions, in reſpect to his methods of preventing the dry rot in a room much affected with it. The mode he adopted was to clear the ends of his timbers, to take away the infected earth to the depth of two feet, and to fill up that ſpace with anchor-ſmith's aſhes, or aſhes from a foundry, before his flooring boards were laid.

And on minute examinations being made under the direction of the ſociety, at the diſtances of ſix and twelve years after the flooring was laid, the boards, wainſcot, and timbers, were all found entirely free from any appearance of the dry rot. The uſe of ſtone-work next the ground, as the foundations of poſts, door frames, partitions, &c. has alſo been found uſeful in preventing ſuch wood-works from being attacked by this diſeaſe. And alſo the cauſing a more free circulation of air about ſuch foundations by the fixing of iron gratings in ſtone-work in different places, ſo as to produce the moſt perfect ventilation. But notwithſtanding all that has yet been done in reſpect to the nature and modes of preventing this ſort of rot, much ſtill remains to be effected both in regard to the nature of its origin, and the moſt certain means of eradicating it under different circumſtances.

It will probably, however, be found the beſt and moſt effectual plan, until further trials and diſcoveries have thrown more full and complete light on its nature and cauſes, to take care that the wood-works near the ground in all buildings in ſuch places as rot timber have as little contact with it as poſſible, by being raiſed and ſupported at ſome diſtance from it, by means of ſolid ſtone or brick and mortar work, by a full and free circulation of air being every where admitted in the foundations near ſuch wood-works, by being careful to make uſe of ſuch timber only as is perfectly well ſeaſoned and prepared, and by having conſtantly a ſufficient number of drains made all round to diſcharge any moiſture that may occur. It may likewiſe be of farther advantage in all ſuch caſes to avoid painting or coating over the wood-work near the parts which are liable to be diſeaſed or become rotten, for ſome conſiderable length of time after they have been done; as well as to allow of large fires to be occaſionally made, where convenient, as near to ſuch ſituations as poſſible, in order that every ſort of moiſture and dampneſs, together with the peculiar rawneſs of ſuch new works, may always be removed as much as they are capable of in the firſt inſtance, or as ſoon after the works have been finiſhed as may be compatible with their nature and extent.

In regard to the boletus lachrymans being the cauſe of the dry rot in timber, it has lately been contended that the different ſorts of fungus, which are met with upon decaying timber of different kinds, are the production of the remaining powers of life in the ſap of the unſeaſoned wood; and that the ſame ſort of living organizable matter, which, whilſt its powers continued in their perfect condition, would have generated the branch of an oak, will, when debilitated and enfeebled, give exiſtence to a certain kind of fungus, and become the cauſe of this diſeaſe.

Mr. T. Wade, in a recent publication, obſerves, that the term dry rot ſeems to be improperly applied to the decay in timber, which it is generally employed to deſignate, and that the impropriety of the expreſſion, probably, has not a little contributed to involve this ſubject in obſcurity. A very ſhort advance in the inveſtigation of this ſubject will ſhew, that moiſture is a condition neceſſary to the putrefactive proceſs, and that water is the moſt efficient agent in the decompoſition of organized bodies.

By capillary attraction fluids are carried to the tops of the higheſt trees, a phenomenon which has been long obſerved, but has not been ſatisfactorily explained. Preciſely the ſame effect takes place when one end of a piece of timber is immerſed in water, or placed in a damp ſituation. It happens even in vacuo.

Timber, ſo placed, at firſt ſwells, after ſome time it changes colour, then it emits gaſes which have a mouldy or muſty ſmell. In the more advanced period of decay, the maſs dries, and cracks in tranſverſe directions. Laſtly, it becomes pulverulent, and forms vegetable mould. Generally, in ſome of theſe ſtages of decompoſition, the different ſpecies of fungus are found to vegetate on the moſs.

When a vegetable is deprived of life, the matter conſtituting it begins to undergo changes in order to enter into new combinations. It is reduced to ſimple principles by the aid of warmth, and the preſence of air and water. In houſes, ſhips, &c. we cannot prevent the influence of theſe powerful agents, but it may be retarded. It ſeems the uſual mode of ſeaſoning timber by exſiccation is of little uſe. Timber, thus prepared, is found, indeed, to ſhrink and loſe much of its weight; but even very old oak timber, (procured from ancient buildings,) when immerſed in water, or expoſed in a damp ſituation, readily acquires the weight, and ſwells to the dimenſions of green timber, from which, in its properties, it does not materially differ.

Mr. Wade therefore endeavoured to diſcover ſome other means by which timber may be made to reſiſt change, or decay.

Lignum vitæ, box, ebony, &c. are nearly indeſtructible, owing to their being of ſo cloſe a texture that water cannot be abſorbed by them, neither do they give out any ſoluble matter to water, at leaſt not without long boiling, or digeſting at a very high temperature. Therefore the great agent that determines the changes in wood in general, here has not any influence.

Other durable woods, ſuch as teak, cedar, &c. though of an open grain, and very porous, contain reſinous, or oleaginous matter, repelling moiſture, which cannot inſinuate itſelf, as is the caſe with the feathers of ſome fowls, &c. On theſe principles the common periſhable woods may be made to reſemble thoſe which are very laſting, or, indeed, nearly indeſtructible.

Thus, to prevent the decay of oak, &c. it is neceſſary either to cauſe it to be incapable of abſorbing moiſture, or to render the ligneous fibre inſoluble.

Some of the effects produced bear conſiderable analogy with tanning, by which proceſs a ſkin, entirely ſoluble in water, forming jelly or glue, and quickly ſuſceptible of putrefaction, is made into leather, a ſubſtance not at all ſoluble in water, and capable of enduring for a long period, ſometimes for ſeveral centuries.

For various methods of performing this, we beg to refer the reader to Mr. Wade's book, in which the operations recommended ſeem ſimple and economical.

Rot *in Timber*, a diſeaſe in trees which quickly injures and deſtroys the woody parts of them by inducing a ſort of rotting and decay. It has been ſtated to proceed from different cauſes, but the principal, according to the author of the Practical Planter, are thoſe of external wounds or bruiſes, the trees growing in unfavourable ſoils, the roots of which have been barked at the period of planting, or in cutting out plants. And ſecondly, by the tree growing in

ſpouty

ſpouty ſoil, whoſe larger roots have been injudiciouſly hacked at the time of tranſplanting, or in cutting out a neighbouring plant. In this caſe the diſeaſe affects the pith, eats upward, and often conſumes the heart to ſuch a degree, while the bark remains in a perfectly ſound ſtate, that the trunk is enfeebled, and eaſily broken. This is demonſtrated by cutting affected trees at different ages, and the *rot* is generally found leſs or more advanced upward, according to the ſize of the cavity. He here ſtates a very curious inſtance of this ſpecies of rot, that occurred at Wemyſs caſtle, in Scotland, in 1795. In thinning a wood, whoſe trees conſiſted chiefly of elm and aſh, in one part of it the ſoil was obſerved to be ſpouty, and the elm-trees in rather a ſickly condition. Every elm-tree cut in this part was more or leſs affected; ſome were rotted a foot, others two, three, &c. feet upwards, and the wood above, to the extremity of the bole, was uniformly ſound, and ſold at two ſhillings a foot. One beautiful aſh-tree, in particular, was ſold ſtanding, at the rate of half a crown a foot of timber; nor was there the ſmalleſt outward blemiſh from the ground to the very top. When it was cut down, a completely ready made *pump*, fifteen feet in length from the ground upwards, was diſcovered, and actually, as he was afterwards informed, applied as ſuch. It is conceived that in this caſe the remedy is to be at all due pains to prevent the cauſe, by carefully draining the ſoil of poiſonous, ochry water, and when neceſſity occaſions the cutting of large roots, to treat them in the manner of an amputated branch.

And a third cauſe of the rot which he notices, is that of ſtagnant water lodging in the angle formed by the ſtem and an upright branch, or in the angle formed by rival ſtems, where no actual ground has ever been made; but, which often happens, if the tree be in a youthful vigorous ſtate, a cup or hollow is formed, reſembling that between the thumb and finger half opened. Here the water lodging, in time penetrates the bark, and forms the firſt receptacle of corruption, which being once begun advances apace to the great injury of the trees. In this caſe the firſt thing neceſſary towards a cure, or prevention of further injury, is to clean out the water, (for which a ſyringe may be uſeful,) duſt, &c. and dry the whole well by aid of a mop or woollen cloth; then to fill it up, until it run over, with tar; after which to fix on an apron of thin lead, in ſuch a manner as that its edges may reach about a foot upwards on each limb of the tree, being joined cloſe, and faſtened with ſaddle tacks, &c.

The compoſition adviſed by Mr. Forſyth is probably much better for the purpoſe, as being leſs liable to decompoſition; and at the ſame time capable of being applied with greater exactneſs. It is remarked by the firſt writer that knots or excreſcences are frequently found on the boles and branches of trees, particularly of elms. What may have occaſioned them, in many caſes, is not eaſily accounted for; but it is ſometimes obvious that they proceed from bruiſes, or the mal-treatment of trees in youth. In this caſe we frequently find them hollow within, and full of water, which, if not removed, will of a certainty induce the rot. And he adviſes that when the knot is quite entire on all ſides, and perfectly ſound, which may be known by ſtriking it with a mallet, it ſhould be ſuffered to remain. But that when it is found hollow, as above, it ſhould be ſawn clean off, the wound ſhould be ſmoothed, as already directed, cleaned, dried, and laid over with tar, &c. The compoſition before-mentioned is, however, here probably preferable for the ſame reaſon as in that caſe. See *Compoſition for* Trees, and Timber-*Trees*.

In caſes where the internal parts of trees of the timber kind become rotten, and get hollow, in conſequence of the above, or other cauſes, as not unfrequently happens to the oak and elm, as well as different other kinds, eſpecially when they are of ſome conſiderable length of growth, it has been directed, in order to reſtore them, that the decayed and rotten wood ſhould be cut out at different times, as the new wood comes in contact with it; great care being taken not to cut too much at any one time, but to leave enough to ſupport the trees, and prevent them from being blown down by high winds, until the new wood is ſtrong enough for that purpoſe: the remainder may then be cut out, as there will be no danger. By theſe means, the application of his compoſition, and heading down, it has been aſſerted by the late Mr. Forſyth, that a great number of rotten hollow trees, which had, when taken in hand, little more than the bark remaining ſound, have within a few years been entirely filled up; and others, that were headed down within a few feet of the ground, have had their ſtumps completely covered by the leading ſhoots, forming handſome trees; the places at which they were headed being only diſcerned by faint cicatrices.

It is ſtated that a lime-tree, about 18 inches in diameter, whoſe trunk was decayed, rotten, and hollow, from the top to the bottom, and to which, after cutting out the decayed wood, the compoſition had been applied about 16 years before, was lately cut down for the purpoſe of aſcertaining the progreſs it had made in the interior part, and was found entirely filled up with new ſound wood, which had completely incorporated with what little old wood remained, when it was firſt taken in hand. Its body has been cut into ſhort lengths, in order to be ſhewn, for the ſake of convincing thoſe who may be doubtful on the ſubject.

Alſo an old elm, the inſide of which was totally decayed, and out of which were taken, at different times, two large cart-loads of rotten wood, has made ſhoots more than 20 feet high in the courſe of ſix years. Several others of different ſorts are likewiſe ſtated to have made equally fine ſhoots in this mode of treating them, and are now fine thriving trees; the marks of the places at which they were headed down being ſcarcely perceivable. A lime, the hollow part of which is 11 feet in height, is now, it is ſaid, filling up: the tree is about a foot in diameter. A decayed part, 4 feet long and 28 inches broad, in a large elm, is now, too, ſtated to be rapidly filling up with ſound wood. About two feet and a half in length on one ſide, which was for ſome time left to nature, ſtill continued, it is ſaid, to decay, till the compoſition was applied: new wood and bark are now aſſerted to be forming in the part. Beſides theſe, a great many other trees of the ſame kind, ſome of which had wounds ten feet long and two feet broad, are now alſo ſaid to be entirely filled up, as well as many ſycamores, oaks, and other foreſt-trees, reſtored to a flouriſhing ſtate by having the dead wood cut out, and the compoſition applied.

However, notwithſtanding theſe and many other ſimilar ſtatements, a variety of doubts and objections have been raiſed and entertained againſt this mode of filling up and curing the decayed and rotten parts of foreſt-trees, by perſons of much information and experience on the ſubject of vegetable economy; ſo that additional facts, and more careful and exact concluſions from them, are probably neceſſary before the utility or inutility of the method can be fairly appreciated or fully aſcertained.

Rot *in Hops*, a diſeaſe in this ſort of crops, which is very ſimilar to that of the mould. See Hop and Mould.

Rot, in *Geography*, a river of Wurtemberg, which runs into the Lein.

ROTA,

incommodious, as to half-inch wainſcot, &c. The incorruptibility of charcoal is proved by a variety of indiſputable facts.

A great many uſeful facts on this ſubject have been ſtated by Mr. Batſon, of Limehouſe, in the twelfth volume of the ſame Tranſactions, in reſpect to his methods of preventing the dry rot in a room much affected with it. The mode he adopted was to clear the ends of his timbers, to take away the infected earth to the depth of two feet, and to fill up that ſpace with anchor-ſmith's aſhes, or aſhes from a foundry, before his flooring boards were laid.

And on minute examinations being made under the direction of the ſociety, at the diſtances of ſix and twelve years after the flooring was laid, the boards, wainſcot, and timbers, were all found entirely free from any appearance of the dry rot. The uſe of ſtone-work next the ground, as the foundations of poſts, door frames, partitions, &c. has alſo been found uſeful in preventing ſuch wood-works from being attacked by this diſeaſe. And alſo the cauſing a more free circulation of air about ſuch foundations by the fixing of iron gratings in ſtone-work in different places, ſo as to produce the moſt perfect ventilation. But notwithſtanding all that has yet been done in reſpect to the nature and modes of preventing this ſort of rot, much ſtill remains to be effected both in regard to the nature of its origin, and the moſt certain means of eradicating it under different circumſtances.

It will probably, however, be found the beſt and moſt effectual plan, until further trials and diſcoveries have thrown more full and complete light on its nature and cauſes, to take care that the wood-works near the ground in all buildings in ſuch places as rot timber have as little contact with it as poſſible, by being raiſed and ſupported at ſome diſtance from it, by means of ſolid ſtone or brick and mortar work, by a full and free circulation of air being every where admitted in the foundations near ſuch wood-works, by being careful to make uſe of ſuch timber only as is perfectly well ſeaſoned and prepared, and by having conſtantly a ſufficient number of drains made all round to diſcharge any moiſture that may occur. It may likewiſe be of farther advantage in all ſuch caſes to avoid painting or coating over the wood-work near the parts which are liable to be diſeaſed or become rotten, for ſome conſiderable length of time after they have been done; as well as to allow of large fires to be occaſionally made, where convenient, as near to ſuch ſituations as poſſible, in order that every ſort of moiſture and dampneſs, together with the peculiar rawneſs of ſuch new works, may always be removed as much as they are capable of in the firſt inſtance, or as ſoon after the works have been finiſhed as may be compatible with their nature and extent.

In regard to the boletus lachrymans being the cauſe of the dry rot in timber, it has lately been contended that the different ſorts of fungus, which are met with upon decaying timber of different kinds, are the production of the remaining powers of life in the ſap of the unſeaſoned wood; and that the ſame ſort of living organizable matter, which, whilſt its powers continued in their perfect condition, would have generated the branch of an oak, will, when debilitated and enfeebled, give exiſtence to a certain kind of fungus, and become the cauſe of this diſeaſe.

Mr. T. Wade, in a recent publication, obſerves, that the term dry rot ſeems to be improperly applied to the decay in timber, which it is generally employed to deſignate, and that the impropriety of the expreſſion, probably, has not a little contributed to involve this ſubject in obſcurity. A very ſhort advance in the inveſtigation of this ſubject will ſhew, that moiſture is a condition neceſſary to the putrefactive proceſs, and that water is the moſt efficient agent in the decompoſition of organized bodies.

By capillary attraction fluids are carried to the tops of the higheſt trees, a phenomenon which has been long obſerved, but has not been ſatisfactorily explained. Preciſely the ſame effect takes place when one end of a piece of timber is immerſed in water, or placed in a damp ſituation. It happens even in vacuo.

Timber, ſo placed, at firſt ſwells, after ſome time it changes colour, then it emits gaſes which have a mouldy or muſty ſmell. In the more advanced period of decay, the maſs dries, and cracks in tranſverſe directions. Laſtly, it becomes pulverulent, and forms vegetable mould. Generally, in ſome of theſe ſtages of decompoſition, the different ſpecies of fungus are found to vegetate on the moſs.

When a vegetable is deprived of life, the matter conſtituting it begins to undergo changes in order to enter into new combinations. It is reduced to ſimple principles by the aid of warmth, and the preſence of air and water. In houſes, ſhips, &c. we cannot prevent the influence of theſe powerful agents, but it may be retarded. It ſeems the uſual mode of ſeaſoning timber by exſiccation is of little uſe. Timber, thus prepared, is found, indeed, to ſhrink and loſe much of its weight; but even very old oak timber, (procured from ancient buildings,) when immerſed in water, or expoſed in a damp ſituation, readily acquires the weight, and ſwells to the dimenſions of green timber, from which, in its properties, it does not materially differ.

Mr. Wade therefore endeavoured to diſcover ſome other means by which timber may be made to reſiſt change, or decay.

Lignum vitæ, box, ebony, &c. are nearly indeſtructible, owing to their being of ſo cloſe a texture that water cannot be abſorbed by them, neither do they give out any ſoluble matter to water, at leaſt not without long boiling, or digeſting at a very high temperature. Therefore the great agent that determines the changes in wood in general, here has not any influence.

Other durable woods, ſuch as teak, cedar, &c. though of an open grain, and very porous, contain reſinous, or oleaginous matter, repelling moiſture, which cannot inſinuate itſelf, as is the caſe with the feathers of ſome fowls, &c. On theſe principles the common periſhable woods may be made to reſemble thoſe which are very laſting, or, indeed, nearly indeſtructible.

Thus, to prevent the decay of oak, &c. it is neceſſary either to cauſe it to be incapable of abſorbing moiſture, or to render the ligneous fibre inſoluble.

Some of the effects produced bear conſiderable analogy with tanning, by which proceſs a ſkin, entirely ſoluble in water, forming jelly or glue, and quickly ſuſceptible of putrefaction, is made into leather, a ſubſtance not at all ſoluble in water, and capable of enduring for a long period, ſometimes for ſeveral centuries.

For various methods of performing this, we beg to refer the reader to Mr. Wade's book, in which the operations recommended ſeem ſimple and economical.

Rot *in Timber*, a diſeaſe in trees which quickly injures and deſtroys the woody parts of them by inducing a ſort of rotting and decay. It has been ſtated to proceed from different cauſes, but the principal, according to the author of the Practical Planter, are thoſe of external wounds or bruiſes, the trees growing in unfavourable ſoils, the roots of which have been barked at the period of planting, or in cutting out plants. And ſecondly, by the tree growing in

ſpouty

ſpouty ſoil, whoſe larger roots have been injudiciouſly hacked at the time of tranſplanting, or in cutting out a neighbouring plant. In this caſe the diſeaſe affects the pith, eats upward, and often conſumes the heart to ſuch a degree, while the bark remains in a perfectly ſound ſtate, that the trunk is enfeebled, and eaſily broken. This is demonſtrated by cutting affected trees at different ages, and the *rot* is generally found leſs or more advanced upward, according to the ſize of the cavity. He here ſtates a very curious inſtance of this ſpecies of rot, that occurred at Wemyſs caſtle, in Scotland, in 1795. In thinning a wood, whoſe trees conſiſted chiefly of elm and aſh, in one part of it the ſoil was obſerved to be ſpouty, and the elm-trees in rather a ſickly condition. Every elm-tree cut in this part was more or leſs affected; ſome were rotted a foot, others two, three, &c. feet upwards, and the wood above, to the extremity of the bole, was uniformly ſound, and ſold at two ſhillings a foot. One beautiful aſh-tree, in particular, was ſold ſtanding, at the rate of half a crown a foot of timber; nor was there the ſmalleſt outward blemiſh from the ground to the very top. When it was cut down, a completely ready made *pump*, fifteen feet in length from the ground upwards, was diſcovered, and actually, as he was afterwards informed, applied as ſuch. It is conceived that in this caſe the remedy is to be at all due pains to prevent the cauſe, by carefully draining the ſoil of poiſonous, ochry water, and when neceſſity occaſions the cutting of large roots, to treat them in the manner of an amputated branch.

And a third cauſe of the rot which he notices, is that of ſtagnant water lodging in the angle formed by the ſtem and an upright branch, or in the angle formed by rival ſtems, where no actual ground has ever been made; but, which often happens, if the tree be in a youthful vigorous ſtate, a cup or hollow is formed, reſembling that between the thumb and finger half opened. Here the water lodging, in time penetrates the bark, and forms the firſt receptacle of corruption, which being once begun advances apace to the great injury of the trees. In this caſe the firſt thing neceſſary towards a cure, or prevention of further injury, is to clean out the water, (for which a ſyringe may be uſeful,) duſt, &c. and dry the whole well by aid of a mop or woollen cloth; then to fill it up, until it run over, with tar; after which to fix on an apron of thin lead, in ſuch a manner as that its edges may reach about a foot upwards on each limb of the tree, being joined cloſe, and faſtened with ſaddle tacks, &c.

The compoſition adviſed by Mr. Forſyth is probably much better for the purpoſe, as being leſs liable to decompoſition; and at the ſame time capable of being applied with greater exactneſs. It is remarked by the firſt writer that knots or excreſcences are frequently found on the boles and branches of trees, particularly of elms. What may have occaſioned them, in many caſes, is not eaſily accounted for; but it is ſometimes obvious that they proceed from bruiſes, or the mal-treatment of trees in youth. In this caſe we frequently find them hollow within, and full of water, which, if not removed, will of a certainty induce the rot. And he adviſes that when the knot is quite entire on all ſides, and perfectly ſound, which may be known by ſtriking it with a mallet, it ſhould be ſuffered to remain. But that when it is found hollow, as above, it ſhould be ſawn clean off, the wound ſhould be ſmoothed, as already directed, cleaned, dried, and laid over with tar, &c. The compoſition before-mentioned is, however, here probably preferable for the ſame reaſon as in that caſe. See *Compoſition for* Trees, and Timber-*Trees*.

In caſes where the internal parts of trees of the timber kind become rotten, and get hollow, in conſequence of the above, or other cauſes, as not unfrequently happens to the oak and elm, as well as different other kinds, eſpecially when they are of ſome conſiderable length of growth, it has been directed, in order to reſtore them, that the decayed and rotten wood ſhould be cut out at different times, as the new wood comes in contact with it; great care being taken not to cut too much at any one time, but to leave enough to ſupport the trees, and prevent them from being blown down by high winds, until the new wood is ſtrong enough for that purpoſe: the remainder may then be cut out, as there will be no danger. By theſe means, the application of his compoſition, and heading down, it has been aſſerted by the late Mr. Forſyth, that a great number of rotten hollow trees, which had, when taken in hand, little more than the bark remaining ſound, have within a few years been entirely filled up; and others, that were headed down within a few feet of the ground, have had their ſtumps completely covered by the leading ſhoots, forming handſome trees; the places at which they were headed being only diſcerned by faint cicatrices.

It is ſtated that a lime-tree, about 18 inches in diameter, whoſe trunk was decayed, rotten, and hollow, from the top to the bottom, and to which, after cutting out the decayed wood, the compoſition had been applied about 16 years before, was lately cut down for the purpoſe of aſcertaining the progreſs it had made in the interior part, and was found entirely filled up with new ſound wood, which had completely incorporated with what little old wood remained, when it was firſt taken in hand. Its body has been cut into ſhort lengths, in order to be ſhewn, for the ſake of convincing thoſe who may be doubtful on the ſubject.

Alſo an old elm, the inſide of which was totally decayed, and out of which were taken, at different times, two large cart-loads of rotten wood, has made ſhoots more than 20 feet high in the courſe of ſix years. Several others of different ſorts are likewiſe ſtated to have made equally fine ſhoots in this mode of treating them, and are now fine thriving trees; the marks of the places at which they were headed down being ſcarcely perceivable. A lime, the hollow part of which is 11 feet in height, is now, it is ſaid, filling up: the tree is about a foot in diameter. A decayed part, 4 feet long and 28 inches broad, in a large elm, is now, too, ſtated to be rapidly filling up with ſound wood. About two feet and a half in length on one ſide, which was for ſome time left to nature, ſtill continued, it is ſaid, to decay, till the compoſition was applied: new wood and bark are now aſſerted to be forming in the part. Beſides theſe, a great many other trees of the ſame kind, ſome of which had wounds ten feet long and two feet broad, are now alſo ſaid to be entirely filled up, as well as many ſycamores, oaks, and other foreſt-trees, reſtored to a flouriſhing ſtate by having the dead wood cut out, and the compoſition applied.

However, notwithſtanding theſe and many other ſimilar ſtatements, a variety of doubts and objections have been raiſed and entertained againſt this mode of filling up and curing the decayed and rotten parts of foreſt-trees, by perſons of much information and experience on the ſubject of vegetable economy; ſo that additional facts, and more careful and exact concluſions from them, are probably neceſſary before the utility or inutility of the method can be fairly appreciated or fully aſcertained.

Rot *in Hops*, a diſeaſe in this ſort of crops, which is very ſimilar to that of the mould. See Hop and Mould.

Rot, in *Geography*, a river of Wurtemberg, which runs into the Lein.

ROTA,

ROTA, a town of Spain, in the province of Seville, on the coaſt of the Atlantic, celebrated for its wine; 3 miles W. of Puerto de Santa Maria.

Rota. See Zarpana.

Rota, in *Mechanics*. See Wheel.

Rota *Ariſtotelica*, *Ariſtotle's Wheel*, is the name of a celebrated problem in mechanics, founded on the motion of a wheel about its axis; thus called, becauſe firſt, that we know of, taken notice of by Ariſtotle.

The difficulty is this. While a circle makes a revolution on its centre, advancing at the ſame time in a right line along a plane, it deſcribes, on that plane, a right line, equal to its circumference. Now if this circle, which we may call the *deferent*, carry with it another ſmaller circle, concentric with it, and which has no motion but what it receives from the deferent; which is the caſe of the nave of a coach-wheel carried along by the wheel; this little circle, or nave, will deſcribe a line in the time of the revolution, equal, not to its own circumference, but to that of the wheel: becauſe its centre advances in a right line as faſt as that of the wheel does; as being in reality the ſame with it.

The matter of fact is certain; but how it ſhould be, ſeems a myſtery. It is obvious that the wheel, advancing during the revolution, muſt deſcribe a right line equal to its circumference; but how would the nave, which revolves like the wheel, deſcribe a right line ſo much greater than its circumference?

The ſolution Ariſtotle gives is no more than a good explication of the difficulty. Galileo, who next attempted it, has recourſe to an infinity of infinitely little vacuities in the right line deſcribed by the two circles; and imagines that the little circle never applies its circumference to thoſe vacuities; but in reality only applies it to a line equal to its own circumference; though it appears to have applied it to a much larger.

But it is evident, that this is all gratis dictum. The vacuities are imaginary; and why does not the great circle apply its circumference to them? Laſtly, the magnitude of theſe vacuities muſt be augmented or diminiſhed, according to the different proportion of the two circles.

F. Tacquet will have it, that the little circle, making its rotation more ſlowly than the great one, does on that account deſcribe a line longer than its circumference; yet without applying any point of its circumference to more than one point of its baſe. But this is no more allowable than the former.

The attempts of ſo many great men proving vain, M. Dortous de Meyran, a French gentleman, had the good fortune to hit on a ſolution, which he ſent to the Royal Academy of Sciences; where being examined by Meſſrs. de Louville and Saulmon, appointed for that purpoſe, they made their report, that it was ſatisfactory. The ſolution is to this effect:

The wheel of a coach is only acted on, or drawn in a right line; its circular motion or rotation ariſes purely from the reſiſtance of the ground on which it is applied.

Now this reſiſtance is equal to the force with which the wheel is drawn in the right line, inaſmuch as it defeats that direction; of conſequence, the cauſes of the two motions, the one right, the other circular, are equal; and, therefore, their effects, *i. e.* the motions, are equal. And hence the wheel deſcribes a right line on the ground equal to its circumference.

As for the nave of the wheel, the caſe is otherwiſe. It is drawn in a right line by the ſame force as the wheel; but it only turns round becauſe the wheel turns; and can only turn with it, and at the ſame time therewith.

Hence it follows, that its circular velocity is leſs than that of the wheel in the ratio of the two circumferences; and, therefore, its circular motion is leſs than its rectilinear one.

Since then it neceſſarily deſcribes a right line equal to that of the wheel, it can only do it by ſliding, or what they call the motion of rotation; that is, a part of the circular nave cannot be applied to a part of a right line greater than itſelf but by ſliding along that part, and that more or leſs, as the part of the nave is leſs than that of the circle. See Rotation.

Rota is alſo uſed for a particular court of juriſdiction in Rome, eſtabliſhed for taking cognizance of beneficiary matters, &c.

The rota conſiſts of twelve doctors choſen out of the four nations of Italy, France, Spain, and Germany; three of them being Romans, one a Florentine, one a Milaneſe, one of Bologna, one of Ferrara, one a Venetian, one a Frenchman, two Spaniards, and one a German; each having four clerks or notaries under him.

Their office is to judge of all beneficiary cauſes, both within Rome, and throughout the ſtate of the church, in caſe of appeal, and of all civil proceſſes which are for above five hundred crowns.

They are alſo called *chaplains* of the pope, as ſucceeding the ancient judges of the ſacred palace, who held their court in his chapel.

The denomination *rota*, *wheel*, ſome will have derived hence, that they officiate by rotation; others, becauſe the moſt important affairs of the Chriſtian world turn upon them. Du-Cange derives it from *rota porphyretica*, becauſe the pavement of the chamber where they formerly ſat was of porphyry, and faſhioned like a wheel.

Rota, La, in *Biography*, an admirable bravura ſinger in the Incurabili Conſervatorio at Venice, in 1770, under the regency of Galuppi.

ROTAB, in *Geography*, a river of Saxony, which runs into the Saale, three miles S. of Lena.

ROTACEÆ, in *Botany*, the 20th natural order among the *Fragmenta* of Linnæus, named from *rota*, a wheel, in alluſion to the form of the *corolla*, which is wheel-ſhaped, *rotata*. No commentary upon this order is found in the lectures of Linnæus, publiſhed by Giſeke. The genera ſtand thus; *Trientalis*, *Centunculus*, *Anagallis*, *Lyſimachia*, *Phlox*, *Exacum*, *Chlora*, *Gentiana*, *Swertia*, *Chironia*, and *Sarothra*. To which are ſubjoined, in a ſeparate ſection, *Aſcyrum*, *Hypericum*, and *Ciſtus*; theſe ſurely have little affinity to the reſt.

ROTACH, in *Geography*, a river of Bavaria, which runs into the Maine, near Lichtenfels, in the biſhopric of Bamberg.

ROTAI, or Rotte, a ſmall iſland in the Eaſt Indian ſea, where a Dutch factor reſides, who trades with the natives in the chief article of their produce, which is ſugar. The north end of this iſland, and the ſouth end of *Timor* (which ſee), lie N. $\frac{1}{2}$ E. and S. $\frac{1}{2}$ W., and are about three or four leagues diſtant from each other. At the weſt end of the paſſage between Rotte and *Semau* (which ſee), are two ſmall iſlands, one of which lies near the Rotte ſhore, and the other off the ſouth-weſt point of Semau, with a good channel between them, about ſix miles broad. The iſle of Rotte has not ſo lofty and mountainous an appearance as Timor, though it is agreeably diverſified by hill and valley. On the north ſide are many ſandy beaches, near which grow ſome trees of the fan palm; but the far greater part was covered

covered with a kind of brushwood without leaves. Cook's Voyage by Hawkesworth, vol. iii. p. 264.

ROTALA, in *Botany*, so named by Linnæus, from *rota*, a wheel; apparently in allusion to the spoke-like appearance of its numerous radiating whorled leaves.—Linn. Mant. 2. 143. Schreb. 33. Willd. Sp. Pl. v. 1. 189. Vahl. Enum. v. 2. 26. Mart. Mill. Dict. v. 4. Juss. 303.—Class and order, *Triandria Monogynia*. Nat. Ord. *Caryophylleï, sect.* 3, Linn. *Caryophylleis affine*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, tubular, membranous, three-toothed, permanent. *Cor.* none. *Stam.* Filaments three, capillary, the length of the calyx; anthers roundish. *Pist.* Germen superior, ovate; style thread-shaped; stigma three-cleft. *Peric.* Capsule ovate, obscurely triangular, inclosed in the calyx, of three cells, and three valves. *Seeds* numerous, roundish.

Ess. Ch. Calyx three-toothed. Corolla none. Capsule of three cells, with many seeds.

1. R. *verticillaris*. Linn. Mant. 2. 175. (Ene pael; Rheede Malab. v. 9. 159. t. 81.)—Native of wet situations in the East Indies, from whence it was sent by Koenig to Linnæus. A small annual *herb*, quite smooth, four inches, or more, in height, erect, branched, having the aspect of an *Ammannia*, as Vahl, from the inspection of the only known specimen, in the Linnæan herbarium, remarked. *Root* with many rows of whorled fibres. *Stem* and *branches* reddish; quadrangular in the upper part. *Leaves* from four, or five, to eight in each whorl, sessile, linear, entire, bluntish, or somewhat emarginate, at the end, about half an inch long; paler, with a prominent rib, beneath. *Flowers* axillary, small, sessile, solitary, pale; their permanent *calyx* membranous and pellucid, globular, investing the *fruit*, about the size of a mustard seed.

ROTAS, in *Geography*, a town of Hindoostan, in Lahore, 81½ miles N.W. by N. from Lahore. N. lat. 32° 58′.

Rotas, a circar of Hindoostan, in the soubah of Bahar, bounded on the N.E. by Boujapour, on the E. by Bahar Proper, on the S. by Palamow, on the W. by the circar of Bidzigur, on the N.W. by Chunar; its form approaching to a square about 58 miles each way. The chief towns are Rotasgur and Saseram.

ROTASGUR, a town of Hindoostan, in the above-mentioned circar, situated on the river Soane; 94 miles S.W. of Patna. N. lat. 24° 38′. E. long. 84° 2′.

ROTATA, Corolla, in *Botany*, a monopetalous corolla, whose tube is as short as possible, and the limb horizontally extended, like the form of a wheel. This differs from a salver-shaped corolla, in the want of an elongated tube. See Corolla.

ROTATION, in *Mechanics*, is a term used to denote the motion of the several parts of a solid body about an axis, called the axis of rotation, and which may be either *fixed* or *spontaneous*, according as the body is constrained to make its revolution about a determinate point or line, or is free to revolve in any direction from a momentum impressed upon it in space.

We have already treated of several cases of rotatory motion, under our articles Center *of Gyration*, Percussion, Oscillation, &c. and it therefore only remains, in this place, to offer some general remarks with regard to such motion, and to enumerate a few of the most important particulars relating to this interesting branch of mechanics.

When a solid body turns round an axis, retaining its shape and dimensions unaltered, every particle is absolutely describing a circle round this axis; which axis passes through the centre of the circle, and is perpendicular to its plane. Moreover, in any instant of its motion, the particle is moving at right angles with the radius vector, or line joining it with the centre of rotation: therefore, in order to ascertain the direction of the particle, we may draw a line from that particle perpendicular to the axis of rotation. This line will be in the plane of the circle of rotation of that particle, and will be its radius vector; and a line drawn from the particle, perpendicular to its radius vector, will be a tangent to the circle of rotation, and will represent the direction of the motion of this particle.

The whole body being supposed to turn together, it is evident, that when it has made one complete rotation, each point has described the circumference of a circle, and the entire paths of the different particles will be in the proportion of these circumferences, and therefore of their radii: and this is also true of any portion of these circumferences; that is, the velocities of the different particles are proportional to their radii vectores, or to their distances from the axis of rotation; and all these motions are in parallel planes, to which the axis of rotation is perpendicular. Hence it follows, that when we compare the motion of different revolving bodies with respect to velocity, it is evident that it cannot be done by directly comparing the velocity of any particle in one of these bodies with that of any particle of the other; for as all the particles of each have different velocities, this comparison can establish no ratio. But we may familiarly compare such motions, by the number of complete turns which they make in any equal portions of time; and, therefore, as the length or number of feet described by any body, in rectilinear motion, is a proper measure of its progressive velocity, so the angle described by any particle of a revolving body is a proper measure of its motion or rotation: and in this manner may the motion of two or more bodies be compared, and this velocity is with propriety called the angular velocity.

Again, with respect to the motion of bodies at liberty to move freely by the action of any force impressed: if any such body receives an impulsion in any direction, which does not pass through the centre of gravity, the motion which ensues is a rotatory one. For if, at the same moment, a body is impelled according to any direction A B, (*Plate* XXXVII. *Mechanics, fig.* 9.) not passing through the centre of gravity, an equal and opposite force is exerted upon the body in a parallel direction, C G passing through the centre of gravity, that centre will manifestly be kept at rest: nevertheless it is clear, that the other parts of the body will not be in a state of quiescence, because the two forces, though equal, are not directly opposite; so that the only motion that the body can have, its centre of gravity being at rest, is evidently a motion of rotation about that centre. Now the fixed axis, about which the body revolves, is pressed by the impelling force, while it generates rotatory motion; but the axis, being by hypothesis immoveable, re-acts equally against that pressure; and, when it passes through the centre of gravity, would, as above stated, cause each particle to move with the same velocity, and in the direction of the force. If, then, the force which presses against a fixed axis, in given circumstances, be ascertained, the motion of the body in free space, when the axis is removed, will be known; for the latter motion will consist of the rotatory motion about the axis passing through the centre of gravity, considered as fixed, compounded with the motion of the centre of gravity caused by the force now at liberty to impel the centre, the fixed axis which passes through it being removed.

When a solid body receives an impulse on any one point, or

or that point is urged in any way by a moving force, it cannot move unless the other points, with which it is connected by the force of cohesion, move also; except the force of impulsion is sufficient to overcome that of cohesion, a case which is not meant to be considered here. And whatever is the motion of any particle, that particle must be conceived as urged by a force precisely competent to the production of that motion, by acting immediately on the particle itself. The particle, immediately impelled by the external force, is either pressed towards its neighbouring particles, or is drawn from them; and by this endeavour to change its place, the connecting forces are exerted, or brought into action. We are but little acquainted with these connecting forces; but this is of little importance in a mechanical point of view; for the fact, that the forces by which the moleculæ of bodies act on each other are equal, is quite sufficient for our present purpose.

After these general remarks, let us endeavour to illustrate the principles above laid down in the solution of a few of the most obvious and most practical cases relating to this important branch of dynamics.

Let A F G H (*Plate* XXXVII. *Mechanics, fig.* 1.) represent the circumference of a wheel, which turns in its own plane round a horizontal axis, passing through S, its centre; and let a weight P, fixed at the extremity of a line A P, communicate motion to the wheel. Let also the whole weight of the wheel be Q, and suppose this weight to be collected uniformly into the circumference A F G H: then during the descent of the weight P, each point of the circumference must move with a velocity equal to that with which P descends; and consequently since the moving force is the weight P, and the mass moved P + Q, the force which accelerates P in its descent will be that part of the accelerating force of gravity which is expressed by the fraction $\frac{P}{P+Q}$. The velocity, therefore, that is generated in P, in any given time, is found by means of the general formula, given under the article Accelerated *Motion*; that is, $v = 2ft$, $v = \frac{2Pgt}{P+Q}$; and the space through which it has passed in the same time is $s = \frac{Pgt^2}{P+Q}$. Thus, for example, if P and Q were equal to each other, then $\frac{P}{P+Q} = \frac{1}{2}$, $v = gt$, and $s = \frac{1}{2}gt^2$.

The parts of the weight Q, which are uniformly disposed over the circumference A F G H, balance each other round the common centre of gravity S; their weight, therefore, has no effect in accelerating or retarding the descent of P; and this will be the case, whenever the axis of motion passes through the common centre of gravity. But in order to render the properties of rotatory motion more obvious, it will be convenient to dispose the parts of the revolving system, so that the axis of motion shall not necessarily pass through the common centre of gravity. Thus, referring to the preceding figure, instead of supposing the weight Q to be uniformly collected over the circular rim A F G H, let it be collected into any point Q. Here it is evident, that if the mass Q be acted upon by gravity, the force which communicates motion to the system round S will be variable; it being the greatest, when S Q is horizontal; and gradually diminishing, till Q has descended to its lowest point.

But in order to begin first with the simplest case, the moving force should be constant, as it will be, if we suppose the mass that is collected in Q to be destitute of weight, and to possess inertia only: it follows, therefore, that during the revolution of Q round S as an axis, the moving force will be constantly equal to P, and the mass moved = P + Q, and consequently the force which accelerates the descending weight, or any point in the circumference, will be that part of gravity which is expressed by $\frac{P}{P+Q}$, the same as before.

In these cases, the force which communicates motion to the system has been supposed a weight, or body, acted on by the earth's gravity, and consequently constitutes a part of the mass moved, at the same time that it acts as a moving force. But motion may be communicated by a force, which shall add nothing to the inertia of the matter moved; as, for instance, steam, muscular power, &c.: and it will, therefore, be convenient, in many investigations, to assume the moving force of this kind. The inertia of the moving force P, therefore, in the subsequent propositions, will not be taken into the account, unless expressly mentioned. Thus, if any number of bodies without gravity, being collected into the points F, H, Q, are caused to revolve round the axis S, by a moving force P, the force which accelerates these bodies in their revolution will be $\frac{P}{F+H+Q}$, when P is without inertia; or it will be $\frac{P}{F+H+Q+P}$, when P is possessed of inertia; the bodies F, H, and Q, as also the power P, being supposed to act at equal distances from the axis of motion.

But when bodies revolve at unequal distances from the axis, their velocities being different, other formulæ will be necessary for determining the force whereby any given point of the system is accelerated.

Let B (*fig.* 2.) represent a material point, moveable about an axis of motion passing through S: with the centre S, and distance S D, describe a circle D G H. Now if B be connected with every point in the area of the circle, which is an inflexible substance, no force can be applied to move the circle, but what must communicate the same angular motion to B. Let us suppose this force to be P, acting on the circumference of the inflexible circle D G H, by means of a line passing over the same, to which P is connected. Now the absolute force of P to move D, or any point in the circumference, will be P; but the communication of motion to this point D is resisted by the inertia of the body B, which being moved with a different velocity, and acted on by a different moving force, its inertia is not to be estimated by its quantity of matter only, but by considering what mass or quantity of matter which, when disposed at the distance S D, will oppose the same resistance to the descent of the weight P, as the body B itself does, when acting at the distance S B.

In order to estimate this, we must consider that when any two bodies are put in motion by two constant forces acting for the same time, the quantities of matter moved are in a direct ratio of the moving forces, and in the inverse ratio of the velocities generated; that is, if $\frac{M}{m}$ expresses the ratio of the moving forces, $\frac{Q}{q}$ that of the quantities of matter, and $\frac{V}{v}$ that of the velocities generated; the relation

tion of these quantities is defined by the equation $\frac{Q}{q} = \frac{M}{m} \times \frac{V}{v}$, by the laws of rectilinear motion. To apply this, it must be observed, that although the absolute force of the weight P, acting upon the point D, remains constantly the same, yet its effect upon bodies placed at different distances from the axis of motion are in the inverse proportion of those distances; therefore, the moving forces exerted by P, on the points B and D, will be in the proportion of S D to S B. Also, by the problem, the angular motion of D and B are equal; and, consequently, the velocity of B is to the velocity of D, as S B to S D. And since the quantities of matter in B, D, are in the direct proportion of the moving forces, or of S D to S B, and in the inverse proportion of the velocities generated, or of S B to S D, we shall have the quantity of matter in B to that contained in D, as $SD^2 : SB^2$; and consequently the weight sought $= B \times \frac{SB^2}{SD^2}$.

The same may be otherwise found thus: let x = the quantity of matter required to be collected in D, M the moving force which acts on B, m that which acts on D, V the velocity of B, and v the velocity of D; then $\frac{B}{x} = \frac{M}{m} \times \frac{v}{V}$, but $\frac{M}{m} = \frac{SD}{SB}$, by the property of the lever; and $\frac{v}{V} = \frac{SD}{SB}$, by the nature of angular motion; therefore, $\frac{B}{x} = \frac{SD^2}{SB^2}$, and $x = B \times \frac{SB^2}{SD^2}$, as above.

Whenever, therefore, a body B revolves round an axis, by the action of a constant force P, applied at a given distance, S D, from the axis, in order to find the force which accelerates D, the mass B may be supposed to be removed, and instead of it an equivalent mass $B \times \frac{SB^2}{SD^2}$ collected in the point D, to which the force is applied. After which, the acceleration of the point D, or any other point of the circumference, will be determined from the principles already explained; for the moving force being P, and the mass moved $B \times \frac{SB^2}{SD^2}$, the acceleration of P, or D, will be that part of gravity expressed by the fraction $\frac{P}{B \times \frac{SB^2}{SD^2}} = \frac{P \times SD^2}{B \times SB^2}$, while we suppose the power P void of inertia; or by $\frac{P}{B \times \frac{SB^2}{SD^2} + P} = \frac{P \times SD^2}{B \times SB^2 + P \times SD^2}$, when the inertia of P is considered.

On the same principle, if any number of bodies, A, B, C, &c. (*fig.* 3.) be put in motion round a fixed axis, passing through S, by a constant force P, applied at D, the point D will be accelerated in the same manner, and consequently the whole system will have the same angular velocity. If, instead of A, B, C, &c. placed at the distances S A, S B, S C, &c. we substitute the bodies $\frac{A \times SA^2}{SD^2}$, $\frac{B \times SB^2}{SD^2}$, and $\frac{C \times SC^2}{SD^2}$; these being collected into the points a, b, and c, respectively; and the moving force in this case being P, and the mass moved $\frac{A \times SA^2}{SD^2} + \frac{B \times SB^2}{SD^2} + \frac{C \times SC^2}{SD^2}$; the force which accelerates D will be that part of the force of gravity that is expressed by the fraction,

$$\frac{P \times SD^2}{A \times SA^2 + B \times SB^2 + C \times SC^2};$$

or, if the inertia of P be considered, by

$$\frac{P \times SD^2}{A \times SA^2 + B \times SB^2 + C \times SC^2 + P \times SD^2}.$$

The velocity of the point D is uniformly accelerated, because the force above determined is invariable: it follows also, that the angular velocity of the system is uniformly accelerated, because the absolute velocity of any point at a given distance from the axis of motion, is as the angular velocity of that point, and consequently of the whole system. It is also manifest, that it is of no consequence whether the bodies A, B, C, &c. revolve in the same or different planes, if their distances from the axes S A, S B, S C, &c. are the same, these distances being estimated by lines drawn from A, B, and C, perpendicular to the common axis of motion; if, therefore, they should be situated in various planes, they may be referred to any one given plane perpendicular to the axis.

It is obvious likewise, that changing the position of the bodies A, B, C, in the same plane will not affect the force which accelerates the system, provided their respective distances from the axis of motion be not altered; thus, with the centre S, and distances S B, S C, let the arcs of circles be described; if B is transfered to b', or C to c', the moving force which acts on these bodies respectively will not be altered, and consequently the masses moved being likewise constant, the accelerating force will be the same.

All these propositions are equally true, whatever may be the force by which the angular motion is generated, provided it be constant; or, if variable, should its action be considered for an evanescent particle of time only.

We have here followed the method employed by Mr. Atwood in his treatise on "Rectilinear and Rotatory Motion;" being, as we conceive, the best calculated to convey a correct and elementary idea of the laws of rotatory motion. But it is obvious, that, instead of considering the given bodies A, B, C, (*fig.* 3.) to be equivalent to other bodies placed at the distance S D, we might enquire, at what distance from the centre of motion S all these bodies must be collected, without changing their masses, so that the same angular motion may be generated in the system? This point is called the *centre of gyration;* and as the method of finding this point has been already treated of under the article Center, we shall, in the subsequent part of this article, consider it as known, and shall proceed to the solution of a few such problems as appear best calculated for illustrating the subject under consideration.

Prop. I.

Let D, E, F, (*fig.* 4.) represent a wheel, or cylinder, turning about an axis passing through its centre of gravity S; round the circumference of which a perfectly flexible line is made to pass, and to the end of which a body, P, is suspended;

pended; then, having given the radius S D, the power P, and the weight of the wheel, or cylinder, D E F, it is required to determine the angular velocity generated in the ſyſtem in a given time.

Let R repreſent the centre of gyration, and make $SR = r$, $SD = d$, the weight of the cylinder $EDF = w$, and the given power $= p$; then the force which accelerates the point D is $\frac{pd^2}{wr^2}$, if we ſuppoſe p void of inertia; but if the inertia of p be conſidered, the force of acceleration is $\frac{pd^2}{wr^2 + pd^2}$, the force of gravity being aſſumed unity; but if the force of gravity be taken $16\frac{1}{12} = 193$ inches $= l$; and $3.14159 = c$, then, in the time t, the velocity generated in the point D, or deſcending weight P, will be repreſented by

$$v = \frac{2ltpd^2}{pd^2 + wr^2} \text{ inches in a ſecond.}$$

And ſince the circumference of the circle $EFD = 2cd$, the angular velocity generated in the time t, will be

$$\frac{360^\circ \times 2ltpd^2}{2cd(pd^2 + wr^2)} = \frac{360^\circ ltpd}{c(pd^2 + wr^2)} \text{ degrees, or}$$

$$\frac{ltpd}{cpd^2 + cwr^2} \text{ revolutions in a ſecond.}$$

1. On the ſame principles it will be found, that the angular velocity generated in the ſyſtem during the deſcent of the weight p, through any ſpace S, is

$$\text{ang. vel.} = \sqrt{\left(\frac{lsp}{c^2d^2p + c^2r^2w}\right)} \times 360^\circ \text{ degrees, or}$$

$$\text{ang. vel.} = \sqrt{\left(\frac{lsp}{c^2d^2p + c^2r^2w}\right)} \text{ revol. in a ſecond.}$$

2. The ſpace deſcribed by the weight p in its deſcent from reſt during t ſeconds, is $s = \frac{lt^2d^2p}{d^2p + r^2w}$, and conſequently, the time of deſcribing s is,

$$t = \sqrt{\frac{sd^2p + sr^2w}{lpd^2}} \text{ ſeconds.}$$

3. The ſpace deſcribed by p from reſt, while an angular velocity of n revolutions in a ſecond is generated, is

$$s = \frac{n^2c^2d^2p + n^2c^2r^2w}{lp}.$$

4. The force which accelerates the centre of gyration R, is $f = \frac{pdr}{d^2p + r^2w}$.

5. The abſolute velocity generated in the weight p, while it deſcends from reſt through the ſpace S, is

$$v = \sqrt{\frac{4lspd^2}{d^2p + r^2w}}, \text{ and the velocity of the point R, is}$$

$$v = \sqrt{\frac{4lspr^2}{d^2p + r^2w}}, \text{ and the velocity generated in the}$$

point R, in the time t, is

$$v = \frac{2ltdpr}{{}^2p + r^2w}.$$

All theſe reſults are drawn immediately from the known formulæ for accelerated motion, by making $f = \frac{pd^2}{wr^2 + pd^2}$ the accelerating force, as determined in the preceding part of this propoſition.

In the above inveſtigation we have conſidered the revolving ſyſtem to be a uniform wheel, or cylinder; but, it is obvious, the ſame will have place for any ſyſtem of bodies, provided only that the axis of motion paſſes through its centre of gravity, and that R be the centre of gyration of the ſyſtem.

Prop. II.

Let A B C (*fig.* 5.) repreſent a wheel and axle, and let the axis be horizontal, having given its weight w, and the weight q applied to the circumference of the axle, and p applied to the circumference of the wheel, in order to raiſe q; it is required to aſſign the ſpace deſcribed by the elevated weight q from reſt in any given time; the proportion of the radii of the wheel and axle being alſo known.

Here the abſolute force which impels D is p, and ſince q acts in a direction contrary to p, with a force $= \frac{q.SA}{SD}$, this muſt be ſubucted from p, which gives $p - \frac{q.SA}{SD} = \frac{p.SD - qSA}{SD}$ for the motive force which impels D. Let the centre of gyration of the wheel and axle be R; then ſuppoſe the maſs of matter in the whole ſyſtem removed, if the maſs $\frac{w.SR^2 + q.SA^2 + p.SD^2}{SD^2}$ be concentrated in D, the point D will be accelerated in the ſame manner, as when the parts of the ſyſtem are diſpoſed as deſcribed in the problem. Since, then, the force which impels $D = \frac{p.SD - q.SA}{SD}$, it follows that this force, divided by the whole inertia, or the maſs ſuppoſed to be concentrated in D, will give for the accelerative force on $D = \frac{p.SD^2 - q.SA.SD}{w.SR^2 + p.SD^2 + q.SA^2}$, and the accelerative force on $q = \frac{p.SD.SA - qSA^2}{w.SR^2 + p.SD^2 + q.SA^2}$.

Or, if we make $SD = n$, $SA = m$, $SR = r$, then the accelerating force on D is $\frac{pn^2 - qmn}{wr^2 + pn^2 + qm^2}$.

If the inertia of the wheel and axle is not conſidered, the above becomes $= \frac{pn^2 - qmn}{pn^2 + qm^2}$. And if the inertia of p alſo $= 0$, then we have $\frac{pn^2 - qmn}{qm^2}$; or, if the maſs moved have no weight, but poſſeſſes inertia only, as when it is drawn along a perfectly poliſhed plane, as repreſented alſo in *fig.* 5, then the accelerative force is ſimply $\frac{pn^2}{pn^2 + qm^2}$.

Let this accelerative force in any of the caſes we have ſuppoſed

ſuppoſed be put $= f$; then the ſpace, velocity, time, &c. will be found immediately from the general formula

$$s = \tfrac{1}{2} t v = g f t^2 = \frac{v^2}{4gf}.$$

Suppoſe, for example, $SD = n = 6$, $SA = m = 2$, then $SR = r = 6\sqrt{\tfrac{1}{2}}$. (See CENTER *of Gyration.*) Let alſo $w = 10$, $p = 100$, $q = 40$. Then, by our firſt formula,

$$\frac{n^2 p - n m q}{w r^2 + p n^2 + q m^2} = \frac{36 \cdot 100 - 6 \cdot 2 \cdot 40}{10 \cdot 18 + 100 \cdot 36 + 40 \cdot 4} = \frac{3600 - 480}{180 + 3600 + 160} = \frac{3120}{3940} = \frac{156}{197},$$ the accelerative force on D, that of gravity being 1. Whence the ſpace paſſed through by the deſcending weight p in 1″, is $s = g f t^2 = \frac{156 \cdot 16\frac{1}{12}}{197}$ feet, or $\frac{193 \cdot 156}{197}$ inches.

Whenever motion is communicated to any body, a certain reſiſtance muſt have been overcome by the moving force: this reſiſtance is of various kinds. 1. The inertia of the maſs moved, whereby it endeavours to perſevere in its ſtate of quieſcence, or of uniform motion in a right line. 2. That of a weight, or other abſolute force, oppoſed to the action of the moving power. 3. Obſtacles upon which the moving body impinging is retarded in its progreſs; ſuch, for example, is the reſiſtance which ariſes from the particles of a fluid through which a body moves. The eſtimation of theſe reſiſtances, and their effects in retarding the motion of bodies acted on by a given force, are deducible from the laws of motion, and conſtitute a part of the ſolution of almoſt every problem relating to the motion of bodies.

The moving forces alſo are of various kinds; *viz.* gravity, muſcular power, the impact of bodies ſolid or fluid, &c.; and the effect of theſe moving forces, which are exerted on bodies in order to create motion, excluſive of the reſiſtance oppoſed to them, depend on the various circumſtances of the time in which they act, and on the ſpaces through which the bodies moved are impelled, &c. Whence it follows, that, from the great variety of undetermined conditions which may enter into mechanical problems, there muſt be of courſe various ways of producing the ſame mechanical effect; and it is a very material part of the art, conſidered either in a theoretical or practical point of view, to proportion the means to the end, and to effect this with all the advantages that the nature of the caſe is capable of. It is the due obſervation of theſe particulars, which contribute to render the mechanic inſtruments complete, and the neglect of them defective, in their conſtruction. This proper choice of means to produce mechanical effect, is frequently the reſult of long and continued experience, independent of theory; the knowledge of which, however, when immediately applied to practice, would ſave the artiſt much time and trouble; and, at the ſame time, be productive of other advantages which experience alone muſt be deſtitute of.

PROP. III.

In order to illuſtrate this application of theory to practice, let A B C (*fig.* 5.) be a wheel and axle moveable round an horizonal axis, paſſing through S, and a given weight q, which applied to the circumference of the axle, to be raiſed by the application of a given moving force, p, which is applied to the circumference of the wheel; let it be required to aſſign the proportion of the radii of the wheel and axle, ſo that the time in which the weight w aſcends through any given ſpace ſhall be the leaſt poſſible.

Let the given radius of the axle $SA = m$, $SR = r$, $SD = x$; then, by the laſt propoſition, the accelerative force on p is $\frac{x^2 p - q m x}{w r^2 + p x^2 + q m^2}$, and that which accelerates q is $\frac{m x p - m^2 q}{w r^2 + p x^2 + q m^2}$; the ſquare of the time, therefore, in which any ſpace S is deſcribed by the aſcending weight q, is

$$t^2 = \frac{s}{l} \times \frac{w r^2 + p x^2 + q m^2}{m p x - m^2 q}, \quad (l \text{ being} = 193 \text{ in.})$$

and which, by the queſtion, is to be a minimum. And which, therefore, put into fluxions, and reduced, gives

$$x = \frac{m q + \sqrt{(m^2 q^2 + p w r^2 + q p m^2)}}{p},$$

the radius required.

Or, if we do not conſider the inertia of the wheel, then $x = \frac{m q + \sqrt{(m^2 q^2 + q p m^2)}}{p}$; if $p = q$, then $x = m + m\sqrt{2} = m(1 + \sqrt{2})$, the radius of the wheel in this particular caſe.

To give an example in numbers, let $q = 100$, $p = 33$, $w = 20$, $r = \sqrt{50}$, or $r^2 = 50$, $m = 1$, then the diſtance ſought is $\frac{100 + \sqrt{(10000 + 33000 + 3300)}}{33} = \frac{315.17}{33} = 9.55$ inches.

This, therefore, will be the moſt convenient diſtance to apply the given moving force, when the chief object is to leſſen the time of aſcent. If it be required to aſſign the diſtance S D, when the momentum communicated to w, while it aſcends through a given ſpace, is the greateſt poſſible, the ſolution will be the ſame as before, which, therefore, anſwers to two conditions; that is, it will render the time in which q aſcends through a given ſpace the leaſt, and the momentum generated during the ſame aſcent the greateſt poſſible.

If the weight q, inſtead of aſcending in a vertical direction, is drawn along an horizontal plane, as in *fig.* 5, the ſurface of which is ſuppoſed perfectly poliſhed; then the weight q, as oppoſed to the moving force $= 0$, poſſeſſing in this caſe only inertia, we ſhall have for the radius of the wheel

$$x = \frac{\sqrt{(p w r^2 + p q m^2)}}{p} = \sqrt{\frac{w r^2 + q m^2}{p}}$$

which, if the inertia of w be rejected, becomes ſimply $x = \sqrt{\frac{q}{p}}$.

Hence, if the quantity of matter to be drawn along the plane is four times greater than that which is contained in the moving force, the radius of the axle S A being given, in order that it may be impelled with the greateſt velocity poſſible, and with the greateſt momentum, the radius of the wheel ſhould be double that of the axle, when the inertia of the wheel is not conſidered.

PROP. IV.

As a further application of our theory, let A B C, (*fig.* 5.) be a wheel and axle; when, having given a moving force or weight p, acting on the circumference of the

the wheel in order to raiſe a weight q, which is applied to the circumference of the axle, it is required to aſſign the quantity q, when the momentum generated in it in any given time ſhall be the greateſt poſſible; the inertia of the wheel and axle not being conſidered.

Making, as before, S D $= n$, S A $= m$, the force which accelerates q is $f = \frac{n m p - m^2 q}{n^2 p + m^2 q}$; therefore, if $l = 193$ inches, the velocity generated in q in the time t will be $2 t l \times \frac{n m p - m^2 q}{n^2 p + m^2 q}$, and the momentum generated in q will be $2 t l \times \frac{n m p q - m^2 q^2}{n^2 p + m^2 q}$; and as this is to be a maximum by the problem, its fluxion $= 0$, which being taken and reduced gives $q = \frac{\sqrt{(n^4 p^2 + n^3 m p^2)} - n^2 p}{m^2}$.

Therefore, if S D : S A :: $n : 1$, then $q = p \sqrt{(n^4 + n^3)} - n^2 p$; if the radius of the axle equal the radius of the wheel, that is, $n = 1$; then the weight $q = p (\sqrt{2} - 1)$, and conſequently the weight moved muſt be about $\frac{5}{12}$ths of the moving force.

But if we introduce the weight of the wheel, and call it w, r being the diſtance of the centre of gyration from the axis, then the momentum generated in the time t will be expreſſed by $2 l t \times \frac{n m p q - m^2 q^2}{w r^2 + n^2 p + m^2 q}$, which is the greateſt poſſible when $q = \frac{\sqrt{(n^4 p^2 + 2 n^2 r^2 p w + r^4 w^2 + r^2 n m p w + n^2 m p^2)} - (n^2 p + r^2 w)}{m^2}$.

Prop. V.

Again, let A B C H (*fig.* 7.) be a ſyſtem of bodies moveable round a vertical axis, which paſſes through the common centre of gravity of the ſyſtem. And ſuppoſe D E G to be a wheel, the axis of which is vertical, and coinciding with that of the ſyſtem; let motion be communicated by means of a line going round this wheel, the ſtring D P being ſtretched by a given weight p; let it be required to aſſign the radius of the wheel E G D, ſo that the angular velocity communicated to the ſyſtem in a given time may be the greateſt poſſible. Let the weight of the ſyſtem $= w$, and the diſtance of the centre of gyration from the axis of motion $= r$, the radius ſought S D $= x$; then the motive force being p, the velocity generated in a given time in that deſcending weight will be proportional to $\frac{p x^2}{w r^2 + p x^2}$, and the angular velocity generated in the ſame time as $\frac{p x}{w r^2 + p x^2}$, which is to be a maximum by the conditions of the problem, we have, therefore, $\frac{p w r^2 \dot{x} + p^2 x^2 \dot{x} - 2 p^2 x^2 \dot{x}}{(w r^2 + p x^2)^2} = 0$, whence $p w r^2 = p^2 x^2$, or $x = r \sqrt{\frac{w}{p}}$, the diſtance ſought.

Suppoſing, therefore, the moving force $= \frac{1}{4}$ of the weight of the ſyſtem w, we ſhall have $x = r \sqrt{\frac{w}{\frac{1}{4} w}} = 2 r$; that is, the weight ſhould be applied at a diſtance from the axis, equal to twice the diſtance of the centre of gyration, in order to produce the greateſt angular velocity in a given time.

Prop. VI.

In order to increaſe the action of a given moving force againſt a weight to be raiſed, or reſiſtance to be overcome, a combination of two or more mechanic powers is frequently made uſe of. Thus, let p be a power applied by means of a line to the vertical wheel C, (*fig.* 6.), and ſuppoſe the circumference of the axle K to be in contact with the circumference of the wheel B, ſo that the circumference of the wheel B may always move equally faſt with that of the axis which belongs to C; let alſo the axle of B communicate motion to the vertical wheel A, to the axle of which a weight, q, is ſuſpended, ſo as to act in oppoſition to p; moreover, let $l m n$ to 1, be the ſum of the ratios of the radius of each wheel to that of its axle; then if $p l m n = q$, the two weights, p and q, will ſuſtain each other in equilibrio; but if $p l m n$ be greater than q, the equilibrium will be deſtroyed, and the weight q will aſcend; and it is required to aſſign the ſpace which, under thoſe circumſtances, will be deſcribed by q in a given time.

Let the radii of the wheel and axle A be in the ratio of l to 1; thoſe of B as m to 1; and thoſe of C as n to 1; the diſtance of the centre of gyration in A from the axis $= r$, the ſame of B $= r'$, and of C $= r''$; the weight of the wheel and axle A $= w$; that of B $= w'$; and that of C $= w''$.

Now the abſolute moving force is p, but ſince q acts in oppoſition to it, it muſt be ſubducted from p, in order to obtain the real motive force of the ſyſtem. And ſince q would balance a weight $= \frac{q}{l m n}$, if applied at p, the force which impels p on the whole will be $\frac{p l m n - q}{l m n}$. In the next place, the inertia which reſiſts the communication of motion to p muſt be aſcertained. Now motion is communicated to the wheel A, from the circumference of the axle B, and the inertia of A, and of the weight q, which reſiſts the communication of a force applied at S $= \frac{w r^2 + q}{l^2}$; in regard, therefore, to the inertia of A and q, theſe may be ſuppoſed to be removed, and the equivalent maſs $\frac{w r^2 + q}{l^2}$ collected into the circumference of the wheel A, or of the axle B. And ſince motion is communicated to B, by the circumference of the axle C, the inertia of B, together with the equivalent maſs $\frac{w r^2 + q}{l^2}$ will be $\frac{r'^2 l^2 w' + w r^2 + q}{l^2 m^2}$.

In like manner, ſince motion is communicated to C by the weight p acting at D, the inertia which reſiſts the communication of motion to D or p, will be

$$\frac{p n^2 + w'' r''^2}{n^2} + \frac{r'^2 l^2 w' + w r^2 + q}{l^2 m^2 n^2} = \frac{l^2 m^2 n^2 p + l^2 m^2 w'' r''^2 + r'^2 l^2 w' + w r^2 + q}{l^2 m^2 n^2},$$

and the force which accelerates p in its deſcent from reſt

$$= \frac{l m n (p l m n - q)}{l^2 m^2 n^2 p + l^2 m^2 w'' r''^2 + r'^2 l^2 w'^2 + w r^2 + q},$$

and

and that which accelerates q

$$= \frac{p\,l\,m\,n - q}{l^2\,m^2\,n^2\,p + l^2\,m^2\,w''^2\,r''^2 + r'^2\,l^2\,w' + w\,r^2 + q};$$

if, therefore, we make this force $= f$, all the circumſtances of the motion may be determined by the general formula $s = \frac{1}{2}\,t\,v = g\,f\,t^2 = \frac{v^2}{4\,g\,f}$; as before ſhewn. See a variety of other propoſitions in Atwood's treatiſe on "Rotatory Motion."

In all the preceding propoſitions, the axis of the revolving ſyſtem has been ſuppoſed fixed; but there are other caſes by which rotatory motion may be produced, which ought to be attended to in this article; ſuch as that which enſue from a body deſcending down an inclined plane, having a ribbon or cord wound about it, one end of which is fixed at the upper part of the plane, which, by preventing the body ſliding freely, cauſes a rotatory motion. The ſame effect alſo follows from the friction of the body againſt the plane; and the ſame may be imagined when there is no plane, but the body is left to fall freely, except ſo far as the cord wound about it ſhall produce a rotatory motion in its deſcent. We ſhall not attempt the inveſtigation of theſe caſes, but merely ſtate the reſults that have been obtained; and muſt refer the reader for the former to the ſeveral treatiſes on dynamics, enumerated under the articles DYNAMICS and MECHANICS.

Let a body (*fig.* 8.) have a cord wound about it, either at its circumference, or any other part, as C, having one end fixed at a point above, as at D; then if the body be left to deſcend by the action of gravity, it will acquire a motion of rotation by the unwinding of the cord, and the ſpace actually deſcended by the body in this caſe, will be to the ſpace deſcended in the ſame time, when falling freely, as C G to C O; O and G repreſenting the centres of oſcillation and gyration when the point of ſuſpenſion is at C. And the weight of the body will be to the tenſion of the cord, as C O to C G. The ſame ratios have place when the body deſcends down an inclined plane; the forces which generate the motion being both decreaſed in the ſame ratio.

The force by which ſpheres, cylinders, &c. are cauſed to revolve as they move down an inclined plane (inſtead of ſliding), is the adheſion of their ſurfaces, occaſioned by their preſſure againſt the plane. This preſſure is part of the weight of the body; for this weight being reſolved into its component parts, one in the direction of the plane, the other perpendicular to it, the latter is the force of the preſſure; and which, while the ſame body rolls down, the plane will be expreſſed by the coſine of the plane's elevation. Hence, ſince the coſine decreaſes, will the arc or angle increaſe. After the angle of elevation arrives at a certain magnitude, the adheſion may become leſs than what is neceſſary to make the circumference of the body revolve faſt enough; and in this caſe, it will proceed partly by ſliding, and partly by rolling; but the angle at which this circumſtance takes place, will evidently depend upon the degree of adheſion between the ſurfaces of the body and plane. This, however, will never happen, if the rotation is produced by the unwinding of a ribbon, and it is on this latter ſuppoſition that the following particular caſes are deduced.

Let W be the weight of the body, s the ſpace deſcended by a heavy body falling freely, or ſliding freely down a plane; then the ſpace S, deſcribed by rotation in the ſame time, by the following bodies, will be in theſe proportions.

1. A hollow cylinder or cylindrical ſurface $S = \frac{1}{4}\,s$; tenſion $= \frac{1}{2}$ W.
2. A ſolid cylinder $S = \frac{2}{3}\,s$; tenſion $= \frac{1}{3}$ W.
3. A ſpheric ſurface $S = \frac{2}{3}\,s$; tenſion $= \frac{2}{3}$ W.
4. A ſolid ſphere $S = \frac{5}{7}\,s$; tenſion $= \frac{2}{7}$ W. See Gregory's Mechanics, vol. i.

ROTATION, *Spontaneous*, is that rotatory motion which a body acquires when acted upon by any external force in free ſpace. And the *centre of ſpontaneous rotation* is that point which remains at reſt the inſtant the body receives its impulſion, or it is that point about which the body begins to revolve.

The moſt general method of treating this ſubject is with reference to three rectangular co-ordinates, after the method of Lagrange and other modern French writers; but as that method is not commonly adopted by Engliſh mathematicians, we muſt neceſſarily either enter at great length into explanation, or run the riſk of not being underſtood by many of our readers, on which account we ſhall here adopt a ſimilar mode of inveſtigation to that which we have followed in the preceding part of this article.

Firſt, then, we may obſerve, that when a body, B, (*fig.* 9.) of any ſhape whatever, receives an impulſe, the direction of which does not paſs through the centre of gravity, and takes in conſequence two motions, as we have ſtated in the early part of this article, it is evident, that for an inſtant of time we may conſider it as having only one motion, namely, a motion of rotation about a point or fixed axis, C, which may be either within the body, or out of it, according to its ſhape, and the diſtance, G S, between the centre of gravity and the direction of impact. If, while the line G S is carried parallel to itſelf from G S to G′ S′, we imagine that it revolves about the moveable point G, as the particles of the body have greater or leſs velocities, as they are more or leſs diſtant from G, it is manifeſt that there is upon S G a certain point, C, which will be found to deſcribe from C′ towards C an arc equal to G G′, which, during an evaneſcent inſtant, may be regarded as a right line; in that caſe the point C will have been carried as far backward by its motion of rotation, as it will have been advanced parallel to G G′ by the velocity common to all the parts of the body; the point C has, therefore, during this inſtant, been actually at reſt in C; and may conſequently be conſidered as a fixed point about which the body during ſuch inſtant has a rotatory motion. This point is the centre of ſpontaneous rotation, and is the ſame as the centre of ſuſpenſion, correſponding to the centre of percuſſion, the centre of percuſſion being the point where the body is ſtruck.

Without entering into a minute demonſtration of this property, we may convince ourſelves of its truth, by conſidering that the action of a body againſt an immoveable obſtacle, in the centre of percuſſion, muſt have the ſame effect upon the body, as if that body had been at reſt, and it had been ſtruck by the obſtacle; in which latter caſe, the centre of ſuſpenſion would not be affected, and therefore it becomes the centre of ſpontaneous rotation. On which account it alſo follows, that the centre of ſpontaneous rotation is wholly independent of the magnitude of impact; but depends entirely on the diſtance that the force ϕ S, or the reſult of all the forces, acts from the centre of gravity, G; and conſequently, when that force acts in the direction, or coincides with G G′, there will be no motion of rotation, as is obvious.

We may alſo farther obſerve, that if an impact be made on any point of the axis of a ſymmetrical body, or a ſolid of revolution, and that point be conſidered as the point of

the wheel in order to raiſe a weight q, which is applied to the circumference of the axle, it is required to aſſign the quantity q, when the momentum generated in it in any given time ſhall be the greateſt poſſible; the inertia of the wheel and axle not being conſidered.

Making, as before, S D $= n$, S A $= m$, the force which accelerates q is $f = \frac{n m p - m^2 q}{n^2 p + m^2 q}$; therefore, if $l = 193$ inches, the velocity generated in q in the time t will be $2 t l \times \frac{n m p - m^2 q}{n^2 p + m^2 q}$, and the momentum generated in q will be $2 t l \times \frac{n m p q - m^2 q^2}{n^2 p + m^2 q}$; and as this is to be a maximum by the problem, its fluxion $= 0$, which being taken and reduced gives $q = \frac{\sqrt{(n^4 p^2 + n^3 m p^2)} - n^2 p}{m^2}$.

Therefore, if S D : S A :: $n : 1$, then $q = p \sqrt{(n^4 + n^3)} - n^2 p$; if the radius of the axle equal the radius of the wheel, that is, $n = 1$; then the weight $q = p (\sqrt{2} - 1)$, and conſequently the weight moved muſt be about $\frac{5}{12}$ths of the moving force.

But if we introduce the weight of the wheel, and call it w, r being the diſtance of the centre of gyration from the axis, then the momentum generated in the time t will be expreſſed by $2 l t \times \frac{n m p q - m^2 q^2}{w r^2 + n^2 p + m^2 q}$, which is the greateſt poſſible when $q = \frac{\sqrt{(n^4 p^2 + 2 n^2 r^2 p w + r^4 w^2 + r^2 n m p w + n^2 m p^2)} - (n^2 p + r^2 w)}{m^2}$.

Prop. V.

Again, let A B C H (*fig.* 7.) be a ſyſtem of bodies moveable round a vertical axis, which paſſes through the common centre of gravity of the ſyſtem. And ſuppoſe D E G to be a wheel, the axis of which is vertical, and coinciding with that of the ſyſtem; let motion be communicated by means of a line going round this wheel, the ſtring D P being ſtretched by a given weight p; let it be required to aſſign the radius of the wheel E G D, ſo that the angular velocity communicated to the ſyſtem in a given time may be the greateſt poſſible. Let the weight of the ſyſtem $= w$, and the diſtance of the centre of gyration from the axis of motion $= r$, the radius ſought S D $= x$; then the motive force being p, the velocity generated in a given time in that deſcending weight will be proportional to $\frac{p x^2}{w r^2 + p x^2}$, and the angular velocity generated in the ſame time as $\frac{p x}{w r^2 + p x^2}$, which is to be a maximum by the conditions of the problem, we have, therefore, $\frac{p w r^2 \dot{x} + p^2 x^2 \dot{x} - 2 p^2 x^2 \dot{x}}{(w r^2 + p x^2)^2} = 0$, whence $p w r^2 = p^2 x^2$, or $x = r \sqrt{\frac{w}{p}}$, the diſtance ſought.

Suppoſing, therefore, the moving force $= \frac{1}{4}$ of the weight of the ſyſtem w, we ſhall have $x = r \sqrt{\frac{w}{\frac{1}{4} w}} = 2 r$; that is, the weight ſhould be applied at a diſtance from the axis, equal to twice the diſtance of the centre of gyration, in order to produce the greateſt angular velocity in a given time.

Prop. VI.

In order to increaſe the action of a given moving force againſt a weight to be raiſed, or reſiſtance to be overcome, a combination of two or more mechanic powers is frequently made uſe of. Thus, let p be a power applied by means of a line to the vertical wheel C, (*fig.* 6.), and ſuppoſe the circumference of the axle K to be in contact with the circumference of the wheel B, ſo that the circumference of the wheel B may always move equally faſt with that of the axis which belongs to C; let alſo the axle of B communicate motion to the vertical wheel A, to the axle of which a weight, q, is ſuſpended, ſo as to act in oppoſition to p; moreover, let $l m n$ to 1, be the ſum of the ratios of the radius of each wheel to that of its axle; then if $p l m n = q$, the two weights, p and q, will ſuſtain each other in equilibrio; but if $p l m n$ be greater than q, the equilibrium will be deſtroyed, and the weight q will aſcend; and it is required to aſſign the ſpace which, under thoſe circumſtances, will be deſcribed by q in a given time.

Let the radii of the wheel and axle A be in the ratio of l to 1; thoſe of B as m to 1; and thoſe of C as n to 1; the diſtance of the centre of gyration in A from the axis $= r$, the ſame of B $= r'$, and of C $= r''$; the weight of the wheel and axle A $= w$; that of B $= w'$; and that of C $= w''$.

Now the abſolute moving force is p, but ſince q acts in oppoſition to it, it muſt be ſubducted from p, in order to obtain the real motive force of the ſyſtem. And ſince q would balance a weight $= \frac{q}{l m n}$, if applied at p, the force which impels p on the whole will be $\frac{p l m n - q}{l m n}$. In the next place, the inertia which reſiſts the communication of motion to p muſt be aſcertained. Now motion is communicated to the wheel A, from the circumference of the axle B, and the inertia of A, and of the weight q, which reſiſts the communication of a force applied at S $= \frac{w r^2 + q}{l^2}$; in regard, therefore, to the inertia of A and q, theſe may be ſuppoſed to be removed, and the equivalent maſs $\frac{w r^2 + q}{l^2}$ collected into the circumference of the wheel A, or of the axle B. And ſince motion is communicated to B, by the circumference of the axle C, the inertia of B, together with the equivalent maſs $\frac{w r^2 + q}{l^2}$ will be $\frac{r'^2 l^2 w' + w r^2 + q}{l^2 m^2}$. In like manner, ſince motion is communicated to C by the weight p acting at D, the inertia which reſiſts the communication of motion to D or p, will be

$$\frac{p n^2 + w'' r''^2}{n^2} + \frac{r'^2 l^2 w' + w r^2 + q}{l^2 m^2 n^2} = \frac{l^2 m^2 n^2 p + l^2 m^2 w'' r''^2 + r'^2 l^2 w' + w r^2 + q}{l^2 m^2 n^2},$$

and the force which accelerates p in its deſcent from reſt

$$= \frac{l m n (p l m n - q)}{l^2 m^2 n^2 p + l^2 m^2 w'' r''^2 + r'^2 l^2 w'^2 + w r^2 + q},$$

and

and that which accelerates q

$$= \frac{p\,l\,m\,n - q}{l^2 m^2 n^2 p + l^2 m^2 w''' r'''^2 + r'^2 l' w' + w r^2 + q};$$

if, therefore, we make this force $= f$, all the circumſtances of the motion may be determined by the general formula $s = \frac{1}{2} t v = g f t^2 = \frac{v^2}{4 g f}$; as before ſhewn. See a variety of other propoſitions in Atwood's treatiſe on "Rotatory Motion."

In all the preceding propoſitions, the axis of the revolving ſyſtem has been ſuppoſed fixed; but there are other caſes by which rotatory motion may be produced, which ought to be attended to in this article; ſuch as that which enſue from a body deſcending down an inclined plane, having a ribbon or cord wound about it, one end of which is fixed at the upper part of the plane, which, by preventing the body ſliding freely, cauſes a rotatory motion. The ſame effect alſo follows from the friction of the body againſt the plane; and the ſame may be imagined when there is no plane, but the body is left to fall freely, except ſo far as the cord wound about it ſhall produce a rotatory motion in its deſcent. We ſhall not attempt the inveſtigation of theſe caſes, but merely ſtate the reſults that have been obtained; and muſt refer the reader for the former to the ſeveral treatiſes on dynamics, enumerated under the articles Dynamics and Mechanics.

Let a body (*fig.* 8.) have a cord wound about it, either at its circumference, or any other part, as C, having one end fixed at a point above, as at D; then if the body be left to deſcend by the action of gravity, it will acquire a motion of rotation by the unwinding of the cord, and the ſpace actually deſcended by the body in this caſe, will be to the ſpace deſcended in the ſame time, when falling freely, as C G to C O; O and G repreſenting the centres of oſcillation and gyration when the point of ſuſpenſion is at C. And the weight of the body will be to the tenſion of the cord, as C O to C G. The ſame ratios have place when the body deſcends down an inclined plane; the forces which generate the motion being both decreaſed in the ſame ratio.

The force by which ſpheres, cylinders, &c. are cauſed to revolve as they move down an inclined plane (inſtead of ſliding), is the adheſion of their ſurfaces, occaſioned by their preſſure againſt the plane. This preſſure is part of the weight of the body; for this weight being reſolved into its component parts, one in the direction of the plane, the other perpendicular to it, the latter is the force of the preſſure; and which, while the ſame body rolls down, the plane will be expreſſed by the coſine of the plane's elevation. Hence, ſince the coſine decreaſes, will the arc or angle increaſe. After the angle of elevation arrives at a certain magnitude, the adheſion may become leſs than what is neceſſary to make the circumference of the body revolve faſt enough; and in this caſe, it will proceed partly by ſliding, and partly by rolling; but the angle at which this circumſtance takes place, will evidently depend upon the degree of adheſion between the ſurfaces of the body and plane. This, however, will never happen, if the rotation is produced by the unwinding of a ribbon, and it is on this latter ſuppoſition that the following particular caſes are deduced.

Let W be the weight of the body, s the ſpace deſcended by a heavy body falling freely, or ſliding freely down a plane; then the ſpace S, deſcribed by rotation in the ſame time, by the following bodies, will be in theſe proportions.

1. A hollow cylinder or cylindrical ſurface $S = \frac{1}{4} s$; tenſion $= \frac{1}{2}$ W.
2. A ſolid cylinder $S = \frac{2}{3} s$; tenſion $= \frac{1}{3}$ W.
3. A ſpheric ſurface $S = \frac{2}{5} s$; tenſion $= \frac{2}{5}$ W.
4. A ſolid ſphere $S = \frac{5}{7} s$; tenſion $= \frac{2}{7}$ W. See Gregory's Mechanics, vol. i.

Rotation, *Spontaneous*, is that rotatory motion which a body acquires when acted upon by any external force in free ſpace. And the *centre of ſpontaneous rotation* is that point which remains at reſt the inſtant the body receives its impulſion, or it is that point about which the body begins to revolve.

The moſt general method of treating this ſubject is with reference to three rectangular co-ordinates, after the method of Lagrange and other modern French writers; but as that method is not commonly adopted by Engliſh mathematicians, we muſt neceſſarily either enter at great length into explanation, or run the riſk of not being underſtood by many of our readers, on which account we ſhall here adopt a ſimilar mode of inveſtigation to that which we have followed in the preceding part of this article.

Firſt, then, we may obſerve, that when a body, B, (*fig.* 9.) of any ſhape whatever, receives an impulſe, the direction of which does not paſs through the centre of gravity, and takes in conſequence two motions, as we have ſtated in the early part of this article, it is evident, that for an inſtant of time we may conſider it as having only one motion, namely, a motion of rotation about a point or fixed axis, C, which may be either within the body, or out of it, according to its ſhape, and the diſtance, G S, between the centre of gravity and the direction of impact. If, while the line G S is carried parallel to itſelf from G S to G′ S′, we imagine that it revolves about the moveable point G, as the particles of the body have greater or leſs velocities, as they are more or leſs diſtant from G, it is manifeſt that there is upon S G a certain point, C, which will be found to deſcribe from C′ towards C an arc equal to G G′, which, during an evaneſcent inſtant, may be regarded as a right line; in that caſe the point C will have been carried as far backward by its motion of rotation, as it will have been advanced parallel to G G′ by the velocity common to all the parts of the body; the point C has, therefore, during this inſtant, been actually at reſt in C; and may conſequently be conſidered as a fixed point about which the body during ſuch inſtant has a rotatory motion. This point is the centre of ſpontaneous rotation, and is the ſame as the centre of ſuſpenſion, correſponding to the centre of percuſſion, the centre of percuſſion being the point where the body is ſtruck.

Without entering into a minute demonſtration of this property, we may convince ourſelves of its truth, by conſidering that the action of a body againſt an immoveable obſtacle, in the centre of percuſſion, muſt have the ſame effect upon the body, as if that body had been at reſt, and it had been ſtruck by the obſtacle; in which latter caſe, the centre of ſuſpenſion would not be affected, and therefore it becomes the centre of ſpontaneous rotation. On which account it alſo follows, that the centre of ſpontaneous rotation is wholly independent of the magnitude of impact; but depends entirely on the diſtance that the force ϕ S, or the reſult of all the forces, acts from the centre of gravity, G; and conſequently, when that force acts in the direction, or coincides with G G′, there will be no motion of rotation, as is obvious.

We may alſo farther obſerve, that if an impact be made on any point of the axis of a ſymmetrical body, or a ſolid of revolution, and that point be conſidered as the point of

ſuſpenſion, the correſponding centre of oſcillation will be the centre of ſpontaneous rotation. This follows immediately from the properties of the centre of percuſſion and oſcillation. (See CENTER.) To which we may alſo add, that ſince the force divided by the body acted upon, is a general expreſſion for the velocity of the centre of gravity of that body; therefore the velocity of the centre of gravity of the body will be the ſame, whatever may be the direction of the impelling force; ſo that the permanency of the quantity of motion obtains the ſame in motions about a centre of ſpontaneous rotation, as in all other caſes.

PROP. I.

When ϕ S, (*fig.* 9.) the direction of impact, paſſes through the centre of the impelling body, the centre of gravity of the body ſtruck, will move with a velocity equal to the product of the quantity of motion of the impelling body into the diſtance between the centre of gravity and ſpontaneous rotation, divided by the ſum of the products of the impelling body into the diſtance of the point of impact from the centre of ſpontaneous rotation, and of the impelled body into the diſtance of the impelled body, into the diſtance between the centres of ſpontaneous rotation and of gravity.

Let the quantity of matter of the impinging body be b, its velocity v, or $bv = \phi$; and when the body B is ſtruck in the direction ϕ S, (in which the centre of the body b is always found), let the velocity of its centre of gravity be V, the centre of ſpontaneous converſion being at C. Then C G : C S :: V : *the velocity of the point* S, which is therefore $V \cdot \frac{CS}{CG}$; conſequently, $v - V \cdot \frac{CS}{CG}$ = the velocity loſt by b in the direction ϕ S; whence, by the third law of motion, $b \times \frac{v \cdot GC - V \cdot CS}{CG} = B \cdot V$, and by reduction, $V = \frac{b \cdot v \cdot CG}{B \cdot CG + b \cdot CS}$, as was to be demonſtrated.

Hence, if the inertia of the ſtriking body be evaneſcent, the velocity V will become $\frac{bv}{B} = \frac{\phi}{B}$, being the ſame as would be generated if the body b impinged directly on it with the velocity V.

PROP. II.

The inertia of the ſtriking body being evaneſcent, the angular velocity of the ſyſtem about the centre of gravity is equal to the momentum of the impelling body, divided by twice the product of the maſs of the impelled body, and the diſtance C G, into the periphery of a circle whoſe diameter is unity.

If the fixed axis paſſed through C, the centre of gravity would deſcribe a circle, whoſe radius is C G, with the velocity $\frac{bv}{B}$. But, in the preſent caſe, the motion of the ſyſtem will be compounded of the uniform rectilinear motion of the centre of gravity, in the direction G′C, perpendicular to C S, and the angular motion $x G' p = G C G'$, generated round the centre of gravity. And ſince the periphery of a circle, whoſe radius is C G, is $2\pi \cdot CG$ (π being = 3.1416), we have this analogy, $\frac{bv}{B} : 2\pi \cdot CG :: 1'' : \frac{2\pi \cdot B \cdot CG'}{bv}$, the time of one revolution in ſeconds.

Whence it follows, that the number of revolutions, or parts of a revolution, in a ſecond, or the angular velocity U, will be $1 \div \frac{2\pi \cdot B \cdot CG}{bv} = \frac{bv}{2\pi \cdot B \cdot CG}$.

And ſince C is the centre of percuſſion to S as a centre of motion, if Q be the centre of gyration with reſpect to G as a centre of motion (that is, if Q be the principal centre of gyration), we ſhall have $GC \cdot GS = GQ^2$, or $CG = \frac{GQ^2}{GS}$. This value of GC being ſubſtituted for it in the preceding expreſſion for the angular velocity, it becomes $U = \frac{b \cdot v \cdot GS}{2\pi B \cdot GQ^2}$. It follows alſo from what is ſhewn above, that the centre of ſpontaneous rotation, during the motion of the ſyſtem, deſcribes the common cycloid. For the motion of any point in the ſyſtem is compounded of the uniform rectilinear motion of the centre of gravity, and of the angular motion generated round that centre; but the velocity with which the centre of ſpontaneous rotation would move round the centre of gravity, if there only exiſted a rotatory motion in the ſyſtem, would be equal to that with which the centre of gravity would move round it, if the centre C were fixed; conſequently, ſince the centre C has both a rotatory and progreſſive motion, each of which is equal to that of the centre of gravity, it will deſcribe a cycloid.

PROP. III.

In the body, or ſyſtem B, (*fig.* 9.) to which, when quieſcent, motion has been communicated by the impulſe of a force, ϕ, without inertia, that is, rectilinear motion to the centre of gravity meaſured by the ſpace V, which that centre would deſcribe uniformly in any given time, and angular motions meaſured by the revolutions U, or parts of a revolution, which it would deſcribe uniformly round G in the ſame time; then if the notations in the preceding propoſitions be retained, and Q be the principal centre of gyration, when the ſyſtem revolves about its centre of gravity, the perpendicular diſtance from the centre of gravity, at which the impelling force muſt act ſo as to have generated theſe progreſſive and rotatory motions, will be $GS = \frac{2\pi \cdot U \cdot GQ^2}{V}$.

Let ϕ S be the direction of the impulſe, and let ϕ be equal to the momentum of an evaneſcent body b, moving with the velocity V, B being the weight of the ſyſtem; then the velocity communicated to the centre of gravity of the ſyſtem, will, by the laſt propoſition, be $= \frac{b \cdot v \cdot SG}{2\pi \cdot B \cdot GQ^2}$. But by the propoſition, the velocity communicated to the centre of gravity of the ſyſtem is V; and the angular motion, that is, the number of revolutions, or parts of a revolution, deſcribed while the centre of gravity paſſes over the ſpace V, is U; ſo that from the conditions there ariſes this equation, $U = \frac{b \cdot v \cdot GS}{2\pi \cdot B \cdot GQ^2} = \frac{V \cdot GS}{2\pi \cdot GQ^2}$, by putting V for its equal $\frac{bv}{B}$. Hence $GS = \frac{2\pi \cdot U \cdot GQ^2}{V}$.

If the body B be a ſphere, whoſe radius is r, then $GQ^2 = \frac{2}{5}r^2$, and if u be the abſolute velocity of rotation of an equator of the ſphere, we have $U = \frac{u}{2\pi r}$; whence the preceding value of G S is transformed to this, $GS = \frac{2}{5}r \cdot \frac{u}{V}$.

This propoſition may be applied to the double motion of the planets. The earth revolves about an axis paſſing through its centre of gravity, while, by a motion of tranſlation, that centre is carried on in free ſpace in an orbit nearly circular; and a ſimilar kind of double motion has been diſcovered in ſeveral of the planets, and analogy leads us to believe it obtains in the others. Now, ſuppoſing the bodies of the planets to be ſpherical, as they are nearly, the uſe of this propoſition at once appears. Having given, for inſtance, the magnitude of an impulſe, with reſpect to the maſs of the earth, and the direction φ S, in which it was applied, at any given diſtance S G from the centre of gravity, the angular motion round G would be inferred; and converſely if the actual rotatory velocity of the earth's equator, and the velocity in its orbit, be aſcertained, the diſtance G S from the centre, at which it may have received a ſingle impulſe φ S adequate to produce the double motion, may be readily found.

Thus, any point in the earth's equator paſſes over 25,020 miles by rotation in one ſidereal day; and if the mean diſtance of the earth from the ſun be 95 million miles, the earth will paſs over nearly 596,904,000 miles by its orbital motion in a year, or in about 366 ſidereal days; hence $596{,}904{,}000 \div 366 = 16{,}308{,}852$, will be equal to V in our theorem, while $25{,}020 = u$. Conſequently, $GS = \frac{2}{5}r \cdot \frac{u}{V} = \frac{r}{163.2}$. So that if an impulſe be impreſſed upon a quieſcent ſphere, and the direction of force ſhould be at a diſtance S G from its centre of gravity of about $\frac{1}{163}$d part of its radius, the angular motion of that ſphere, and the abſolute motion of its centre, will have the ſame relation to each other, as thoſe which actually obtain in the earth.

The time of the rotations of Mercury, Uranus, and the laſt new planets, are unknown; but for the following planets it is aſcertained, ſo that, by the ſame theorem, we obtain theſe values of G S; *viz.* Mars, $\frac{r}{195}$; Jupiter, $\frac{r}{2.8125}$; Saturn, $\frac{r}{2.588}$; the Moon, $\frac{r}{555}$.

We have not ſufficient data for the ſun; but the very circumſtance of his having a rotation of $27^d\ 7^h\ 47^m$, makes it very probable that he, with all his attendant planets, is alſo moving forward in celeſtial ſpace, perhaps round ſome centre of ſtill more general and extenſive gravitation; for the perfect oppoſition and equality of two forces, for giving a rotation without a progreſſive motion, has the odds againſt it of infinity to unity. This corroborates the conjectures of philoſophers, and the obſervations of Herſchel and other aſtronomers, who think that the ſolar ſyſtem is approaching to that quarter of the heavens in which the conſtellation Aquilea is ſituated.

Prop. IV.

If a body revolves about an axis paſſing through its centre of gravity with the angular velocity U, while this axis is carried round another axis, alſo paſſing through its centre of gravity, with the angular velocity U, theſe two motions compoſe a motion of every particle of the body, round a third axis lying in the plane of the other two, and inclined to each of the former axes in angles whoſe ſines are inverſely as the angular velocities round them; and the angular velocity V round this new axis, is to that about one of the primitive axes, as the ſine of the inclination of the latter axis, to the ſine of the inclination of the new axis to the other primitive axis.

Thus, if a body turns round an axis A G a, (*fig.* 10.) paſſing through its centre of gravity G, with the angular velocity U, while this axis is carried round another axis B G b, with the angular velocity u; and if G D be taken to G E as U to u, (the points B and E being taken on that ſide of the centre where they are moving towards the ſame ſide of the figure,) and the line D E be drawn, the whole and every particle of the body will be in a ſtate of rotation, about a third axis C G c parallel to D E, lying in the plane of the other two, and the angular velocity v about the axis C G c, will be to U as D E : D G; and to u as D E : G E. For let P be any particle of the body, and ſuppoſe a ſpherical ſurface, whoſe centre is G, to paſs through P. Draw P R perpendicular to the plane of the figure; then is P R the common ſection of the circle of rotation I P; round the axis A a, and the circle K P k of rotation round the axis B b. Let F and O be the centres of theſe circles of rotation, and I i, and K k, their diameters. Draw the radii P F, P O, and the tangents P M, P N; theſe tangents are in the plane M P N, which touches the ſphere in P, and the plane of the axis in the line M N, to which a line drawn from G, through R, would be perpendicular. Suppoſe P N to repreſent the velocity of rotation of the point P, about the axis B b, while P f repreſents its velocity of rotation about A a, and complete the parallelogram P N $t f$; then is P t the direction and velocity of the reſultant of the compoſition of P N, P f, and it is manifeſtly in the ſame plane as the conſtituent lines. Let perpendiculars f F, t T, be drawn to the plane of the axis, and the parallelogram P N $t f$ will be orthographically projected on that plane, its projection being alſo a parallelogram R N T F. Draw the diagonal R T. Then, ſince P R is perpendicular to the plane of the primitive axis, P R t T is ſo likewiſe; and conſequently the compound motion P t is in the plane of a circle of revolution about ſome axis ſituated in the plane of the other two. Produce I R, and draw G C interſecting it perpendicularly in H; and let L P l be the circle of rotation, its diameter being L l = 2 L H; then is P t a tangent, and perpendicular to P H, and it will meet I R in ſome point Q of the line M N. The particle P is in a ſtate of rotation about the axis C G c; its velocity is to the velocities round A a, or B b, as P t to P F, or P T to P N. Now P N the tangent is perpendicular to O P, and P R is perpendicular to O N; therefore O P : P N :: P R : R N, or $RN = \frac{PN.RN}{PO}$. But the velocity of P about the axis B b, is u . O P; whence $RN = \frac{U.OP.PR}{OP} = u.PR$. In like manner, R F = U . P R; conſequently R F : R N :: U : u :: G D : G E. But N T : R N :: ſin. N R T : ſin. N T R :: ſin. G E D : ſin. G D E; hence ſin. N R T : ſin. N T R :: ſin. G E D : ſin. G D E. Now, ſince N R is perpendicular to E G, and N T (parallel to F I) perpendicular to D G, we have R N T = E G D. Hence T R is perpendicular, and C c parallel to E D. Alſo, ſince R N, R F, R T, are as the velocities u, U, v, about theſe different axes, and vary reſpectively, as E G, D G, D E, we have v : U : u :: E D : G D : G E; which was to be demonſtrated.

Hence, if every particle of a body, whether ſolid or fluid, receives at the ſame time two ſeparate impulſes, the one

one competent to the production of a motion of the particle round an axis with a certain angular velocity, and the other competent to the production of a rotatory motion about another axis with a certain velocity, the combined effect of all these impulsions, will be a motion of the whole system about a third axis, given in position, with an angular velocity which is also given; and this motion will obtain, without any separation or disunion of parts, except such as may be occasioned by the action of the centrifugal forces resulting from the rotation.

Hence, also, if a body be turning round any axis, and every particle, in one instant, get precisely such an impulse as is competent to produce a given angular velocity round another axis, the body will turn round a third axis given in position, with a given angular velocity.

Lastly, when a rigid body acquires a rotation about an axis, by an impulse on one part of it, and either at the same time, or afterwards, receive an impulse on any part which alone would have produced a certain rotation about another axis, the joint effect of these impulses will be a rotation about a third axis, in conformity with this proposition. For when a rigid body acquires a motion about an axis, not by the simultaneous impulse of the precisely competent force on each particle, but by an impulse on one part, there has been propagated to every particle, (by means of the cohesive forces,) an impulse precisely competent to the production of that motion which the particle actually acquires; and when a rigid body already turning round an axis A *a*, receives an impulse which makes it actually turn about another axis C *c*, there has been propagated in each particle a force precisely adequate to the production, not of the motion but of the *changes* of motion which takes place in that particle; that is, a force which, when compounded with the inherent force of its primitive motion, produces the new motion, that is, by the proposition a force which alone would have caused it to turn about a third axis B *b*, with a rotation making the other component of the actual rotation about C *c*.

This elegant theorem, the enunciation of which is due to P. Frisi, is very important, and gives a great extension to the doctrine of the composition of motion. It is of great use in many curious problems, and particularly that of the precession of the equinoxes. Those who wish for farther information on the subject of rotatory motion, may consult Gregory's "Mechanics," from which we have taken the three last propositions; Simpson's "Tracts;" Frisi's "Cosmographia;" "Philosophical Transactions," 1780; Landen's "Memoirs;" Atwood "On the Rotatory Motion of Bodies;" Lagrange's "Méchanique Analytique;" and a memoir "Sur le Mouvement de Rotation," by Français, Paris, 1813; in which latter work the subject is treated with all the generality it seems to admit of, and which method we should have adopted in this article, but for the reasons stated in the commencement of it, that is to say, the length to which we must have extended it, in order to have rendered it intelligible to the English reader.

Rotation is also synonimous with Rolling, which see.

Rotation, in *Geometry*, the circumvolution of a surface round a line, called the *axis of rotation*.

By such rotation of planes, the figures of certain regular solids are formed or generated.

The method of cubing solids, generated by such rotation, is laid down by M. de Moivre, in his specimen of the use of the doctrine of fluxions. For the fluxions of such solids take the product of the fluxion of the abscissa, multiplied by the circular base, and suppose the ratio of a square to the circle inscribed to be as $\frac{n}{1}$; the equation expressing the nature or property of any circle, whose diameter is d, is $yy = dx - xx$. Therefore $4\,\frac{dx\,x - x^2\,x}{n}$ is the fluxion of a portion of the sphere, and consequently the point itself $4\,\frac{\frac{1}{2}x\,dx - \frac{1}{3}x^3}{n}$, and the circumscribed cylinder is $4\,\frac{dx\,x - x^3}{n}$; therefore the portion of the sphere is to the circumscribed cylinder as $\frac{1}{2}d - \frac{1}{2}x$ to $d - x$. Phil. Trans. N° 216.

For other instances of this kind, and a view of the application of the doctrine of fluxions, to find the contents of solid bodies, see Solidity. See also Centrobaryc *Method*.

Rotation, *Revolution*, in *Astronomy*. See Revolution.

Rotation, *Diurnal*. See Diurnal, and Earth.

Rotation, in *Anatomy*, the action of the musculi rotatores; or the motion which they give to the parts they are fixed to.

There are two muscles, the great and the little obliquus, used to perform the rotation of the eye. The obturator internus and externus effect the rotation of the thighs.

Mr. Winslow has given an account of this, as well as of pronation, and other circulatory animal motions. See Mem. de l'Acad. des Sciences, 1729. See also Extremities.

Rotation *of Crops*, in *Agriculture*, the several means of cropping lands of the arable kind in such a manner as to prevent their being exhausted as much as possible, and at the same time to preserve them free from weeds in the most complete and perfect mode. The proper alternation of different sorts of crops in this intention, is a matter of vast importance to the interests of agriculture, and in which immense improvements have been made in this and other countries within this last half century, but which is still far from any thing like perfection. See *Course of* Crops.

In addition to what has been stated under the head referred to above, it may be observed, in this place, that the nature and state in which the manure is, when applied to the lands, should likewise be attended to in fixing the rotations of the crops, in order that the first and all the succeeding ones may be supported in the best and most effectual manner by the changes that are always taking place afterwards in such materials, when united and incorporated with the soils; and in this way, those parts of them which are not fitted to or suitable for one kind of crop, may be converted to the nourishment and support of the next, and so on in the same manner. Thus, where the turnip is the first crop in the rotation, and manure of the fresh dung kind is used, which directly affords it the necessary supply of soluble matter, while the heat which is generated in its decomposition assists the sprouting and growth of the seed, it should be succeeded by barley, or some other similar sort of grain crop, with suitable grass seeds, as the land will have been but little robbed of its fertility by the preceding turnip crop, and of course will plentifully supply the soluble portions of the gradually decomposing substance of the manure to that crop; while the grasses that remain on the land, which, in many cases, draw only a small portion of the matter of which they are composed from the earth, and in all probability take up the gypseous substance contained in the manure, which would be of little utility to other sorts of crops, and

and which, in consequence of their large supply of leaves, derive a considerable proportion of their nutriment from the surrounding atmosphere, when they become ultimately ploughed down into the ground, afford a considerable supply of manure to the succeeding wheat crop, by the gradual decay and decomposition of their roots and leaves, and besides, the woody fibrous parts of the farm-yard manure, which was at first applied, and which contains in its composition the phosphate of lime, as well as some other soluble parts which are of difficult reduction, are now broken down, and brought into a suitable state for the support of that crop.

After this deteriorating and exhausting crop has been taken from the ground, recourse must again be had to fresh manure, and the rotation be renewed.

And in the strong clayey soils, after the land has remained for two years in the state of grass, from the time of taking a well fresh dunged soil for barley crop, the leys may be ploughed down and sown with pea and bean crops; after which the pea and bean stubble may be turned in for a wheat crop; and in many cases this may be followed by crops of winter tares and winter barley to be eaten off upon the land in the spring season, previously to its being prepared by their being ploughed in, and other means for the sowing of turnips.

In these cases, the rotation may cease and begin again, either after taking the wheat crop, or those of the tares and winter barley, according as the circumstances of the different cases may be in respect to the land.

It may be noticed, that pea and bean crops, in all cases of this nature, appear to be very well suited to form and prepare the land for wheat crops, as is clearly ascertained, from their being alternately cultivated for many years together in some such situations. This may probably depend, in some measure, upon the small proportion of substance similar to that of albuminous matter which they contain, and afford, as well as upon the principles supplied by the decay of the bean roots in the ground, which may be capable of forming a part of the glutinous material in wheat crops.

In the business of cropping lands, it may likewise be necessary to have regard to the nature and manner in which the different sorts of plants are fed and supported, for though the composition of them in general may be very similar, the specific differences in the products of a number of them, as well as many other facts and circumstances, fully demonstrate that they must draw different sorts of matters from the earth or soil, and although it must be obvious that such vegetables as have the smallest supplies of leaves, will, in proportion, be the most exhausting to the earth or soil of its common nutrient materials, yet that particular sorts of plants, as they are principally supported by particular kinds of matters, will, where their produce is carried off the land, require peculiar principles of such natures to be supplied to the soil on which they grow.

The case of the potatoe, as well as some other plants, is highly illustrative of this point, as it is well known that it produces the most fully, and in the most luxuriant manner at first, while the ground or mould is in a fresh or virgin state, and just turned up from old ley or pasture; but that in the course of a few years it degenerates and declines, standing in need of a new fresh soil; and the nature of its production has a constant tendency to search for this, as the fibrous radicles afford new bulbs or roots at a considerable distance from the old plant.

Such grounds also as have been long cropped with some kinds of artificial grasses, as red clover, &c. frequently cease to yield good and full crops of them; they becoming, in the language of the farmer, sick of, or tired with them; one principal and probable reason of which is, perhaps, the deficiency or absolute want of the peculiar sort of material which is necessary for their growth and support, as above, which in this instance is that of gypsum. This, therefore, may be proper to be regarded in determining the rotations in such cases.

A most remarkable case of this property and capability of particular plants to drain and exhaust the land of the particular principles and substances suited to their growth and support, is met with in the mushroom tribe, which are asserted never to appear in succession on the same point of ground.

In short, in every rotation of crops, it is of essential importance that every part of the land should, in its turn or succession, be made to contribute, as fully as it is capable, to the different plants as crops, by their being properly chosen and adapted in this respect.

In many instances of strong loamy land, great benefit may be derived from cropping with beans, which have been fully dunged for, after barley and clover, as the latter of the above crops and the manure will supply abundant support for the bean crop, and that crop, in its stubble and roots, afford an admirable preparation and supply of food for wheat, as already noticed; which may be properly and beneficially succeeded by tares, which again prepare the ground well by their being fed off on the land, or soiled for another crop of wheat. The rotation may then begin again.

Some think that all plants, the seeds of which yield oil, exhaust land in a very high degree. Thus cole, which is a sort of cabbage, especially when it perfects its seed, as well as the cabbage itself, which is believed by many to deteriorate the land greatly, is improper as a crop in preparation for wheat, though it is had recourse to in many districts, and thought highly of for that purpose. Great caution is constantly necessary in the rotations of cropping with such sorts of plants as crops.

In some cases of the lighter kinds of mixed soils, peas are found full as good a preparation for the wheat crop as beans, having the advantage of being off the land so much sooner. Pease or tares also prepare well for wheat, after ray-grass, on the stone-brash lands in many instances, when well cultivated.

That bean crops should always precede the wheat, and not follow it, as is too frequently the case in a number of districts, is sufficiently evident from the above remarks. Peas may sometimes be substituted in the place of the bean crop, with considerable propriety and utility.

It may be concluded on this most interesting subject, that of all the signs which denote the progress or perfection of the art of husbandry in any district or country, there is none which is more certain and correct than that of the rotations of the crops, which are pursued by the farmers in the management of their arable lands. Where there is no regular and appropriate change in the kinds of the crops, so as to suit them to the nature of their support, and the states and circumstances of the land, the system of farming must be in a wretched state indeed; but where the arable grounds are regularly preserved in a productive state, by suitable rotations well applied, not only the interest of the tenant is promoted, his judicious conduct rendered evident, and the advantage of the proprietor secured by the improvement which is effected, but the good of the community greatly increased, by the products of the earth being rendered so much more abundant for its use and support.

The practice of applying manure and cropping, so as to

draw out the ſtrength of it, and that of the ſoil, as ſoon as it can be done, until the land is rendered quite barren and incapable of affording any more produce without ſome reſpite, is moſt miſerable, and deſerves the higheſt reprobation, though not uncommon.

It has been contended, that a well-ſelected rotation of crops is capable of doubling the ſupport of the preſent population, and of vaſtly increaſing the wealth and reſources of the nation. Alſo, that having recourſe to proper modes of cropping, may ſometimes be highly beneficial in preventing the ruſt or mildew in wheat, as over-dunging immediately for ſuch crops is found to be productive of the diſeaſe, while the application of it previouſly to ſome ſort of ſmothering crop, ſuch as rape or cole in ſtrong lands, and potatoes on thoſe that are light, is an almoſt effectual means of avoiding it. Some maintain that this diſeaſe ſeldom or ever takes place in wheat crops after rape or cole, and others aſſert the ſame to be nearly the caſe in them after potatoes. And that, as wheat after clover on light ſoils is liable to be affected in this way, it may occaſionally be of importance to take it before that crop ſomewhat in this manner, potatoes, wheat, clover, barley.

Rotation *of Crops*, in *Gardening*, the introduction of the moſt proper and ſuitable courſes of crops, for the production of good garden vegetables of different kinds, and for the keeping of the ground in the richeſt and moſt proper condition for the cultivation and growth of them. This is equally important and neceſſary in the garden as in the field, but it cannot, by any means, be ſo fully and effectually accompliſhed in the former as in the latter, on account of the ſmallneſs of the uſual limits of it, and the greatneſs of the number of different articles which are required to be raiſed and cultivated, as well as their more intimate relation to each other. See Crops, *Courſe of*.

In addition to what has been ſaid under the head above alluded to, it may be obſerved, that the management of this buſineſs may, in ſome meaſure, be effected by a ſuitable diviſion and arrangement of the cultivated culinary vegetables into different claſſes, as crops for the purpoſe, as their natures, habits, methods of culture, and difference in duration and other circumſtances may indicate. And by the application of the manure which is uſed in ſuch ſtates, kinds, and manners, as that it may go the fartheſt, be conſumed to the greateſt advantage in the raiſing of the different ſorts of vegetables in ſucceſſion, and produce them of the beſt and moſt healthy kinds.

Manure ſhould be applied in the firſt inſtance only for thoſe crops that are not injured in any way by it, but which receive great benefit from its uſe, and cannot be grown well without its being always employed in ſuch ſtates as are moſt favourable to them, according to their different natures, habits, and kinds, as the potatoe, cabbage, bean, celery, &c. When theſe crops have taken up the more groſs parts, the finer and more delicate vegetables may ſucceed on the ſame land in their proper order, ſo as to conſume the remaining parts of the manure in the moſt advantageous ways, both to the produce and the land.

On this principle, the rotations ſhould obviouſly begin either with the potatoe, cabbage, bean, celery, or ſome other crop of a ſimilar kind, well manured for; and be followed by thoſe of the more delicate ſorts, in their moſt ſuitable courſes, ſo as not to be hurt in their growth or flavour. The uſe of graſs ſeeds on well manured land may alſo ſometimes be had recourſe to by market gardeners, for laying down their lands in the view of refreſhing them, and ſoon breaking them up again.

By proper attention to the different circumſtances which have been noticed above, and others of the ſame nature that may occur, different uſeful and advantageous rotations of crops may be introduced into garden culture, and the art be, in this way, very greatly improved.

ROTATOR, in *Anatomy*, a name given to the oblique muſcles of the eye, called alſo, from the direction of the fibres, *circulares*, and from the effect of their action, *amatorii*. See Eye.

ROTCHET, in *Ichthyology*, an Engliſh name for the fiſh called by authors *cuculus*, and more frequently by us the red *gurnard*. See Trigla *Cuculus*.

ROTE, an old muſical inſtrument, frequently mentioned in the French Fabliaux, and ſuppoſed to mean the *valle*, an inſtrument played with a wheel, inſtead of a bow.

Rote, in *Geography*, a river of Germany, which runs into the Itch, two miles N. of Coburg.

ROTEBRO, a town of Sweden, in the province of Upland; 30 miles N.N.W. of Stockholm.

ROTELE, in *Ichthyology*, a name by which ſome call the *rutilus latior*, or *rubellus fluviatilis*, more frequently known by the name of the roach, a river-fiſh, with red belly-fins and tail. See Cyprinus *Rutilus*.

ROTELSEE, in *Geography*, a town of the duchy of Wurzburg; 4 miles E. of Kitzingen.

ROTENBACH, a town of the archduchy of Auſtria; 9 miles N.W. of Schwanaſtadt.

ROTENBERG, a town of Auſtria; 18 miles S.W. of Freyſtatt.

ROTENBURG, a town of Switzerland, in the canton of Lucerne; 4 miles N. of Lucerne.—Alſo, a town of Wurtemberg, on the N. ſide of the Neckar, oppoſite to Ehingen; 21 miles S.W. of Stuttgart. N. lat. 48° 32′. E. long. 9° 3′.—Alſo, a town of Germany, in the county of Verden, on the Wumme; 12 miles N.N.E. of Verden. N. lat. 53° 8′. E. long. 9° 24′.—Alſo, a town of Germany, in the principality of Heſſe, on the Fulda; 25 miles S.S.E. of Caſſel. N. lat. 51° 1′. E. long. 9° 42′.—Alſo, a town of Brandenburg, in the New Mark, on the Oder; 12 miles E.S.E. of Croſſen. N. lat. 52° 5′. E. long. 15° 30′.—Alſo, a town of the duchy of Baden; 14 miles E.S.E. of Spire. N. lat. 49° 15′. E. long. 8° 48′.—Alſo, a town of the duchy of Magdeburg; 40 miles S. of Magdeburg.

ROTENSTEIN, a town of the duchy of Carinthia; 10 miles S.W. of Saxenburg.

ROTGANS, Luke, in *Biography*, an eminent Dutch poet, was born of a good family at Amſterdam, in 1645. His education led him to the cultivation of polite literature, which, for a time, he quitted to take up arms in defence of his native country, when invaded by the French in 1672. When his ſervices were no longer required, he retired to a villa between Amſterdam and Utrecht, where he reſumed with new vigour his favourite purſuits. When peace was concluded between France and Holland, he paid a viſit to Paris. He died of the ſmall-pox in 1710, in the 66th year of his age. He was author of a number of poems, highly eſteemed in his own country. Of theſe, one is a "Life of William III.," in eight books. His other pieces are moral and miſcellaneous, which, with two tragedies, were printed, in 1715, at Lewarden.

ROTH, in *Geography*, a town of Germany, in the principality of Anſpach, at the union of the Roth and Rednitz, containing an aſylum for thoſe who have been guilty of manſlaughter; and manufactures of ſtockings, Spaniſh lace, and ſtuffs; 15 miles S. of Nuremberg. N. lat. 49° 10′. E. long. 10° 59′.—Alſo, a river of Germany, formed from two ſprings, called the Ober and the Unter Roth, which

unite near Hilpolſtein, on the borders of Franconia; and after this union, it falls into the Rednitz, near the town of Roth.—Alſo, a river of Bavaria, which riſes about 10 miles S. of Landeſhut, and runs into the Inn, oppoſite to Scherding.—Alſo, a town of Germany, in the lordſhip of Limberg; 4 miles W.N.W. of Gaildorf.—Alſo, a river of Germany, which runs into the Danube, S.W. of Leipheim.

ROTH, *Ajeſt*, a town of Bohemia, in the circle of Prachatitz; 4 miles N.E. of Piſek.

ROTH, *Haus*, a town of Sileſia, in the principality of Neiſſe; 7 miles E.N.E of Neiſſe.

ROTHA, a town of Saxony, in the circle of Leipſic; 6 miles S. of Leipſic. N. lat. 51° 12′. E. long. 12° 21′.

ROTHALS, in *Ornithology*, a name given by Geſner, and ſome others, to the pochard, or red-headed wigeon, the *anas ferina;* a bird diſtinguiſhed from all others of the duck-kind, by having no variegation in its wings. See DUCK (FERINA).

ROTHARIS, in *Biography*, king and legiſlator of the Lombards, was duke of Breſcia, at the time of the death of king Ariovald, in the year 638, who left a widow, named Gundeberg, but no male iſſue. The Lombards gave this lady the privilege of raiſing to the throne the perſon whom ſhe ſhould fix on for her huſband, and her choice fell upon Rotharis, the ſubject of this article. For the ſake of uniting himſelf with the queen, he repudiated his own wife, whom, however, he promiſed to maintain in the dignity of a queen. This engagement he did not long regard, but ſhut her up in an apartment of the palace of Pavia, where ſhe remained five years; when, through the mediation of Clovis II., ſhe was reſtored to her rank in ſociety. Rotharis had ſcarcely aſcended the throne, when he had to contend with all the power of certain nobles diſaffected to his government, which, however, he quelled, and afterwards reigned with equal glory and proſperity at home and abroad. His predeceſſor had bound himſelf by a treaty with the exarch of the empire, to reſtrain himſelf within certain boundaries; but Rotharis did not conceive himſelf under any obligation to obſerve this treaty, and ſuddenly burſt into the province of the Cottian Alps, which he reduced, and then made himſelf maſter of all the towns in the Venetian territories. The exarch, at the ſame time, made an incurſion into the Lombard territory, which called away Rotharis from his conqueſts: an engagement enſued, in which the exarch was totally defeated, and obliged to ſave the relics of his army by ſpeedy flight. Rotharis likewiſe penetrated into Liguria, and took Genoa, Albenga, and other maritime towns, which he pillaged and diſmantled, carrying away the inhabitants as priſoners. Rotharis has the high merit of having firſt given to his nation a code of written laws. In the fifth year of his reign he ſummoned a general diet of his nobles at Pavia, where, with their conſent, he enacted a number of laws, which were made public in an edict iſſued in 643, conſiſting of 386 articles. Theſe, though they bear the ſtamp of a rude age and people, are accounted more judicious than the laws of ſome other barbaric people. It has been obſerved, that Rotharis was ſufficiently enlightened not only to deride the ſuperſtition of witchcraft, but to protect the victims of that reputed crime from popular rage. He alſo practiſed religious toleration, and provided in all the cities of his kingdom a biſhop for each of the two prevailing perſuaſions, the Arian and the Catholic. He died in 653, at the age of 47 years, having reigned more than 15 years. Univer. Hiſt.

ROTHBEIN, in *Ornithology*. See SCOLOPAX *Calidris*.

ROTHBURY, in *Geography*, a market-town and pariſh in Coquetdale ward, in the county of Northumberland, England, is ſituated 29½ miles N. by W. from Newcaſtle, and 306½ miles N.N.W. from London. In the oldeſt records, this place is called Robirie, Rathbury, and Routhbiry; and its name has by ſome been derived from the Britiſh word *Rhath*, ſignifying *a cleared ſpot*, or the Gaelic *Rath*, denoting *a ſurety* or *place of ſafety;* but it is more probable, on account of its Saxon termination, that it was ſo called from *roth*, *red*, from the ferruginous appearances around it, where iron mines and ochre abound. Soon after the Conqueſt, Rothbury, though itſelf only a member of the barony of Warkworth, appears to have been a large manor, including alſo thoſe of Thropton and Snitter. King John enfeoffed the barons of Whalton, in this manor, for the payment of one knight's fee. It reverted to the crown, together with Warkworth, by ſettlement; and was, in 1330, granted to the Percies, and entailed upon their male poſterity. The duke of Northumberland is now lord of the manor, but poſſeſſes very little freehold property in the town. No remarkable hiſtorical event has ſignalized this place. Previous to the union of England with Scotland, the inhabitants of Rothbury and its vicinity appear to have retained longer than moſt others the ferocity and lawleſsneſs of the ancient race of borderers. The reformation was late in finding its way hither; and there are yet ſome traits remaining of the ruder ages, but which are gradually wearing away. A foot-ball play on Shrove-Tueſday, at which all the males above eight years old are required to attend, is one; and the continuance of the cuſtom of bondage-ſervice, in the foreſt of Rothbury, is another. But this laſt injurious uſage having been abandoned upon the property of the duke of Northumberland, by his grace, it will ſoon, it is to be hoped, be only remembered by tradition.

According to the parliamentary returns in 1811, the town contains 133 houſes, and 750 inhabitants: the pariſh, however, includes 27 other townſhips, which compriſe 712 houſes, and 3732 inhabitants.

Rothbury ſtands in a ſequeſtered and romantic glen, on the north ſide of the river Coquet. The town is wide, airy, and tolerably well built, and is much frequented, during the ſummer ſeaſon, by valetudinarians, to drink goats' whey; theſe animals abounding very much amongſt the adjacent cliffs and rocks. There is a weekly market, but very indifferently ſupplied, and it has four fairs in the year. The church is a very ancient ſtructure, dedicated to All-Saints, in the form of a croſs, and contains a font of very curious workmanſhip, and ſeveral reſpectable monuments. Witton or Whitton tower, one of a line of towers, which, in the border-wars, extended from Hepple to Warkworth, a ſtrong ancient building, with the arms of Unfranville on its weſt ſide, is now the rector's manſion. The living is worth about 1200*l. per annum*. Here is a bridge of three arches over the Coquet.

On the top of a hill, between this town and Thropton, is a circular intrenchment, with a double ditch and vallum, called Old Rothbury; and not far from it, in a ſand-ſtone rock, is a large cave.

Rothbury-foreſt is about ſeven miles from eaſt to weſt, and four miles from ſouth to north. There is now very little wood upon it, and the whole land is nearly incloſed. It contains mines of lime-ſtone, coal, iron, and ochre; though, ſince the wood has diſappeared, nothing but coal is dug, and that only to a very limited extent. In that part of the foreſt, north of the Coquet, and eaſt of Rothbury, near the road leading from Alnwick, are Dibden-wells, the waters

waters of which were formerly held in high eſtimation, and were much reſorted to for the cure of ſcorbutic eruptions.

Halyſtone, a ſmall village, about five miles weſt from Rothbury, is ſuppoſed to have been a place of ſome conſequence in the time of the Saxons; for here, according to the venerable Bede, Paulinus baptized, in a copious adjoining ſpring, called our Lady's well, upwards of 3000 perſons. There was alſo a priory of Benedictine nuns, a few veſtiges of which are now in exiſtence.

Harbottle caſtle, about a mile from Halyſtone, was once a formidable fortreſs, but is now in ruins. It was given by William the Conqueror to Robert de Unfranville, lord of Tours and Vian, by a general grant of the lordſhip of Redeſdale, to hold, by defending that country for ever from wolves and enemies, by the ſame ſword which the Conqueror wore when he entered Northumberland. In 1173 it was ſacked by the Scots; but in 1296 it was beſieged in vain by them. It is now the property of Thomas Clennels, eſq., who has built a modern manſion near it.

At Hepple, on the Coquet, about five miles from Rothbury, there was alſo a ſtrong caſtle, or tower, of which there are very few remains at preſent. Cartington caſtle, two miles north-weſt from Rothbury, was formerly the ſeat of the Ratcliffes: the part of it which remains is kept in good repair, and is very ſtrongly built. Here is an aſylum for ſix females of the Roman Catholic religion, who, from their ſecluded life, are uſually called nuns. See Hiſtorical and Deſcriptive View of the County of Northumberland, &c., 2 vols. 8vo. 1811, drawn up by Mr. Mackenzie of Newcaſtle. Beauties of England, vol. vii. Northumberland, by the Rev. Mr. Hodgſon.

ROTHEM, a river of Germany, which runs into the Danube, 5 miles above Ulm.

ROTHEMSEE, a lake of Germany, in the principality of Anſpach; 6 miles E. of Gerhardſbron.

ROTHENBACH, a town of Germany, in the circle of the Lower Rhine; 30 miles E.S.E. of Francfort on the Maine.—Alſo, a town of Bavaria, in the biſhopric of Bamberg; 2 miles E. of Forcheim.—Alſo, a town of Bavaria, in the territory of Nuremberg; 3 miles N.W. of Altorf.

ROTHENBURG, a town of Luſatia, on the river Neiſſe; 14 miles N. of Gorlitz. N. lat. 51° 23′. E. long. 15° 2′.—Alſo, a city of Bavaria, capital of a territory, and imperial, near the Tauber, ſituated on a mountain. The water of the Tauber ſupplies the town by means of a machine, which raiſes it to a part called the Klingenthurn, and from thence it falls down, forming three fountains in the town. The city is encompaſſed with ditches and walls, the latter being fortified with towers. It has five churches, and the inhabitants are Lutherans. This is a very ancient place, and it continued imperial till the year 1802, when it was aſſigned among the indemnities to the elector of Bavaria; 18 miles W. of Anſpach. N. lat. 49° 22′. E. long. 10° 14′.—Alſo, a town of the duchy of Magdeburg; 40 miles S. of Magdeburg.

ROTHENFELS, a caſtle giving name to a county, called Konigſegg Rothenfels, and ceded to Bavaria among the indemnities; one mile N.W. of Immerſtadt.—Alſo, a town of the duchy of Wurzburg, on the Maine, the caſtle of which was demoliſhed by the peaſants in the year 1525; 16 miles W.N.W. of Wurzburg.

ROTHENSIRBEN, a town of Sileſia, in the principality of Breſlau; 8 miles S. of Breſlau.

ROTHENSTEIN, a town with a caſtle, in the duchy of Wurzburg; 8 miles S.S.E. of Königſhofen.

ROTHER, a river of England, in Suſſex, which runs into the ſea at Rye.—Alſo, a river in the county of Derby, which runs into the Don, near Rotheram, in Yorkſhire.

Rother-*Beaſts*, a word uſed in old ſtatutes, and ſtill in the northern parts of England, for any horned beaſts; as oxen, cows, ſteers, heifers, &c.

Whence *rother-ſoil*, in Hereforddſhire, is taken for the dung or ſoil of ſuch cattle.

Rother-*Nails*, are ſuch as have a very large head, and are uſed to faſten the rudder-irons in ſhips. See Rudder.

ROTHERAM, in *Geography*, a market-town and pariſh in the upper diviſion of the wapentake of Strafford and Tickhill, Weſt-Riding of Yorkſhire, England, is ſituated near the confluence of the rivers Rother and Don, at the diſtance of 45 miles S. by W. from the city of York, and 160 miles N.N.W. from London. It is deſcribed by Leland as "a meatly large town, with a fare collegiate chirch," which was founded by Thomas Scott, archbiſhop of York, and a native of Rotheram, in 1481, for a provoſt, five prieſts, a ſchool-maſter in ſong, and ſix choriſters, alſo a ſchool-maſter in grammar, and another in writing. This eſtabliſhment was diſſolved by king Henry VIII. Camden calls Rotheram "a large ſooty market town," and not unaptly, for even at the preſent day it is far from meriting the appellation of handſome or agreeable. The ſtreets are narrow and irregular; and the houſes, which are moſtly conſtructed of ſtone, have a dull and dingy appearance. A conſiderable trade in coals and other articles is carried on here, by means of the river Don. The market day for corn, cattle, and butcher's meat is on Monday, weekly; and on every alternate Monday is a fair for fat cattle, ſheep, and pigs; there are alſo two annual fairs, on Whit Monday, and the firſt day of December. Both markets and fairs are well attended; indeed Rotheram is one of the two greateſt marts in Yorkſhire for fat cattle and ſheep. The chief public buildings are the town-hall, the pariſh-church, and two meeting-houſes, one for Independents and another for Methodiſts. The church, according to Burton, in his "Monaſticon Eboracenſe," was erected in the reign of Edward IV. It is a handſome and ſpacious edifice, in the early pointed ſtyle, and conſiſts of a nave, with two ſide aiſles, a chancel, and a tower at the weſt end. Annexed to the church is a ſchool-houſe, for the education of thirty poor children of the pariſh of Rotheram. The clergyman for the time is governor, and has the nomination of the children; but the truſtees of the founder, Thomas Hollis, of London, eſq. appoint the maſter. This inſtitution is managed under very excellent regulations, a copy of which is delivered to the parents of all children admitted to its benefits. In this town is likewiſe an academical inſtitution, or college, for the education of Proteſtant diſſenters. It is called "The Rotheram Independent Academy," becauſe more immediately connected with the claſs of religioniſts called Independents. It was firſt opened in November, 1795, under the ſuperintendance of the Rev. Dr. Williams, who preſided as divinity tutor, and is deſigned for the education of young men propoſing to become Independent clergymen. This academy is ſupported by voluntary contributions. The building appropriated to it was erected by the late Samuel Walker, eſq. and is calculated for the convenient accommodation of ſixteen ſtudents. The library contains above 1200 volumes, chiefly preſented by patrons of the inſtitution; and there is likewiſe a tolerable collection of philoſophical apparatus. The term of ſtudy is four years, but the managers have a diſcretionary power to prolong it if they think proper.

According to the parliamentary returns of 1811, the town of Rotheram alone contained 731 houſes, and 2950 inhabitants; and the reſt of the pariſh, including the town-

ſhips

ſhips of Brinſworth, Catliffe, Dalton, Orgreave, and Tinſley, 209 houſes, and 986 inhabitants.

On the oppoſite ſide of the river from Rotheram is the townſhip, or village, of Maxborough, where very extenſive iron-works are carried on by Meſſrs. Walker. At theſe works cannon of the largeſt calibre are manufactured, as are alſo almoſt every kind of caſt-iron articles, with many of wrought-iron, ſuch as bar, ſheet, ſlit, or rod iron. Tin plates, and ſteel of every deſcription, are likewiſe made here in great quantities; and the iron bridges at Sunderland and Yarm were caſt at theſe founderies. The coal, and the iron-ſtone for the blaſt-furnaces, are chiefly ſupplied from the mines on the eſtates of the earl of Effingham, and thoſe of earl Fitzwilliam. Theſe works were commenced, in 1746, by Mr. Samuel Walker, and his brothers Aaron and Jonathan, and have ever ſince been progreſſively increaſing in extent and importance. In the Methodiſt meeting-houſe is a monument in memory of Mr. S. Walker; the epitaph was compoſed by the celebrated poet, the Rev. William Maſon, who was one of his moſt intimate friends.

The environs of Rotheram are agreeable and picturesque. On an eminence to the eaſtward of the town ſtands an elegant manſion, belonging to the Walker family, which, in point of ſituation, can ſcarcely be excelled. Aldwark-Hall, the ſeat of J. S. Foljambe, eſq. ſituated at the diſtance of four miles from Rotheram, is alſo remarkable for its fine ſituation. Near it is the village of Wickerſley, noted for its manufacture of grindſtones, of which about 5000, of various ſizes, are ſtated to be formed annually, and ſent to Sheffield. The other principal ſeats in the neighbourhood of Rotheram, beſides thoſe mentioned, are Thundercliffe Grange, the ſeat of the earl of Effingham, and Wentworth Houſe, the princely reſidence of earl Fitzwilliam. The latter houſe conſiſts of a centre and two wings, extending about 600 feet in length. Many of the apartments are moſt ſuperb, eſpecially the hall and gallery, the latter of which is ſupported by beautiful Ionic columns, having intervening niches filled with marble ſtatues. Here, and in other parts of the houſe, are likewiſe many paintings; and among others the famous picture of lord Strafford and his ſecretary. Some fine antiques are preſerved in a room called the muſeum. Wentwork-park compriſes upwards of 1500 acres of ground, beautifully diverſified with wood, water, and lawn, and is enriched by ſeveral ornamental buildings. Among theſe is a moſt magnificent mauſoleum, erected by the preſent earl Fitzwilliam, in honour of his uncle, the late marquis of Rockingham. It is conſtructed of a very fine free-ſtone, and conſiſts of three diviſions; the firſt is a ſquare Doric baſement; the ſecond of the ſame form, but of the Ionic order; and the third preſents a cupola, ſupported by twelve columns of the ſame character. Within is an apartment riſing into a dome, which reſts upon eight pillars, encircling a white marble ſtatue of the marquis in his robes of ſtate, executed by Mr. Nollekens. Beauties of England and Wales, vol. xvi. by J. Bigland.

Rotheram *Plough*, in *Agriculture*, a particular ſort of plough, which is found very uſeful, and much employed about the town of that name, in Yorkſhire, as well as in many other places in the kingdom. See Plough.

ROTHERHITHE, in *Geography*, a village and pariſh in the eaſtern diviſion of the hundred of Brixton, and county of Surrey, England, is ſituated on the ſouth bank of the river Thames, at the diſtance of a mile and a half E. of London bridge. The pariſh is bounded on the N. and E. by that river, on the S. by the pariſhes of Bermondſey and Camberwell, on the W. by Horſley-Down, and on the S.E. by the pariſh of Deptford, in Kent. In this pariſh are eleven dock-yards, at ſome of which ſhips are built for the ſervice of the Eaſt India Company. The manor anciently belonged to the "Abbot of Graces," but was granted, in the reign of Richard II. to the priory of St. Magdalen, Bermondſey. After the ſuppreſſion of monaſteries, it continued annexed to the crown till the reign of Charles I. when it was granted to a gentleman of the name of White, and has ſince been poſſeſſed by various families. This manor has a court-leet and a court-baron. Rotherhithe, not being mentioned in Domeſday-book, it ſeems probable that it was then only a hamlet to Bermondſey. The church was erected in 1715, inſtead of a former one, which had then become ruinous. It conſiſts of a nave, chancel, and two ſide aiſles, with a ſquare tower, ſurmounted by a ſpire at the weſt end. The living is a rectory in the dioceſe of Wincheſter and deanery of Southwark. The only remarkable monument here is that of the Pelew prince, Lee Boo, who died of the ſmall-pox December 29th, 1784, in the 20th year of his age. This young man was the ſon of Abba Thulle, king of the iſland of Goo-roo-raa, and came to England with captain Wilſon, whoſe ſhip, the Antelope, was wrecked off that iſland 9th Auguſt, 1783, on which occaſion the natives treated the crew with the utmoſt humanity and kindneſs. In this pariſh is a free-ſchool, at which about 30 boys and 20 girls are clothed and educated.

According to the parliamentary returns of 1811, Rotherhithe pariſh contains 2719 houſes, and 12,114 inhabitants. The Hiſtory and Antiquities of the County of Surrey, by the Rev. Owen Manning, continued by William Bray, eſq. folio, vol. i. Antiquities of Surrey, by N. Salmon, L. L. B. Lond. 8vo. 1736. Aubrey's Natural Hiſtory and Antiquities of Surrey, vol. v. 8vo. Lond. 1719. Lyſons's Environs of London. vol. i. 4to. Lond. 1796. And Supplement to the latter, 1813.

ROTHESAY, or Rosay, a royal borough-town and pariſh in the county and iſle of Bute, Scotland, is ſituated on the bank of a fine bay, at the N.W. ſide of the iſland. The ancient Gaelic and patronimic name of this pariſh is Cilla-bhruic, which ſignifies the church dedicated to St. Broke. The town is yet called, in the Gaelic language, Bailea-Mhoide, or the town where the courts of juſtice are held. Rotheſay is undoubtedly of high antiquity; but it does not ſeem to have been conſtituted a royal borough till the year 1400, when king Robert III., who was then reſident at the caſtle, raiſed it to that dignity. At that period it was a conſiderable town, but in ſucceeding years it declined greatly both in extent and population, as was apparent in the early part of the laſt century, by the number of ruinous houſes, and foundations of others, which were then viſible. About fifty years ago, indeed, it was reduced to the condition of a mean village, poſſeſſing only one decked veſſel of inconſiderable burthen. Under the auſpices of the late earl of Bute, however, the induſtry and emulation of the inhabitants began to revive, and the town has again advanced to a ſtate of comparative proſperity and opulence. Even ſo early as 1790, the inhabitants had accumulated ſhipping to the amount of 4246 tons, and it is believed the eſtimate of tonnage is now nearly doubled. This change has been principally effected by the encouragement given to the herring-fiſheries, in which the inhabitants of Rotheſay have about 100 ſmall veſſels employed annually; but in part it is likewiſe to be attributed to the eſtabliſhment of ſome cotton-mills in the immediate vicinity. Rotheſay, as a royal borough, unites with Cambletown, Irvine, Inverary, and Ayr, in the election of a repreſentative to the great council of the nation. It is the ſeat of the county courts of juſtice; and has the honour of giving the title

waters of which were formerly held in high eſtimation, and were much reſorted to for the cure of ſcorbutic eruptions.

Halyſtone, a ſmall village, about five miles weſt from Rothbury, is ſuppoſed to have been a place of ſome conſequence in the time of the Saxons; for here, according to the venerable Bede, Paulinus baptized, in a copious adjoining ſpring, called our Lady's well, upwards of 3000 perſons. There was alſo a priory of Benedictine nuns, a few veſtiges of which are now in exiſtence.

Harbottle caſtle, about a mile from Halyſtone, was once a formidable fortreſs, but is now in ruins. It was given by William the Conqueror to Robert de Unfranville, lord of Tours and Vian, by a general grant of the lordſhip of Redeſdale, to hold, by defending that country for ever from wolves and enemies, by the ſame ſword which the Conqueror wore when he entered Northumberland. In 1173 it was ſacked by the Scots; but in 1296 it was beſieged in vain by them. It is now the property of Thomas Clennels, eſq., who has built a modern manſion near it.

At Hepple, on the Coquet, about five miles from Rothbury, there was alſo a ſtrong caſtle, or tower, of which there are very few remains at preſent. Cartington caſtle, two miles north-weſt from Rothbury, was formerly the ſeat of the Ratcliffes: the part of it which remains is kept in good repair, and is very ſtrongly built. Here is an aſylum for ſix females of the Roman Catholic religion, who, from their ſecluded life, are uſually called nuns. See Hiſtorical and Deſcriptive View of the County of Northumberland, &c., 2 vols. 8vo. 1811, drawn up by Mr. Mackenzie of Newcaſtle. Beauties of England, vol. vii. Northumberland, by the Rev. Mr. Hodgſon.

ROTHEM, a river of Germany, which runs into the Danube, 5 miles above Ulm.

ROTHEMSEE, a lake of Germany, in the principality of Anſpach; 6 miles E. of Gerhardſbron.

ROTHENBACH, a town of Germany, in the circle of the Lower Rhine; 30 miles E.S.E. of Francfort on the Maine.—Alſo, a town of Bavaria, in the biſhopric of Bamberg; 2 miles E. of Forcheim.—Alſo, a town of Bavaria, in the territory of Nuremberg; 3 miles N.W. of Altorf.

ROTHENBURG, a town of Luſatia, on the river Neiſſe; 14 miles N. of Gorlitz. N. lat. 51° 23′. E. long. 15° 2′.—Alſo, a city of Bavaria, capital of a territory, and imperial, near the Tauber, ſituated on a mountain. The water of the Tauber ſupplies the town by means of a machine, which raiſes it to a part called the Klingenthurn, and from thence it falls down, forming three fountains in the town. The city is encompaſſed with ditches and walls, the latter being fortified with towers. It has five churches, and the inhabitants are Lutherans. This is a very ancient place, and it continued imperial till the year 1802, when it was aſſigned among the indemnities to the elector of Bavaria; 18 miles W. of Anſpach. N. lat. 49° 22′. E. long. 10° 14′.—Alſo, a town of the duchy of Magdeburg; 40 miles S. of Magdeburg.

ROTHENFELS, a caſtle giving name to a county, called Konigſegg Rothenfels, and ceded to Bavaria among the indemnities; one mile N.W. of Immerſtadt.—Alſo, a town of the duchy of Wurzburg, on the Maine, the caſtle of which was demoliſhed by the peaſants in the year 1525; 16 miles W.N.W. of Wurzburg.

ROTHENSIRBEN, a town of Sileſia, in the principality of Breſlau; 8 miles S. of Breſlau.

ROTHENSTEIN, a town with a caſtle, in the duchy of Wurzburg; 8 miles S.S.E. of Königſhofen.

ROTHER, a river of England, in Suſſex, which runs into the ſea at Rye.—Alſo, a river in the county of Derby, which runs into the Don, near Rotheram, in Yorkſhire.

Rother-*Beaſts*, a word uſed in old ſtatutes, and ſtill in the northern parts of England, for any horned beaſts; as oxen, cows, ſteers, heifers, &c.

Whence *rother-ſoil*, in Hereford ſhire, is taken for the dung or ſoil of ſuch cattle.

Rother-*Nails*, are ſuch as have a very large head, and are uſed to faſten the rudder-irons in ſhips. See Rudder.

ROTHERAM, in *Geography*, a market-town and pariſh in the upper diviſion of the wapentake of Strafford and Tickhill, Weſt-Riding of Yorkſhire, England, is ſituated near the confluence of the rivers Rother and Don, at the diſtance of 45 miles S. by W. from the city of York, and 160 miles N.N.W. from London. It is deſcribed by Leland as "a meatly large town, with a fare collegiate chirch," which was founded by Thomas Scott, archbiſhop of York, and a native of Rotheram, in 1481, for a provoſt, five prieſts, a ſchool-maſter in ſong, and ſix choriſters, alſo a ſchool-maſter in grammar, and another in writing. This eſtabliſhment was diſſolved by king Henry VIII. Camden calls Rotheram "a large ſooty market town," and not unaptly, for even at the preſent day it is far from meriting the appellation of handſome or agreeable. The ſtreets are narrow and irregular; and the houſes, which are moſtly conſtructed of ſtone, have a dull and dingy appearance. A conſiderable trade in coals and other articles is carried on here, by means of the river Don. The market day for corn, cattle, and butcher's meat is on Monday, weekly; and on every alternate Monday is a fair for fat cattle, ſheep, and pigs; there are alſo two annual fairs, on Whit Monday, and the firſt day of December. Both markets and fairs are well attended; indeed Rotheram is one of the two greateſt marts in Yorkſhire for fat cattle and ſheep. The chief public buildings are the town-hall, the pariſh-church, and two meeting-houſes, one for Independents and another for Methodiſts. The church, according to Burton, in his "Monaſticon Eboracenſe," was erected in the reign of Edward IV. It is a handſome and ſpacious edifice, in the early pointed ſtyle, and conſiſts of a nave, with two ſide aiſles, a chancel, and a tower at the weſt end. Annexed to the church is a ſchool-houſe, for the education of thirty poor children of the pariſh of Rotheram. The clergyman for the time is governor, and has the nomination of the children; but the truſtees of the founder, Thomas Hollis, of London, eſq. appoint the maſter. This inſtitution is managed under very excellent regulations, a copy of which is delivered to the parents of all children admitted to its benefits. In this town is likewiſe an academical inſtitution, or college, for the education of Proteſtant diſſenters. It is called "The Rotheram Independent Academy," becauſe more immediately connected with the claſs of religioniſts called Independents. It was firſt opened in November, 1795, under the ſuperintendance of the Rev. Dr. Williams, who preſided as divinity tutor, and is deſigned for the education of young men propoſing to become Independent clergymen. This academy is ſupported by voluntary contributions. The building appropriated to it was erected by the late Samuel Walker, eſq. and is calculated for the convenient accommodation of ſixteen ſtudents. The library contains above 1200 volumes, chiefly preſented by patrons of the inſtitution; and there is likewiſe a tolerable collection of philoſophical apparatus. The term of ſtudy is four years, but the managers have a diſcretionary power to prolong it if they think proper.

According to the parliamentary returns of 1811, the town of Rotheram alone contained 731 houſes, and 2950 inhabitants; and the reſt of the pariſh, including the town-

ſhips

ſhips of Brinſworth, Catliffe, Dalton, Orgreave, and Tinſley, 209 houſes, and 986 inhabitants.

On the oppoſite ſide of the river from Rotheram is the townſhip, or village, of Maxborough, where very extenſive iron-works are carried on by Meſſrs. Walker. At theſe works cannon of the largeſt calibre are manufactured, as are alſo almoſt every kind of caſt-iron articles, with many of wrought-iron, ſuch as bar, ſheet, ſlit, or rod iron. Tin plates, and ſteel of every deſcription, are likewiſe made here in great quantities; and the iron bridges at Sunderland and Yarm were caſt at theſe founderies. The coal, and the iron-ſtone for the blaſt-furnaces, are chiefly ſupplied from the mines on the eſtates of the earl of Effingham, and thoſe of earl Fitzwilliam. Theſe works were commenced, in 1746, by Mr. Samuel Walker, and his brothers Aaron and Jonathan, and have ever ſince been progreſſively increaſing in extent and importance. In the Methodiſt meeting-houſe is a monument in memory of Mr. S. Walker; the epitaph was compoſed by the celebrated poet, the Rev. William Maſon, who was one of his moſt intimate friends.

The environs of Rotheram are agreeable and picturesque. On an eminence to the eaſtward of the town ſtands an elegant manſion, belonging to the Walker family, which, in point of ſituation, can ſcarcely be excelled. Aldwark-Hall, the ſeat of J. S. Foljambe, eſq. ſituated at the diſtance of four miles from Rotheram, is alſo remarkable for its fine ſituation. Near it is the village of Wickerſley, noted for its manufacture of grindſtones, of which about 5000, of various ſizes, are ſtated to be formed annually, and ſent to Sheffield. The other principal ſeats in the neighbourhood of Rotheram, beſides thoſe mentioned, are Thundercliffe Grange, the ſeat of the earl of Effingham, and Wentworth Houſe, the princely reſidence of earl Fitzwilliam. The latter houſe conſiſts of a centre and two wings, extending about 600 feet in length. Many of the apartments are moſt ſuperb, eſpecially the hall and gallery, the latter of which is ſupported by beautiful Ionic columns, having intervening niches filled with marble ſtatues. Here, and in other parts of the houſe, are likewiſe many paintings; and among others the famous picture of lord Strafford and his ſecretary. Some fine antiques are preſerved in a room called the muſeum. Wentwork-park compriſes upwards of 1500 acres of ground, beautifully diverſified with wood, water, and lawn, and is enriched by ſeveral ornamental buildings. Among theſe is a moſt magnificent mauſoleum, erected by the preſent earl Fitzwilliam, in honour of his uncle, the late marquis of Rockingham. It is conſtructed of a very fine free-ſtone, and conſiſts of three diviſions; the firſt is a ſquare Doric baſement; the ſecond of the ſame form, but of the Ionic order; and the third preſents a cupola, ſupported by twelve columns of the ſame character. Within is an apartment riſing into a dome, which reſts upon eight pillars, encircling a white marble ſtatue of the marquis in his robes of ſtate, executed by Mr. Nollekens. Beauties of England and Wales, vol. xvi. by J. Bigland.

Rotheram *Plough*, in *Agriculture*, a particular ſort of plough, which is found very uſeful, and much employed about the town of that name, in Yorkſhire, as well as in many other places in the kingdom. See Plough.

ROTHERHITHE, in *Geography*, a village and pariſh in the eaſtern diviſion of the hundred of Brixton, and county of Surrey, England, is ſituated on the ſouth bank of the river Thames, at the diſtance of a mile and a half E. of London bridge. The pariſh is bounded on the N. and E. by that river, on the S. by the pariſhes of Bermondſey and Camberwell, on the W. by Horſley-Down, and on the S.E. by the pariſh of Deptford, in Kent. In this pariſh are eleven dock-yards, at ſome of which ſhips are built for the ſervice of the Eaſt India Company. The manor anciently belonged to the "Abbot of Graces," but was granted, in the reign of Richard II. to the priory of St. Magdalen, Bermondſey. After the ſuppreſſion of monaſteries, it continued annexed to the crown till the reign of Charles I. when it was granted to a gentleman of the name of White, and has ſince been poſſeſſed by various families. This manor has a court-leet and a court-baron. Rotherhithe, not being mentioned in Domeſday-book, it ſeems probable that it was then only a hamlet to Bermondſey. The church was erected in 1715, inſtead of a former one, which had then become ruinous. It conſiſts of a nave, chancel, and two ſide aiſles, with a ſquare tower, ſurmounted by a ſpire at the weſt end. The living is a rectory in the dioceſe of Wincheſter and deanery of Southwark. The only remarkable monument here is that of the Pelew prince, Lee Boo, who died of the ſmall-pox December 29th, 1784, in the 20th year of his age. This young man was the ſon of Abba Thulle, king of the iſland of Goo-roo-raa, and came to England with captain Wilſon, whoſe ſhip, the Antelope, was wrecked off that iſland 9th Auguſt, 1783, on which occaſion the natives treated the crew with the utmoſt humanity and kindneſs. In this pariſh is a free-ſchool, at which about 30 boys and 20 girls are clothed and educated.

According to the parliamentary returns of 1811, Rotherhithe pariſh contains 2719 houſes, and 12,114 inhabitants. The Hiſtory and Antiquities of the County of Surrey, by the Rev. Owen Manning, continued by William Bray, eſq. folio, vol. i. Antiquities of Surrey, by N. Salmon, L. L. B. Lond. 8vo. 1736. Aubrey's Natural Hiſtory and Antiquities of Surrey, vol. v. 8vo. Lond. 1719. Lyſons's Environs of London. vol. i. 4to. Lond. 1796. And Supplement to the latter, 1813.

ROTHESAY, or Rosay, a royal borough-town and pariſh in the county and iſle of Bute, Scotland, is ſituated on the bank of a fine bay, at the N.W. ſide of the iſland. The ancient Gaelic and patronimic name of this pariſh is Cilla-bhruic, which ſignifies the church dedicated to St. Broke. The town is yet called, in the Gaelic language, Bailea-Mhoide, or the town where the courts of juſtice are held. Rotheſay is undoubtedly of high antiquity; but it does not ſeem to have been conſtituted a royal borough till the year 1400, when king Robert III., who was then reſident at the caſtle, raiſed it to that dignity. At that period it was a conſiderable town, but in ſucceeding years it declined greatly both in extent and population, as was apparent in the early part of the laſt century, by the number of ruinous houſes, and foundations of others, which were then viſible. About fifty years ago, indeed, it was reduced to the condition of a mean village, poſſeſſing only one decked veſſel of inconſiderable burthen. Under the auſpices of the late earl of Bute, however, the induſtry and emulation of the inhabitants began to revive, and the town has again advanced to a ſtate of comparative proſperity and opulence. Even ſo early as 1790, the inhabitants had accumulated ſhipping to the amount of 4246 tons, and it is believed the eſtimate of tonnage is now nearly doubled. This change has been principally effected by the encouragement given to the herring-fiſheries, in which the inhabitants of Rotheſay have about 100 ſmall veſſels employed annually; but in part it is likewiſe to be attributed to the eſtabliſhment of ſome cotton-mills in the immediate vicinity. Rotheſay, as a royal borough, unites with Cambletown, Irvine, Inverary, and Ayr, in the election of a repreſentative to the great council of the nation. It is the ſeat of the county courts of juſtice; and has the honour of giving the title

title of a Scottiſh dukedom to the heir apparent of the Britiſh throne.

The caſtle of Rotheſay is now a mere ruin, and is ſo completely enveloped with ivy, that only ſmall portions of its walls are diſcernible to the eye. It was erected at different periods; part of it, forming the preſent entrance, by king Robert III., and the remainder at a much more remote date. The latter diviſion is quite circular, and is ſtrengthened by projecting round towers. This caſtle, in remote times, was the ſcene of ſeveral events of military note in Scottiſh hiſtory. According to Torfæus, Huſbec, grandſon of Somerled, was killed in an attack on a caſtle in Bute, moſt probably of this. In 1263, Haco, king of Norway, obtained forcible poſſeſſion of it, and of the whole iſland; and in 1334 it was ſeized by Edward Baliol, becauſe its then owner, the high ſteward of Scotland, was related to the Bruces, and was next heir to the throne. The year following, the iſland was invaded by the Engliſh under lord Darcy, and given up to plunder; which ſo exaſperated the natives, that, in conjunction with thoſe of Arran, they made an attack upon the caſtle ſoon after lord Darcy left it, and ſucceeded in regaining poſſeſſion of it. Subſequent to this period it became a royal reſidence. King Robert II. and III. lived in it for a conſiderable time; and it would appear that much attention was beſtowed on it, for in the reign of James V. we find that one of the articles of accuſation exhibited againſt ſir James Hamilton, was his not accounting for three thouſand crowns deſtined for the "reform of the caſtle and palace of Roſay." In 1544, the earl of Lennox, aſſiſted by the Engliſh, made himſelf maſter of this place; after which it became the principal reſidence of the Stuarts, anceſtors of the preſent family of Bute, and continued ſo till the year 1685, when it was burnt by the duke of Argyle. The earl of Bute, however, yet ranks among his titles that of hereditary keeper of this palace.

The pariſh of Rotheſay extends about ten miles in length, and from three to four in breadth. In the time of epiſcopacy, it was within the dioceſe of the Iſles, and on the eſtabliſhment of Preſbyterianiſm, was included in the preſbytery of Irvine, or Cuninghame, and the ſynod of Glaſgow and Ayr. In 1639, however, it was disjoined from that preſbytery and ſynod, and annexed to the preſbytery of Denoon, and ſynod of Argyle, to which it continues united. According to the parliamentary cenſus of 1811, this pariſh contained 702 houſes, and 4970 inhabitants, of whom 3544 are reſident within the borough. The Statiſtical Account of Scotland, by Sir John Sinclair, bart. vol. i. 8vo. 1791. Pennant's Tour in Scotland, &c. 4to. vol. i. Lond. 1776. Beauties of Scotland, vol. v. 8vo. 1808. Carliſle's Topographical Dictionary of Scotland, 2 vols. 4to. 1813.

ROTHEWASSER, a river of Saxony, which runs into the Elbe, about three miles below Pirna.

ROTHHAUSEN, a town of Germany, in the county of Henneberg; 8 miles S. of Meinungen.

ROTHHEIM, a town of the duchy of Wurzburg; 5 miles N.E. of Aub.

ROTHIA, in *Botany*, received its name from Schreber, in honour of Dr. Albert William Roth, a phyſician of the duchy of Bremen, born in 1755; whoſe *Flora Germanica*, though as yet unfiniſhed, his *Catalecta Botanica*, and various other works, have procured him a diſtinguiſhed rank amongſt European botaniſts.—Schreb. Gen. 531. Willd. Sp. Pl. v. 3. 1611. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 463. Lamarck Illuſtr. t. 667. Gærtn. t. 174. Roth, Catal. v. 1. 103.—Claſs and order, *Syngeneſia Polygamia-æqualis*. Nat. Ord. *Compoſitæ ſemifloſculoſæ*, Linn. *Cichoraceæ*, Juſſ.

Gen. Ch. *Common Calyx* rounded, finely villous; of about ſeven equal, linear, acute ſcales. *Cor.* compound, imbricated, uniform, of numerous equal florets, all perfect, whoſe partial corolla is of one petal, ligulate, linear, abrupt, with five teeth. *Stam.* Filaments in each floret five, capillary, very ſhort; anthers united into a cylindrical tube. *Piſt.* Germen in each floret ovate; ſtyle thread-ſhaped, the length of the ſtamens; ſtigmas two, reflexed. *Peric.* none, the calyx cloſing over the *ſeeds*, which are ſolitary in each floret; thoſe of the diſk cylindrical, ſomewhat turbinate, ſtriated, with ſeſſile capillary down, feathery in its lower part; thoſe of the radius cylindrical, ſtriated, enveloped in ſcales of the receptacle, but deſtitute of down. *Recept.* flat; hairy in the diſk; chaffy at the radius; the chaffy ſcales in ſeveral rows, linear, channelled, erect, rather acute, tubular at the baſe, the outermoſt equal in length to the calyx, the inner ones gradually ſhorter.

Eſſ. Ch. Receptacle hairy; chaffy in the circumference. Calyx of many equal ſcales. Seed-down hairy, ſeſſile in the diſk; none in the radius.

Obſ. This genus, as every body obſerves, is very near *Andryala*, and we greatly fear ought not to be ſeparated from it. Dr. Roth at firſt named it, after a friend of his. *Voigtia*, in Roemer and Uſteris' Magazine, Faſc. 10. 17. What Gærtner has delineated and deſcribed for *Andryala*, v. 2. 361. t. 158, is now made a ſpecies of *Rothia*; to which circumſtance however he does not advert at p. 371 of the ſame volume, where *Rothia* is deſcribed; neither does Roth, in his original deſcription of this genus, ſeem to have had *Andryala* at all in his contemplation, or he would ſurely have contraſted their eſſential characters. In fact the genus of *Andryala* itſelf depends upon two of the ſpecies now called *Rothia*, with which the third indubitably accords. If *A. lanata* of Linnæus conſtituted a diſtinct genus, the name of *Andryala* might remain with it; but there is much reaſon to believe this plant ought to be referred to *Hieracium*, the hairineſs of its receptacle being uncertain or variable. *A. cheiranthifolia* and *ragufina* have ſo preciſely the habit of *Rothia*, that we can hardly allow them to be ſeparated from it by any technical characters that we can diſcern. In this difficulty we ſhall here give the ſpecies of *Rothia* as we find them; only premiſing that, by any thing here ſaid, we mean not to invalidate Dr. Roth's claim to be commemorated by ſome certain and immutable genus, to which his high botanical merits richly entitle him.

1. R. *andryaloides*. Andryaline Rothia. Gærtn. v. 2. 371. Roth. Catal. n. 1. Willd. n. 1. (Voigtia tomentoſa; Roth in Roem. and Uſt. Mag. faſc. 9. 17.)—Stem much branched from the very baſe. Leaves downy, ovato-lanceolate, claſping the ſtem, nearly entire.—Native of Spain. *Root* annual, branched, ſomewhat woody. *Stem* twelve or eighteen inches high, erect, brown, downy; its branches alternate, widely ſpreading. *Leaves* alternate, diſtant, recurved, rather wavy, downy, and hoary. *Flower-ſtalks* axillary and terminal, ſolitary, nearly twice as long as the leaves, naked, erect, ſingle-flowered, extremely downy. *Bractea* ſolitary under each flower, lanceolate, very downy, ſcarcely longer than the *calyx*, which is alſo downy and whitiſh; contracted and globoſe before the *flower* opens, but afterwards lax, conſiſting of from five to ſeven ſcales. *Corolla* yellow; the florets of the circumference purpliſh at the back. The outer row of ſcales of the *receptacle* is exactly like the *calyx*; the reſt gradually ſmaller, downy on the outſide. The *flowers* are open before noon only.

The

The whole herb has ſtraight, prominent, capitate hairs, intermixed with its downy pubeſcence. *Roth.*

2. R. *cheiranthifolia.* Stock-leaved Rothia. Roth. Catal. n. 2. Willd. n. 2. Ait. n. 2. (Andryala ſinuata; Linn. Sp. Pl. 1137. A. integrifolia β; Syſt. Nat. ed. 12. v. 2. 525.)—Stem erect, corymboſe. Leaves finely woolly, lanceolate, ſinuated, or deeply toothed; the uppermoſt ſeſſile, ovate, taper-pointed, entire. Native of Spain and the ſouth of France, flowering there in May. It is marked in Hort. Kew. as a hardy annual, flowering in July and Auguſt. *Herb* milky, clothed with denſe, white, woolly down, intermixed in the upper part with copious, prominent, capitate, tawny hairs, giving it a reddiſh hue, eſpecially when old. *Stem* twelve or eighteen inches high; branched above, at firſt corymboſe, then racemoſe. *Leaves* ſeſſile, alternate, rather diſtant, obtuſe; the lower ones about a finger's length, with ſhort, triangular, diſtant teeth, and intermediate ſinuſes; the uppermoſt gradually ſmaller and entire. *Flower-ſtalks* naked, or with here and there a linear *bractea.* *Calyx* of from three to five ſcales. Outer ſcales of the *receptacle* like the calyx in ſtructure, but rather longer, very downy at the back; inner ones ſhorter, ſmooth, and more membranous. *Corolla* of a golden yellow in every part.—We cannot help ſuſpecting that what Dr. Roth thus deſcribes as the outer ſcales of the *receptacle,* do in fact belong to the *calyx,* which appears to us compoſed of a row of very numerous equal woolly ſcales, ſurrounded with a few ſhorter external ones, as uſual in many of this tribe.

3. R. *runcinata.* Hoary Rothia. Roth. Catal. n. 3. Willd. n. 3. Ait. n. 2. (Andryala integrifolia; Linn. Sp. Pl. 1136. Syſt. Nat. ed. 12. v. 2. 525. α. Sonchus lanatus; Dalech. Hiſt. v. 2. 1116.)—Stem erect, corymboſe. Leaves downy; the lower ones oblong, runcinate; upper lanceolate, ſlightly toothed. Flower-ſtalks villous, glandular.—Native of the ſouth of Europe. Biennial, twice as large as the foregoing, and varying much in luxuriance. The lower *leaves* are ſtalked. Whole *herb* clothed with fine, denſe, velvet-like pubeſcence, very thick and woolly about the *calyx,* which is moreover beſet with long golden hairs. Roth, very paradoxically, deſcribes the *calyx* as conſiſting of only one or two leaflets, or ſcales, reckoning as ſcales of the *receptacle* what all the world, ſurely, would call a *calyx.* This, therefore, is only a difference of words, and appears ſtill further to invalidate the diſtinction between *Rothia* and *Andryala.* Theſe plants, in reality, require to be all examined and compared, in a living ſtate, by ſome botaniſt accuſtomed to conſider genera on a large ſcale, and who is particularly acquainted with ſyngeneſious plants. We do not profeſs to be, at preſent, furniſhed with materials for the purpoſe.

Rothia, in *Geography,* a town of the iſland of St. Vincent, in York bay. N. lat. 13° 7′. W. long. 61° 16′.

ROTHLA, a town of Bavaria, in the territory of Rothenburg; 8 miles N. of Rothenburg.

ROTHMUNSTER, a princely abbey of Germany, on the Neckar, given as an indemnity, in the year 1802, to the prince of Hohenlohe; 2 miles S. of Rothweil.

ROTHWEIL, a town of Wurtemberg, ſituated on the Neckar, being a very ancient imperial town, and which the emperors Charles IV. and Wenceſlaus engaged to maintain as ſuch. It is chiefly remarkable for its imperial tribunal, the firſt traces of which are to be found in the provincial court of Swabia, which ſeems to have originated in the time of the emperor Louis of Bavaria, and, till the middle of the 15th century, was ſometimes called the provincial court of the emperor, and ſometimes the imperial tribune of Rothweil. In the year 1802 it was given to the duke of Wurtemberg; 44 miles S.S.W. of Stuttgart. N. lat. 48° 7′. E. long. 8° 34′.

ROTHWELL, called alſo Rowell, a town and pariſh in the hundred of Rothwell, and county of Northampton, England, is ſituated 4 miles N.W. by W. from the town of Kettering, and 78 miles N.W. by N. from London. This place is ſaid to derive its name from two remarkable ſprings in the vicinity, the water of one of which is of a petrifying quality, and in the other are frequently found numerous ſmall bones, conjectured to be thoſe of frogs. Here was a ſmall priory of Auguſtine nuns, dedicated to St. John Baptiſt, and which was probably founded by the Clare family, whoſe ſucceſſors in the manor appear, upon record, as its patrons. Rothwell was formerly a conſiderable market-town, but the market has been long diſcontinued. The market-houſe is worthy of attention, from the ſtyle of the building. It was begun by ſir Thomas Treſham, but never completed, owing to his death, which happened in the third year of James I. His ſon and ſucceſſor, Francis Treſham, was providentially the inſtrument of the diſcovery of the gunpowder-plot, by ſending a letter to lord Monteagle, who had married Mr. Treſham's ſiſter, and thus led to the detection of the conſpiracy.

In the church are ſeveral monumental memorials of the Treſham family, and others for different perſons. Rothwell has an annual fair, held on Trinity-Monday. According to the returns to parliament in 1811, the pariſh contains 330 houſes, and 1451 inhabitants.

In the hundred of Rothwell, at Great Oxendon, is a remarkable echo in the belfry of the church-tower. To a perſon ſtanding at the diſtance of 673 feet, on the weſtern part of the elevated ground on which the church is built, this echo returns diſtinctly thirteen ſyllables. An echo, but not to an equal extent, is obtainable from the top of an adjacent hill to the ſouth; but ſcarcely any exiſts on the eaſtern or northern ſides of the tower. But it is ſaid, that the effect has lately been conſiderably diminiſhed, by alterations which have been made in the belfry-windows.

Braybrooke church, between Oxendon and Rothwell, exhibits a very curious and highly decorated monument, erected for ſir Nicholas Griffin, knight, who died in 1509. It diſplays an aſſemblage of pedeſtals, ſhields, creſts, and other ornaments, very characteriſtic of the age of queen Elizabeth.

Kelmarſh-hall, on the one ſide of Rothwell, and Ruſhton-hall, on the other, are noble family manſions; and the latter in particular is very beautifully ſituated.

Robert Talbot, one of our early Engliſh antiquaries, who flouriſhed about 1546, was a native of Thorpe Malſor, a village between Rothwell and Kettering. He was the friend and aſſociate of Leland, and both Camden and Burton ſeem to have made conſiderable uſe of his annotations on the Itinerary of Antoninus. Hiſtory, &c. of Northamptonſhire, by Bridges and Whalley, 2 vols. folio. A new edition, with large additions and corrections, of this work, is now preparing by Mr. George Baker of Northamptonſhire.

ROTHWENSDORF, a town of Saxony, in the margraviate of Meiſſen; 3 miles S. of Pirna.

ROTIME, a town of Fez, near the Atlantic.

ROTKNUSSEL, in *Ornithology,* a name by which the Germans call the *gallinula melampus* of Geſner. It is a bird ſomewhat approaching to the ſnipe-kind; its back is brown, with a ſlight admixture of reddiſh, and ſome ſpots of a duſky colour; its wings are variegated with black and white, and its

its beak and legs are black. It is common in many parts of Germany. See GLAREOLA *Nævia*.

ROTLESREUT, in *Geography*, a town of Germany, in the principality of Culmbach; 5 miles S.E. of Culmbach.

ROTMEINSDORF, a town of the duchy of Wurzburg; 2 miles E. of Ebern.

ROTNEBY, or RONNEBY, a ſea-port town of Sweden, near a river of the ſame name, which runs into the Baltic. It has ſome trade, a harbour, medicinal ſprings, and ſeveral manufactures. The inhabitants are free of Carlſcrona; 9 miles W. of it.

ROTOLO, an Egyptian weight of twelve ounces, each ounce conſiſting of twelve drachms, and each drachm of ſixteen carats. See ROTTOLO.

ROTONDO, ROTUNDO, in *Architecture*, a popular term for any building that is round both within and without-ſide, whether it be a church, hall, a ſaloon, a veſtibule, or the like.

The moſt celebrated rotondo of antiquity is the Pantheon at Rome, dedicated to Cybele, and all the gods, by Agrippa, ſon-in-law of Auguſtus; but ſince conſecrated by pope Boniface IV. to the Virgin, and all the ſaints, under the title of Sta. Maria della Rotondo.

The chapel of the Eſcurial, which is the burying-place of the kings of Spain, is alſo a rotondo; and, in imitation of that of Rome, is alſo called Pantheon.

ROTONDO, in *Geography*, a town of Naples, in the province of Baſilicata; 6 miles S.S.E. of Turſi.

ROTROU, JOHN DE, in *Biography*, a French dramatic writer, was born, in 1609, of an ancient family at Dreux. He diſtinguiſhed himſelf by a great facility in compoſing dramatic pieces, both in tragedy and comedy. In this line of literature he was ſo far ſuperior to his predeceſſors, that he is denominated by Voltaire "the founder of the theatre." He was patronized by cardinal Richelieu, and Corneille uſed to call him his father. He was always a needy man, and wrote moſt of his pieces under the preſſure of immediate neceſſity, ſo that he never had an opportunity of giving a finiſh to them. At length, however, he was enabled to purchaſe the office of lieutenant-particular of his native place, where he conſtantly reſided. A peſtilential diſorder breaking out, and making great ravages at Dreux, he was intreated by his brother to quit that town, and come to Paris; but his reply ſhewed that he was reſolved to remain on the ſpot where his duty placed him. In one of his letters he ſaid, "At the moment I am writing, the bell is tolling for the twenty-ſecond death this day: my turn will come when it pleaſes God." He died in a very ſhort time after this, in the 41ſt year of his age. Of his numerous plays, the beſt are "Choſroes," "Antigone," and "Wenceſlaus." The latter was revived by Marmontel, and Voltaire ſpeaks of ſeveral parts of it in the higheſt terms.

ROTSCHOWALM, in *Geography*, a ſea-port of Ruſſia, in the government of Viborg, ſituated on the north coaſt of the gulf of Finland, on the borders of Sweden, formed by ſeveral iſlands, fortified with forts and redoubts.

ROTSCHWENTZEL, in *Ornithology*, the name of a bird deſcribed by Geſner, and ſome other authors, and ſeeming to be the ſame with our *ruticilla*, or red-ſtart. See MOTACILLA *Phœnicurus*.

ROTSIMPA, in *Ichthyology*, a name given by the Swedes to a ſpecies of cottus, called by Jonſton and Schonveldt *ſcorpius marinus*. It is different from the ſcorpæna of the generality of writers, and is of the cottus kind. It is diſtinguiſhed by Artedi under the name of the *ſmooth cottus*, with many thorns upon the head, and with the upper jaw ſomewhat longer than the under one. See COTTUS *Scorpius*.

ROTSUSTA, in *Geography*, a river of Walachia, which runs into the Podrus, 5 miles N.W. of Strehaja.

ROTTBOLLIA, in *Botany*, ſo named by the younger Linnæus, after Dr. Chriſtian Friis Rottböll, Profeſſor of Botany, as well as of Anatomy, in the univerſity of Copenhagen, who died in 1797, aged 70. He is particularly diſtinguiſhed by his deſcriptions and figures of new or rare plants, a thin folio, publiſhed in 1773, with 21 very neat and accurate plates. As this volume contains only plants of the order of *Calamariæ*, it is uſually quoted *Rottboll's Gramina*, or Graſſes, though that appellation is not preciſely correct. The ſame writer has publiſhed ſeveral botanical treatiſes beſides, either in the form of univerſity eſſays, or in the Medical Tranſactions of Copenhagen.—Linn. fil. Nov. Graminum Genera, 23, with a figure. Suppl. 13. Schreb. 721. Willd. Sp. Pl. v. 1. 463. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 1. 175. Sm. Fl. Brit. 151. Prodr. Fl. Græc. Sibth. v. 1. 71. Brown Prodr. Nov. Holl. v. 1. 206. Juſſ. 31. Lamarck Illuſtr. t. 48.—Claſs and order, *Triandria Digynia*. Nat Ord. *Gramina*, Linn. Juſſ.

Gen. Ch. *Common Receptacle* cylindrical, thread-ſhaped, jointed, with an oblong excavation on one or two ſides of each joint, at the bottom. *Cal.* Glume lateral, fixed, ſimple or divided, cloſing the hollows of each joint, and containing one or two florets. *Cor.* Glume concealed by the calyx, of one or two membranous unawned valves. *Stam.* (in each floret) Filaments three, capillary; anthers linear, forked at each end, hanging out of the floret. *Piſt.* (in one floret only of each joint) Germen oblong, abrupt, convex at one ſide, concave at the other; ſtyles two, capillary; ſtigmas feathery, prominent. *Peric.* none, except the hollow of each finally ſeparated joint, cloſed with the calyx. *Seed* ſolitary, the ſhape of the germen.

Eſſ. Ch. Calyx fixed, nearly ſingle-flowered, ſimple or divided. Flowers alternate, on a jointed common ſtalk.

Obſ. The genera which our learned friend Mr. Brown has ſeparated from *Rottbollia* will be found mentioned under the articles HEMARTHRIA, LEPTURUS, OPHIURUS, and MICROCHLOA. The laſt we conceive to be the moſt diſtinct. We ſhall here take the genus *Rottbollia* as it ſtands in Linnæus and Willdenow, and have drawn up the generic character accordingly.

1. R. *incurvata*. Sea Hard-graſs. Linn. Suppl. 114. Willd. n. 1. Ait. n. 1. Fl. Brit. n. 1. Fl. Græc. t. 91. Engl. Bot. t. 760. Knapp. Gram. t. 103. Fl. Dan. t. 938. (Aegilops incurvata; Linn. Sp. Pl. 1490.)—Spike round, awl-ſhaped, incurved. Glume of the calyx awl-ſhaped, cloſe-preſſed, deeply divided. Stipula very ſhort, abrupt.—Native of the ſandy ſea-coaſts of Europe. A ſmall annual graſs, flowering in Auguſt. The *root* conſiſts of numerous long capillary fibres. *Stems* numerous, decumbent at the baſe, from three inches to a foot long, branched, jointed, leafy, round, ſlender, very ſmooth. *Leaves* linear, acute, narrow, rough on the upper ſurface and edges; their *ſheaths* a little ſwelling, ſmooth, ſtriated, ſhorter than the leaves, each crowned with a ſhort blunt *ſtipula*. *Spikes* ſolitary at the end of each branch, rigid, long and ſlender, more or leſs curved. *Calyx* ſpreading whilſt in full bloom. *Florets* ſolitary, perfect, all fertile.

2. R. *filiformis*. Thread-ſhaped Hard-graſs. Roth. Catal. v. 1. 21. Nardus gangitis; Herb. Linn. (Gramen junceum nodoſum minimum capillare; Barel. Ic. t. 117. f. 1.)—Spike thread-ſhaped, ſlightly compreſſed, erect.

erect. Glume of the calyx ſword-ſhaped, deeply divided. Stipula elongated, lanceolate, obtuſe, jagged.—Native of the ſouth of Europe. Much more ſlender than the former, with a purpliſh *ſtem*, and ſmaller, rougher, channelled *leaves*. *Florets* more crowded together. This is certainly what Linnæus had in his herbarium for *Nardus gangitis*, when he deſcribed that plant in his Sp. Pl. ed. 1. 53, though the mark of a croſs indicates that he had ſome doubts concerning it. Thoſe doubts aroſe from the ſynonyms quoted in the Sp. Pl. which have nothing to do with the graſs before us. Their hiſtory may be found in Tranſ. of Linn. Soc. v. 1. 116.

3. R. *cylindrica*. Stout Hard-graſs. Willd. n. 3. (Gramen loliaceum junceum majus; Barel. Ic. t. 5. G. loliaceum, ſpicis articuloſis erectis; Mont. Gram. 43. f. 28. G. myuros, &c.; Bocc. Muſ. 70. t. 59.)—Spike round, awl-ſhaped, ſlightly curved. Glume of the calyx undivided.—Native of the ſouth of Europe. This appears to be of a ſtouter habit than even the firſt ſpecies, but we know nothing of it, except from the authors quoted. Monti ſays it differs from *R. incurvata* in having the glume of the *calyx* undivided.

4. R. *Thomæa*. Mouſe-tail Hard-graſs. Willd. n. 4. Roxb. Corom. v. 2. 17. t. 132. (R. piloſa; Willd. n. 7. Nardus Thomæa; Linn. Suppl. 105.)—Spike linear, compreſſed, nearly ſtraight. Florets imbricated, in two rows.—Gathered by Koenig on the mountain of St. Thomas in Tranquebar. A ſmall, glaucous, denſely tufted graſs, whoſe *leaves* are fringed with long hairs. *Spikes* ſolitary on each ſtem; their common ſtalk zigzag at each of the flat ſides of the ſpike, but not perceptibly jointed. *Florets* imbricated cloſely, in an alternate order, along each edge of the ſpike. Glume of the *calyx* keeled, undivided, a little recurved at the point.

5. R. *repens*. Creeping Hard-graſs. Forſt. Prodr. 9. Willd. n. 5. (Lepturus repens; Brown Prodr. Nov. Holl. v. 1. 207.)—Spike round, awl-ſhaped. Glume of the calyx undivided. Sheath of the leaves bearded at the top. Root creeping.—Native of the South Sea iſlands, and the tropical part of New Holland, on ſandy ſea-ſhores. *Branches* aſcending. *Leaves* imperfectly two-ranked, ſtraight, linear, rather involute; their ſheaths bearded, with ſcarcely any viſible *ſtipula*. *Spike* thread-ſhaped, acute, beardleſs; its joints ſeparable. *Glumes* of the calyx pointed, longer than their correſponding joints. *Brown*.

6. R. *lævis*. Smooth Hard-graſs. Retz. Obſ. faſc. 3. 11. Willd. n. 6.—Spike cylindrical. Joints two-flowered. Glumes of the calyx oblong, obtuſe, undivided, very ſmooth, the length of the joint.—Native of Tranquebar. *Roots* apparently perennial, with ſtrong fibres. *Stems* aſcending, a foot or more in height, ſcarcely branched, leafy. *Leaves* denſely tufted at the root, ſhort, broad and flat, ſmooth; their ſheaths denſely bearded, without any membranous *ſtipula*: ſtem-leaves ſhort, diſtant, with long ſheaths. *Spikes* terminal, ſolitary, erect, three or four inches long, pale, ſmooth, each joint furrowed, with two lateral, not quite oppoſite, hollows. *Glume* of the calyx very ſmooth and even like ivory, with an obtuſe, oblique, greeniſh point, and a little furrowed at the very baſe.

7. R. *compreſſa*. Flat-ſpiked Hard-graſs. Linn. Suppl. 114. Willd. n. 8. Retz. Obſ. faſc. 3. 12. Roxb. Corom. v. 2. 30. t. 156. (Hemarthria compreſſa; Brown Prodr. Nov. Holl. v. 1. 207.)—Spike compreſſed, awl-ſhaped, incompletely jointed. Joints two-flowered. Outer glume of the calyx undivided; the points of all the glumes ſtraight.—Native of the Eaſt Indies, China, and New South Wales, about ponds. *Stems* compreſſed, leafy. *Leaves* ſmooth, naked, with compreſſed ſheaths. A ſtalked tuft of *ſpikes*, accompanied by a leafy *involucrum*, ſprings from the upper ſheaths. *Calyx* of two valves; one of them internal.

8. R. *uncinata*. Hooked Hard-graſs. (Hemarthria uncinata; Brown Prodr. Nov. Holl. v. 1. 207.)—Spike compreſſed, awl-ſhaped, incompletely jointed. Joints two-flowered. Outer glume of the calyx undivided; the point of the inner one hooked.—Gathered by Mr. Brown in the iſland of Van Diemen.

9. R. *hirſuta*. Great Hairy-ſpiked Hard-graſs. Vahl. Symb. faſc. 1. 11. Willd. n. 9. (Triticum ægilopoides; Forſk. Ægypt-Arab. 26.)—Spike awl-ſhaped, very hairy. Calyx of the perfect florets ſpreading; of the male ones cloſe-preſſed. Stem angular in the upper part.—Native of Egypt; not unfrequent about Alexandria, flowering in March. We have ſpecimens from Dr. Delile, who informs us that a figure of this graſs is deſtined for the great work, deſcriptive of Egypt, part of which has already appeared at Paris. The *ſtem* is branched, rigid, about two feet high, leafy, jointed, the upper joints angular, being flattened at one ſide, ſtriated, a little roughiſh. *Leaves* involute, rigid; their ſheaths ſmooth, ſtrongly furrowed, crowned with a tuft of hairs; the upper ones ſomewhat inflated. *Spike* ſolitary, partly enveloped in the uppermoſt ſheath, about three inches long, rather compreſſed. *Glumes* lanceolate, taper-pointed, emarginate, clothed externally with copious, long, white hairs.

10. R. *Cymbachne*. Boat-valved Hard-graſs. Willd. n. 10. (Cymbachne ciliata; Retz. Obſ. faſc. 6. 36.)—Spikes in pairs, flowering at one ſide only. Calyx of the perfect florets with an inner, boat-like glume. Leaves fringed at the baſe.—Found by Koenig in Bengal. A ſlender graſs, a foot high, with ſeveral, ſimple or branched, *ſtems*; the latter bearing one leaf, the others leafleſs. *Leaves* ſhort, thin, fringed at the margin, above the ſheath, with long, white, ſeparate hairs; ſheath abrupt, pale-brown at the ſummit, fringed. *Spikes* terminal, in pairs, linear, an inch and a half long, ſome conſiſting of perfect, the others of female, *flowers*. *Common ſtalk* linear, membranous, flat at the back, with three longitudinal furrows; zigzag, with alternate hollows, in front. *Calyx* of the *perfect flowers* of two valves, ſingle-flowered, both of them parallel and expoſed to view, cloſe-preſſed to the common ſtalk, or receptacle; the outermoſt valve linear, obtuſe, fringed at the back; innermoſt half-ovate, acute, boat-ſhaped, greatly compreſſed, ſtriated, coloured, fringed at the back, incloſing the corolla. *Anthers* and *ſtigmas* black. *Female flowers* with a ſingle-valved, cloſe-preſſed, ovate, fringed *calyx*, ſlightly cloven at the point. *Corolla* and *ſtamens* wanting. *Stigmas* longer than in the former. *Retzius*.

11. R. *Coelorachis*. Hollow-ſtalked Hard-graſs. Forſt. Prodr. 9. Willd. n. 11.—"Spike round, flowering at one ſide only. Florets in pairs; one of them ſtalked. Calyx of two valves."—Native of the iſland of Tanna. We have ſeen no ſpecimen. Mr. Brown mentions this as one of the few certain *Rottbölliæ*, according to his own ſtrict limitation of the genus. We preſume, from the name, that Forſter had originally conſidered this plant as conſtituting a diſtinct genus; and that he named it in alluſion to the hollows of the common receptacle; which, nevertheleſs, are proper to *Rottböllia*.

12. R. *dimidiata*. Half-ſpiked Hard-graſs. Linn. Suppl. 114, excluding the ſynonym. Willd. n. 12.—Spikes

 compreſſed,

compressed, flowering at one side; striated with undulating lines at the other. Flowers two to each joint, one rather above the other, with short abrupt scales at their base.—Native of the East Indies, and of the Brasils, in sandy ground. Whether Thunberg's Cape plant be the same, we are not certain, there being some confusion between our *Rottböllia* and the *Panicum dimidiatum* of Linnæus; which latter we have never seen, but Koenig and Retzius insisted on their being two very different things. *R. dimidiata* is a stout, branched, smooth grass, with very broad, obtuse, spreading *leaves*, whose sheaths, like the *stem*, are very much compressed. *Spikes* several, on solitary or clustered, simple, axillary and terminal, stalks, two or three inches long, about their own length. Each *spike* is tapering, stout, jointed, curiously striated at the back, with alternately curved and recurved lines; bearing, at the opposite side, on each joint, two angular *flowers*, one elevated above the other, and each accompanied by a short scale at the base. The structure of the *flowers* we have not been able to examine.

13. R. *exaltata*. Tall Hard-grass. Linn. Suppl. 114. Willd. n. 13. Brown Prodr. n. 1. Roxb. Corom. v. 2. 30. t. 157. (Stegosia cochinchinensis; Loureir. Cochinch. 51, on the authority of a specimen from the author, in the Bankslian herbarium.)—Spike round, flowering on every side, beardless. Glumes obtuse, rough as well as the common receptacle. Leaves and their sheaths hairy.—Native of the East Indies, and of Cochinchina. A tall grass, with a solid *stem*. Sheaths of the *leaves* furrowed, besprinkled with elevated points, each bearing a bristle. *Spikes* solitary, lateral, four or five inches long.

14. R. *formosa*. Silky Hard-grass. Brown n. 2.—"Spike round, flowering on every side; its joints, as well as the outer glumes of the perfect flowers, silky; those of the neuter ones smoothish and empty."—Gathered by Mr. Brown in the tropical part of New Holland.

15. R. *perforata*. Perforated Hard-grass. Roxb. Corom. v. 2. 43. t. 182.—Spike round, flowering on every side, beardless. Glumes obtuse, smooth. Common receptacle perforated in each joint, between the opposite flowers. Leaves smooth. Sheaths woolly at their summit.—Native of low rich pasture-ground on the coast of Coromandel, but rare. *Root* fibrous. *Stems* several, about two feet high, erect, round, jointed, solid, slender, smooth, leafy. *Leaves* small, narrow, smooth, except at their edges. *Sheaths* very woolly at the summit within, which woollinesS extends a little way up the leaf. *Spikes* solitary, stalked, terminal and axillary, slender, erect, four or five inches long. *Flowers* two to each of the lower joints, opposite; one to each of the upper ones; sometimes all perfect; sometimes many of them have *stamens* only. This, like most of the other species, is a coarse grass, not eaten by cattle.

16. R. *corymbosa*. Corymbose Hard-grass. Linn. Suppl. 114. Willd. n. 14. Roxb. Corom. v. 2. 42. t. 181. (R. punctata; Retz. Obs. fasc. 3. 12. Ægilops exaltata; Linn. Mant. 575. Retz. Obs. fasc. 2. 27. Ophiurus corymbosa; Brown Prodr. Nov. Holl. v. 1. 207.)—Spikes aggregate, thread-shaped, smooth. Glume of the calyx ovate, obtuse, undivided, with reticulated depressions.—Native of ditches on the coast of Malabar, as well as of the tropical region of New Holland. The *stem* is tall, round, leafy, finely striated, smooth. *Leaves* flat, with long smooth sheaths. *Spikes* purplish, many together, slender, in tufts, on simple or compound, smooth, cylindrical stalks, from the sheaths of the short uppermost leaves. Glume of each *calyx* the length of the joint, a little spreading, at least in the dry specimen, and curiously reticulated at the outside.

17. R. *digitata*. Finger-spiked Hard-grass. Sm. Fl. Græc. Sibth. v. 1. 73. t. 92.—Spikes terminal, clustered. Receptacle angular, rough. Flowers partly stalked. Glumes keeled, taper-pointed. Sheaths of the leaves hairy. Gathered by Dr. Sibthorp in the low country about the base of the Bithynian Olympus. This is a large grass, three feet high, with all the appearance of being perennial. *Stem* branched, leafy, round, smooth. *Leaves* a foot or more in length, moderately spreading, flat, acute, rather glaucous, with a pale central rib; their upper side rough, and often hairy; their sheaths long, close, ribbed, dotted and hairy. *Stipula* of a few short hairs. *Spikes* several, from nine to twelve inches long, erect, forming an oblong tuft at the top of the stem; rarely solitary. *Receptacle*, or *common stalk*, of each zigzag, angular, rough-edged, every joint accompanied at its concave smooth side by two *flowers*, one sessile, the other on a stout, angular, club-like stalk, half the length of the corresponding joint. *Calyx* of two unequal, awl-shaped, rough-keeled valves; that of the stalked flower containing two *florets*, one of which is male; that of the sessile flower only a solitary *floret*, sometimes perfect, sometimes furnished merely with *stamens*. *Corolla* in all the florets of two pellucid white glumes, shorter than the calyx. *Anthers* and *stigmas* yellow.

18. R. *muricata*. Prickly Hard-grass. Retz. Obs. fasc. 3. 12. Willd. n. 15. (Ægilops muricata; ib. fasc. 2. 27.)—"Spikes round, several together, on long stalks. Calyx fringed with prickles; the neutral ones cloven."—Found in the East Indies, by Koenig.—*Stems* angular, leafy. Sheaths of the *leaves* fringed. *Spikes* axillary, two or three together, thicker than in *R. exaltata*, each on a long stalk. *Calyx* slightly downy, fringed with marginal prickles.

19. R. *sanguinea*. Red-flowered Hard-grass. Retz. Obs. fasc. 3. 25. Willd. n. 16.—Spikes axillary, alternate, stalked, approximated. Corolla awned at the base.—Native of China.—*Stem* semi-cylindrical, jointed, leafy; the upper joints invested with dilated, hood-like sheaths, from each of which springs a solitary spike, on a long stalk, the latter concealed by the sheath. *Spikes* thread-shaped. *Flowers* alternate. *Corolla* red, with a long awn from its base. Retzius's description of a *bractea*, as well as of the parts of the flower, is not clear to us without a specimen. He says this grass has entirely the aspect of an *Andropogon*.

R. monandra, Cavan. Ic. v. 1. 27. t. 39. f. 1. Leccion. 52, seems rather a species of *Nardus*, and is, we believe, the *N. aristata* of Linnæus, under which name it was sent to Mr. Davall, by signor Molineri, from Piedmont. See NARDUS, n. 2, where Cavanilles may safely be cited.

ROTTE, in *Geography*. See ROTAI.

ROTTELN, a town of the duchy of Baden; five miles N.N.E. of Bâle.

ROTTEN STONE, in *Mineralogy*, a decomposed stone, used for polishing. See TRIPOLI.

ROTTENBACH, in *Geography*, a town of Bavaria, in the territory of Nuremberg; three miles S.S.W. of Lauf.

ROTTENBERG, a town of Bavaria; 14 miles N.N.W. of Landshut.

ROTTENDEAN, a village of England, in Sussex, very near the sea, and frequented for sea-bathing; four miles S. of Brighthelmstone.

ROTTENEG, a town of Austria; 13 miles S.W. of Freystatt.

ROTTENMANN, a town of the duchy of Stiria; 20 miles

miles N.W. of Judenburg. N. lat. 47° 26′. E. long. 14° 8′.

ROTTENNESS, Putredo. See Putrefaction.

ROTTENSTEIN, in *Geography*, a town of Bohemia, in the circle of Konigingratz; eight miles W.N.W. of Geyersberg.

ROTTERDAM. See Anamooka.

Rotterdam, a fortress in the island of Celebes, near Macassar, belonging to the Dutch. It lies about 800 feet from the beach, opposite to the road of Macassar, where a pier-head extends, which serves for unloading of the ships, and close to which there are 15 or 16 feet of water. The church is a neat building, and has room for 200 persons. The walls of the fortress are high and strong, and constructed of rock-stone. See Vlaardingen.—Also, a small island in the gulf of Manaar, near the W. coast of the island of Ceylon; 10 miles N. of Manaar.—Also, a town of America, in New York, on the N. side of Oneida lake.—Also, a city and sea-port of Holland, situated on a river named "Rotter," where it joins the Meuse. This place had the privileges of a city not long after the year 1270. It has been accustomed to hold the first rank in the assembly of the states among the small cities of Holland; and next to Amsterdam it used to be reckoned the richest and most flourishing city of the whole state, on account of the convenience of its harbour, where depth of water allowed the largest vessels to enter, and canals facilitated their loading and unloading at the warehouses of the merchants. The port of Rotterdam was more frequented by British traders than that of Amsterdam, because when vessels had weighed anchor, one tide brought them out to sea. Among the principal buildings are the town-house, the bank, the East and West India houses, the arsenal, and some of the churches, particularly that dedicated to St. Laurens. On the E. side of the city are a large basin and dock, for the purpose of building and launching vessels in the service of the Admiralty, and the East India Company. The magistracy consists of a council of 24, out of which are elected four burgomasters, a grand bailiff, and seven echevins. Besides the magistracy of the city, here are also three other tribunals, *viz.* the college of the grand bailiff, or dyckgrave of Schieland, and council, composed partly of nobility and partly of the cities of Rotterdam, Goude, and Schiedam, that hold their assemblies at Rotterdam, in a house called Landhuys, whose business it is to inspect the dykes, superintend the roads and canals, and take care of every thing that pertains to the environs of the city; the second tribunal is that of the judges of Schieland, whose jurisdiction extends over what does not belong particularly to the magistrates of cities; the third is the college of the lords of the admiralty for the Meuse, who have a house appropriated to that business. Rotterdam was the birth-place of Erasmus, and it is said that his statue still remains, and also the house in which he was born. The streets are long and generally narrow, and the foot pavement is only distinguished by a clean line of bricks; the population is estimated at about 48,000 people; 30 miles S.S.W. of Amsterdam. N. lat. 51° 55′. E. long. 4° 24′.

ROTTES, a town of Norway; 50 miles N.E. of Romsdal.

ROTTI, an island in the gulf of Venice, near the coast of Friuli. N. lat. 45° 45′. E. long. 12° 9′.

ROTTINGEN, a town of the duchy of Wurzburg, on the Tauber; 13 miles W.N.W. of Rottenburg.

ROTTL, a river of Austria, which runs into the Danube, six miles above Lintz.

ROTTLERA, in *Botany*, is so called in honour of the Rev. Dr. Rottler, Danish missionary at Tranquebar, who like several of his brethren in that remote situation, has alleviated his more serious occupations with the study of plants; and, besides acquiring himself a considerable knowledge of botany, has been eminently serviceable to the science, by his communications to his European friends. The original *Rottlera* of Willdenow proving the identical *Trewia nudiflora* of Linnæus, the present, chosen by Dr. Roxburgh, has been received subsequently by Willdenow, as well as in Hort. Kew. Thus the *Rottlera* of Vahl, in his *Enumeratio*, v. 1. 87, is superseded, and if a good genus, must have another name.—Roxb. Coromand. v. 2. 36. Willd. Sp. Pl. v. 4. 832. Ait. Hort. Kew. v. 5. 406.—Class and order, *Dioecia Icosandria*. Nat. Ord. *Tricoccæ*, Linn. *Euphorbiæ*, Juss.

Gen. Ch. Male, *Cal.* Perianth of one leaf; tube short; limb in four deep, ovate, reflexed segments; the two opposite ones rather the smallest. *Cor.* none. *Stam.* Filaments between thirty and forty, capillary, erect, inserted into the tube of the calyx, and about the length of its limb; anthers linear, cloven at each end.

Female, on a separate tree, *Cal.* Perianth inferior, bell-shaped, with four erect teeth. *Cor.* none. *Pist.* Germen superior, ovate, powdery; styles three, reflexed; stigmas feathery. *Peric.* Capsule roundish, powdery, three-lobed, three-celled, three-valved, the partitions from the centre of each valve. *Seeds* solitary, globose.

Ess. Ch. Male. Calyx deeply four-cleft, reflexed. Corolla none. Stamens thirty to forty.

Female. Calyx four-toothed, erect. Corolla none. Styles three. Capsule superior, three-lobed, three-celled. Seeds solitary.

1. R. *tinctoria*. Dyer's Rottlera. Roxb. Corom. v. 2. 36. t. 168.—Native of the inland mountainous parts of the circars of Hindoostan, flowering in the cold season. Dr. Roxburgh never found it any where else. This is a middle-sized, erect, branching *tree*. *Leaves* alternate, stalked, elliptic-oblong, acute, entire, from four to eight inches in length, three-ribbed and veiny; nearly smooth above; downy beneath; furnished at their base with two brown glands. *Footstalks* round, downy, from one to three inches long. *Flowers* small, in clusters, about the tops of the branches, axillary and terminal; the latter branched. *Capsules* the size of a small cherry, clothed with abundance of deep red granular powder, easily rubbed off. This powder is a valuable article of commerce, being much esteemed, especially among the Moors, for dyeing silk of a deep, bright, very beautiful and durable, full-orange or flame-colour. When the capsules are ripe, in February or March, they are gathered, and the powder carefully brushed off. It is preserved without any further process, and is sold to the merchants trading to Hydrabad, and other inland parts. This substance is but little acted upon by water, except with the admixture of alkaline salts, when it gives out a very deep blood-red colour. To spirits it communicates a rich, deep, reddish flame-colour; but in neither instance does it dissolve, the grains remaining entire, like sand. The inhabitants know this powder by the name of *Wassunta-gunda*, and use it in the following manner. To four parts of *Wassunta-gunda* are added one of alum, and two of salt of soda, native barilla. These are rubbed well together, with a portion of expressed oil of *Sesamum*, so small as hardly to be perceived. When well mixed, the whole is put into boiling water, in quantity proportioned to the silk which is to be dyed, and kept boiling smartly, more or less time, according to the shade required. The silk is turned frequently, to render the colour uniform.

ROTTO-

ROTTOCOMB, in *Geography*, a town of Africa, in Bornou; 8 miles S. of Bornou.

ROTTOFREDO, a town of the duchy of Piacenza; 5 miles W. of Piacenza.

ROTTOLO, in *Commerce*, a weight used in Italy and the Levant. At Aleppo, and its port Scanderoon, the cantaro contains 100 rottoli, each of which is subdivided into 12 ounces, or 720 drachms; the great cantaro of Tripoli contains 175 rottoli, and the zurlo consists of $27\frac{1}{2}$ rottoli. This rottolo, with which most sorts of goods are weighed, weighs 5lbs. avoirdupois nearly. The rottolo with which the silks from Tripoli, and other parts of Syria, are weighed, consists of 700 drachms, answering to $4\frac{7}{8}$ avoirdupois. The rottolo used in weighing the Persian silks contains 680 drachms, or nearly $4\frac{3}{4}$ lbs. avoirdupois. The rottolo of Damascus, with which brass, camphor, benzoin, spikenard, balsam of Mecca, and other drugs are weighed, contains 600 drachms, or $4\frac{1}{8}$ lbs. avoirdupois. Five rottoli, or 3600 drachms, make what is called a *vesno*; which see. At Saide, in Syria, (the ancient Sidon,) silk and sattin yarn are weighed with the rottolo of Damascus, of 600 drachms; 100 such rottoli answering to about 410 lbs. avoirdupois. Heavy goods are weighed with the rottolo of Acre, 100 of which are = 482 lbs. avoirdupois. At Constantinople, the cantaro, or quintal, contains 44 okes, or 100 rottoli; and the cantaro weighs about $123\frac{3}{4}$ lbs. avoirdupois, the oke 2 lbs. 13 oz., and the rottolo $19\frac{3}{8}$ oz., and the chequee $11\frac{1}{4}$ oz. avoirdupois. At Leghorn, the rottolo is 3 lbs. At Naples, the cantaro grosso contains 100 rottoli, each weighing $33\frac{1}{3}$ ounces of the gold and silver weight, or $31\frac{3}{7}$ ounces avoirdupois. Hence 28 rottoli = 55lbs. avoirdupois, and the cantaro grosso = $196\frac{1}{7}$ lbs. avoirdupois. The cantaro piccolo is = 106 lbs. avoirdupois nearly.

In Sicily these different weights are used, *viz.* the rottolo grosso of 33 ounces, the rottolo sotile of 30 ounces, and the libra, or pound of 12 ounces. 10 lbs. of Sicily = 7 lbs. avoirdupois nearly; and, therefore, 40 rottoli grossi, or 44 rottoli sotile = 77lbs. avoirdupois. A cantaro grosso contains 100 rottoli grossi, or $192\frac{1}{7}$ lbs. avoirdupois; a cantaro sotile is 100 rottoli sottili, and is = 175 lbs. avoirdupois. At Smyrna, the cantaro, or kintal, contains 45 okes, or 100 rottoli. The batman is 6 okes, or 2400 drachms; and the oke is 400 drachms, and the rottolo = 180 drachms. The cantaro of 45 okes weighs 123 lbs. 4 oz. avoirdupois; and, therefore, the oke is = 2 lbs. 11 oz. 13 drs. avoirdupois. At Tripoli, the cantaro weight contains 100 rottoli, each of 6 ounces, or 128 termini; this cantaro answers to 168 lbs. peso sotile of Venice, or about 12 lbs. avoirdupois. At Tunis, the cantaro contains 100 rottoli, each of 16 Tunis ounces, and weighs about 111 lbs. avoirdupois. Kelly's Cambist. See WEIGHT.

ROTULA, in *Anatomy*, the patella or knee-pan. See EXTREMITIES.

ROTULA, *Dislocations and Fractures of*, in *Surgery*. See FRACTURE, and LUXATION.

ROTULA, in *Natural History*, the name of a genus of the echini marini, of the general class of the placentæ. The characters of the rotulæ are, that they are flat shells in form of a cake, composed of various flat pieces, and formed into a round, something like that of a wheel, but wanting one or more parts of its outer ring, and radiated or dentated; their mouth is situated in the middle of the base, and the aperture of the anus in the third region of the axis, and marked with a cinquefoil flower at the summit. The great obvious character is, however, the dentated edge. Of this genus there are two known species.

ROTULA, in *Ichthyology*, is also a name given by some to the faber, or doree.

ROTULI *Magni Ingrossator*. See INGROSSATOR.

ROTULORUM CUSTOS. See CUSTOS.

ROTULUS, a roll. See ROLL.

ROTULUS *Contrarientium*. The earl of Lancaster taking part with the barons against king Edward II., it was not thought fit, in respect of their power, to call them rebels or traitors, but only *contrarients*; accordingly, we have a record of those times called *rotulus contrarientium*.

ROTULUS *Wintoniæ*, an exact survey of all England, by counties, hundreds, and tithings, made under king Alfred, not unlike that of Domesday.

It was thus called, because anciently kept at Winchester among other records of the kingdom.

ROTUNDA FENESTRA, in *Anatomy*, an opening of the cochlea into the tympanum. See EAR.

ROTUNDA *Ligamenta Uteri*, two fibrous cords ascending from the uterus, and passing through the abdominal rings. See GENERATION.

ROTUNDO. See ROTONDO.

ROTUNDUM FORAMEN, in *Anatomy*, an opening of the sphenoid bone. See CRANIUM.

ROTUNDUS, a name given to several muscles from the roundness of their body.

Such are the *rotundus major*, called also *teres major*, and the *rotundus minor*, called also *teres minor*, and *transversalis*.

ROTUNDUS, *Pronator Radii*. See PRONATOR.

ROTZ, in *Geography*, a town of Austria; 24 miles N. of Tulln.

ROTZHOF, a town of the duchy of Stiria, on the river Muehr; 16 miles S. of Gratz.

ROU, or PULO ROU, a small island in the Chinese sea, near the coast of Malacca. N. lat. 6° 43′. E. long. 102° 10′.

ROUAD. See RUAD.

ROUAGE, *Battery en*. See BATTERY.

ROUAITHA, in *Geography*. See ROAITHA.

ROUALTHA, a town of Arabia, in the province of Hedsjas; 108 miles S.S.E. of Mecca.

ROVANIEMI, a town of Sweden, in the government of Ulea, on the Kemi; 55 miles N.N.E. of Tornea.

ROUARA, a town of South America, in Guiana.

ROVASIO, a town of France, in the department of the Sesia; 15 miles N. of Vercelli.

ROVATO, a town of Italy, in the department of the Mela; 10 miles W.N.W. of Brescia.

ROUBAIX, a town of France, in the department of the North, and chief place of a canton, in the district of Lille; 6 miles N.E. of Lille. The place contains 8091, and the canton 13,761 inhabitants, on a territory of 40 kiliometres, in four communes.

ROUBAN, a town of Arabia, in the province of Hedsjas; 40 miles S. of Calaat el Moilah.

ROUBBIE′, in *Commerce*, a gold coin of Turkey, which is one-third of the sequin, called Mahbub. See SEQUIN.

ROUCOU, or ROCOU, otherwise called *Annotto* and *Orlean*, is a red dye, formed in masses, from the pellicles of the seeds of an American tree. That which is commonly met with among us is moderately hard and dry, of a brown colour on the outside, and a dull red within. Labat informs us, that the Indians prepare a dye of this sort much superior to that which is brought to us; of a bright shining red colour, almost equal to carmine. For this purpose, instead of steeping and fermenting the seeds in water, they rub them with the hands, previously dipt in oil, till the pellicles come off

off and are reduced into a clear paste, which is scraped off from the hands with a knife, and laid on a clean leaf, in the shade, to dry. De Laet, in his notes on Marcgrave's Natural History of Brasil, mentions two kinds of roucou, or annotto; one of a permanent crimson colour, used as a *fucus*, and another which gives a colour inclining more to that of saffron. This last, which is our annotto, he supposes to be a mixture of the first sort with certain resinous matters, and with the juice of the root of the tree. See ANNOTTO.

ROUELLE, in *Geography*, a river of France, which rises near Le Quesnoy, and runs into the Scheldt, at Valenciennes.

ROUEN, a city of France, and capital of the department of the Lower Seine, situated on the Seine; before the revolution the capital of Normandy, and the see of an archbishop; 13 posts S.W. of Amiens. The place contains 87,000, and its six cantons 87,000 inhabitants, on a territory of 15 kiliometres, in one commune. Rouen is large and commercial, has several manufactures, particularly of cotton, and contains 36 parish churches. In the market-place is a statue of the celebrated maid of Orleans, who was burnt here by the English for a witch. In 1117, when the French were defeated by the English in a battle fought here, the city belonged to the king of England, as a part of Normandy; but in the year 1204, it was surrendered to the king of France. In 1418, Henry V. of England commenced a siege which lasted five months; the inhabitants defending the city with persevering firmness and ardour, and enduring the most severe hardships; but they were at last obliged to surrender, on condition of paying 345,000 crowns of gold, and taking an oath of allegiance to the conqueror, who entered on the 19th of January 1419. N. lat. 49° 26′. E. long. 1° 10′.

ROUEN, in *Agriculture*, a term made use of to signify after-grass, or the hay made from this sort of grass. It is sometimes written *Rowet*. See AFTER-*Grass*.

This sort of preserved grass is now found by many farmers, in different districts, to be of vast utility and advantage in the spring season for the support of some part of their store-sheep stock, as that of the ewes during the lambing-time, and those other sheep which are to be kept in good condition. In the county of Norfolk, Mr. Bevan has a high opinion of the great value and use of this kind of grass, sometimes preserving the quantity of twenty-eight or thirty acres of it in an excellent state for the ewes and lambs in the early spring. And near Swaffham, in the same county, Mr. Mason is in the practice of keeping grass of this nature from the end of July, and not turning at all into it until early in the spring of the following year, when the fattening bullocks and sheep, which have had hay during the winter, are put into it. The old grass is found to nurse up a great bite of young growth, and both together carry on the bullocks in a very favourable manner; it is also excellent for sheep; nothing at such a season is supposed to equal it. At Burnham, on an exposed piece of thirteen acres of this sort of grass, open to the sea, and the north-east wind, which Mr. Overman kept from Midsummer, ten score and sixteen ewes and their lambs were turned in on the 27th of March, and it kept them well a whole month. It is asserted, that they would have been half starved without it; but that by means of it they were fully supported, to the surprise of many who saw them feeding. This piece was fully *tathed* in every part.

The same system of practice is also found equally useful and important in the county of Essex. Mr. Kitcher, of this district, is in the habit of laying up a pasture of this sort of spring food for his sheep, finding it of such astonishing use, that he is determined not to be without so great a resource. And at Ongar, Mr. Dyer shuts up grass for the use of his sheep, both ewes and lambs, in March and the following month: it is found that the young grass shoots up with it in an extraordinary manner, and that his flock does better on it than on turnips. Also at Gosfield, Mr. Thurlow shuts up a space of grass from the beginning of September to the lambing-time, and finds it of very considerable advantage to his flock.

ROVER. See PIRATE.

ROVERBELLA, in *Geography*, a town of Italy; 12 miles N.N.W. of Mantua.

ROVEREDO, or ROVEREITH, a town of the county of Tyrol, with a strong citadel, built by the lords of Castelbarco; but in the year 1414, it was taken from them by the Venetians, from whom Maximilian I. wrested it again by the sword, and incorporated it with the county of Tyrol. This town has a manufacture of fine silk, and carries on a great trade. The wine produced in this tract is called "Goccia d'oro," or golden drops. On Sept. 4th, 1796, Roveredo was taken by the French, after a battle in which the Austrians lost 7000 prisoners, 25 pieces of cannon, 50 waggons, and 7 standards; 8 miles S.E. of Trent. N. lat. 45° 53′. E. long. 11° 3′.

ROUERGUE, a province of France before the revolution, about 25 leagues in length, and 18 in breadth, bounded on the E. and S. by Languedoc, on the W. by Quercy, and on the N. by Auvergne. The land, though not very fertile, produces much wood, and here are mines of copper, iron, sulphur, vitriol, &c. The principal rivers are the Tarn and the Lot. The capital city was Rhodez. It now forms the department of the Aveyron.

ROVERO, a town of Italy, in the Trevisan; 9 miles E. of Cismone.

ROVERSANO, a town of Italy, in the department of the Rubicon; 20 miles W. of Rimini.

ROVERSCIO, AL, or *Per Roverscio*, Ital. in *Music*, reversed, inverted. See RIVOLGIMENTO, and RIVOLTARE.

ROVES, in *Ship-Building*, small square pieces of iron with a hole punched in the middle, through which the nail goes, where it is clenched, and binds together the boards of pinnaces, yawls, &c.

ROVETTA, DON GIOVANNI BATISTA, in *Biography*, a Venetian composer, in great favour in the middle of the 17th century, vice maestro di cappello of St. Mark's cathedral, and composer of five or six operas. He likewise was author of Masses and *Madrigali a sei voci concertati*: in scoring one of them, we found the instrumental parts consisted only of two violins, and a base, wholly different from the voice-parts; but, except an introduction or symphony to each movement, and short ritornels, they had little to do. These madrigals were first published in 1625.

ROUEZ *le Guillaume*, in *Geography*, a town of France, in the department of the Sarthe; 3 miles S. of Sille.

ROUFFACH, a town of France, in the department of the Lower Rhine, and chief place of a canton, in the district of Colmar. The place contains 3292, and the canton 11,882 inhabitants, on a territory of 112½ kiliometres, in eight communes.

ROUFFIGNAC, a town of France, in the department of the Dordogne; 9 miles S.W. of Montignac.

ROUGE', a town of France, in the department of the Lower Loire, and chief place of a canton, in the district of Chateaubriant. The place contains 2134, and the canton 7349 inhabitants, on a territory of 160 kiliometres, in five communes.

ROUGE, *Cape*, or *Red Cape*, a cape on the N. side of the island of St. Domingo; four leagues W. of Point Isabellica.

Isabellica.—Also, a cape called "Ras el Hamrah," on the coast of Algiers. N. lat. 37° 5′. E. long. 7° 42′.

Rouge *River*, a river of America, in Louisiana, so called from the colour of its waters, which are said to tinge those of the Mississippi in the time of the floods, rises in New Mexico, and after running about 600 miles, joins the Mississippi 187 miles above New Orleans, 56¾ miles below Fort Rosalie, receiving 30 miles from its mouth the Noir, or black river. About 70 leagues up Rouge river the French had a considerable post, called Natchitoches, being a frontier to the Spanish settlements. Tobacco of a superior quality is cultivated at this post in considerable quantities, and sold at New Orleans.

Rouge *Chapeau*, or *Red Hat*, a cape on the coast of North America. N. lat. 46° 31′. W. long. 55° 26′.

Rouge-*Croix*, q. d. *Red Cross*. See Poursuivants.

Rouge-*Dragon*, q. d. *Red Dragon*. See Poursuivants.

ROUGEMONT, in *Geography*, a town of France, in the department of the Doubs, and chief place of a canton, in the district of Baume; seven miles N. of Baume. The place contains 1260, and the canton 8290 inhabitants, on a territory of 170 kiliometres, in 26 communes.

ROUGET, in *Ichthyology*, a name given by the French to the fish called the *lyra* and *capo* by authors. It is a species of the trigla, and is distinguished by Artedi by the name of the trigla with a long bifid snout and tubulous nostrils. See Trigla.

ROUGH, Roughness, in *Mechanics*. See Friction, and Resistance.

Rough *Casting*. See Plastering.

Rough *Diamond*. See Diamond.

Rough *Emerald*. See Emerald.

Rough-*leaved Plants*. See Plant.

Rough *Taste*. See Taste.

Rough-*Tree Rails*, in *Ship-Building*, are rails along the waist and quarters of ships, nearly breast high, to prevent persons from falling overboard. This term originated from the practice in merchant vessels of carrying their rough or spare gear in crutch irons along their waist.

Rough *Rider*, a person who is indispensably necessary in every cavalry regiment. He is a sort of non-commissioned officer, and should always associate with the serjeants in preference to the private men.

Rough riders are the assistants of the riding-master, and one should always be appointed to each troop. The necessary qualifications for every rough rider (independently of a thorough knowledge of horsemanship) are activity, zeal, and good conduct.

No rough rider ought to be an officer's servant, as his situation places him above the level of common men.

Rough riders are generally paid five guineas a-year as a compensation for their trouble; they likewise receive 10*s.* 6*d.* from every officer who learns to ride, and from every officer who has a horse broke at the riding school. This money is divided equally amongst them.

Every rough rider must provide himself with a proper jacket for the riding school business, according to the pattern fixed upon in the regiment.

When it is found absolutely necessary to employ non-commissioned officers as rough riders, they must do as much troop duty as they can.

Rough *Horses*, *To*, a word in familiar use among the dragoons to signify the act of breaking in horses, so as to adapt them to military purposes.

Rough *it*, *To*, a cant word used among military men, signifying to face every sort of hardship.

Rough *Creek*, in *Geography*, a river of Kentucky, which runs into Green river, N. lat. 37° 12′. E. long. 87° 35′.

Rough *Skelly*, a cape on the E. coast of Scotland. N. lat. 56° 36′. W. long. 2° 28′.

ROUGHCAST Wash, in *Rural Economy*, a sort of liquid wash, or application, employed for the purpose of being laid over the surfaces of outside walls, or buildings, of this nature, in order to preserve and ornament them. It is noticed by Mr. Vancouver, in his report of the state of the agriculture of the county of Devon, that a wash of this kind is getting greatly into use in that district. It consists, in this case, of four parts of pounded lime, three of sand, two of pounded wood-ashes, and one of the scoria of iron, intermixed very intimately together, and made sufficiently thin or fluid as to be applied by means of a brush. It is remarked, that when dry, it gives to the work the appearance of new Portland stone, and affords an excellent protection against the penetrating force of the south-westerly storms in that exposed county. It is also found useful for applying over the outsides of stone buildings or walls.

ROUGHING Cloth. See Cloth.

ROUGHINGS, in *Agriculture*, a term sometimes applied to latter-grass, or aftermath, and sometimes to coarse pastures. They are always of the coarse rough tusty kinds, when this epithet is applied to them.

ROUGHY, in *Geography*, a river of Ireland, which falls with an impetuous current into the Kenmare river, about two miles E. of Kenmare town.

ROUGIES, a small island on the W. coast of France, being one of the group called the "Seven Islands." N. lat. 48° 54′. W. long. 3° 21′.

ROUGNAT, a town of France, in the department of the Creuse; nine miles S. of Evaux.

ROUHA. See Ourfa.

ROUHAMON, in *Botany*, a Caribbean name, retained by Aublet for one of his genera. See Lasiostoma.

ROUIA, in *Geography*, a town of Syria, containing seven fine palaces, some of which are entire, and several churches built in a fine style; 36 miles S.S.W. of Aleppo.

ROUJAN, a town of France, in the department of the Herault, and chief place of a canton, in the district of Beziers; six miles N.W. of Pezenas. The place contains 1129, and the canton 5720 inhabitants, on a territory of 135 kiliometres, in 11 communes.

ROVIGNO, or Trevigno, a sea-port town of Istria, seated on a rock which projects into the sea, with two harbours capable of containing the largest vessels. It contains about 17,000 inhabitants, chiefly fishermen and boat-builders. In its vicinity are quarries of beautiful marble; 68 miles E. of Venice. N. lat. 45° 10′. E. long. 13° 45′.

ROVIGO, a town of Italy, and capital of the Polesine di Rovigo, on the river Adigetto, the see of the bishop of Adria, to the decline of which town it owes its increase. It was anciently called Buonvico; it is surrounded with walls, turrets, and battlements. The river divides it into the upper and lower towns, and to the E. is a fortified castle. Exclusive of its suburbs, it is about a mile and a half in circumference, and contains six gates, a collegiate and nine other churches, together with several religious houses and hospitals; 37 miles S.S.W. of Venice. N. lat. 45° 4′. E. long. 11° 48′.—Also, a town of Italy, in the Vincentin, on the Adige; 14 miles S.S.W. of Vicenza.

ROUILLAC, a town of France, in the department of the Charente, and chief place of a canton, in the district of Angouleme; 12 miles N.W of Angouleme. The

place contains 1168, and the canton 13,531 inhabitants, on a territory of 252½ kiliometres, in 19 communes.

ROUILLE', Peter Julian, in *Biography*, a learned Jesuit, born at Tours in 1681, was educated in the Jesuits college of that city, and made his profession in the society in 1715. He successively taught the languages, philosophy, and mathematics in its seminaries. In 1724 he was called to Paris to assist father Catrou in the composition of his Roman History. To this work he only contributed the dissertations. He also revised and corrected the work of father d'Orleans, on the revolutions of Spain, and had a considerable share in the "Memoires de Trevoux" from December 1733 to February 1737. He had previously to this, in 1716, delivered "A Discourse on the Excellency and Utility of Mathematics," printed at Caen in 1716. He was author of some other works, and died, highly respected and esteemed, in the year 1740.

ROUILLY, in *Geography*, a town of France, in the department of the Vienne; 15 miles W. of Poitiers.

ROUL, Roll, or *Rowl*, in the *Military Art*. Officers of the same rank, who mount the same guard, and take their turns in relieving one another, pursuant to some established roster, as captains with captains, subalterns with subalterns, and command according to the seniority of their commissions, are said to *roul* or *roll*.

ROULADE, Fr. in *Music*, a division or passage in a song of many notes to one syllable. (See Division and Neume.) A roulade is only an imitation of instrumental melody, either to grace a treble part, render an image more obvious, enforce the expression, or, when it is necessary, to suspend the discourse and prolong the melody. But it is likewise necessary that it should be on a long syllable, that the voice should be spirited, active, and capable of allowing the throat full liberty to warble and express with facility and neatness the notes of the division, without fatiguing the organs of the singer, and consequently the ears of the audience. Rousseau.

The vowels most proper for these flights are *a*, *o*, and *e*, open. The *i* and *u* are not sonorous, but distort the mouth: the diphthongs still more. (Rousseau is here considering the vocal properties of the French alphabet.) As to the nasal vowels or syllables, they should never be employed in roulades. The Italian language, in which the *a* and *o* abound, is more fit for inflexions of voice than the French; and these vowels are not spared by Italian composers, but brought into action as frequently as possible. On the contrary, the French, obliged to compose almost all their melodies to syllables instead of vowels, on account of their defects, are constrained to give the notes a slow and heavy motion, or to admit a clash of consonants in accelerating syllables; which necessarily renders the melody languid or harsh. And we join with the citizen of Geneva in confessing, that we trow French vocal music can never surmount these inconveniencies.

"It is a vulgar prejudice to imagine, that divisions are improper in plaintive and pathetic airs; on the contrary, when the heart is moved and affected to an uncommon degree, the voice more easily finds accents of passion, than the mind can furnish words, and thence arise interjections in all languages. (See Neume.) It is equally erroneous to imagine that a division is always proper, whenever a favourable vowel or syllable occurs, without considering the situation of the singer, and whether the sentiment, which he ought to express, authorizes it.

"Roulades are of modern invention. It does not appear that the ancients ever admitted them in their music, or ever gave them more than two notes to a syllable. And this constitutes the difference between the two musics; one of which was subservient to the language, to which the other gives the law."

These reflections are admirable, deep, comprehensive, and convincing; yet, since they occurred to the penetrating author, more changes and refinements have happened in lyric poetry and singing, which make it necessary to extend this article, in order to keep pace with the times.

Till about the middle of the last century, many Italian composers gave divisions to *a*, *e*, and *o*, indiscriminately; all Farinelli's divisions are confined to the vowel *a*. (See a collection of them in Burney's Hist. Mus. vol. iv.) Even the vowel *o* closes the lips and teeth more than the Italian *a*, on which account, we suppose, it has been wholly refused divisions or roulades in its vocal music. See Language, *Euphony of*, where this subject has been fully discussed.

ROULAND l'Eglise, in *Geography*, a town of France, in the department of the Doubs; and chief place of a canton, in the district of Baume; nine miles N.E of Besançon. The place contains 423, and the canton 9066 inhabitants, on a territory of 250 kiliometres, in 33 communes.

ROULERS, a town of France, in the department of the Lys, and chief place of a canton, in the district of Courtnay. The place contains 8063, and the canton 13,587 inhabitants, on a territory of 37½ kiliometres, in two communes.

ROULET, a town of France, in the department of the Charente; eight miles S.W. of Angouleme.

ROUM, *i. e.* the kingdom of the Romans, a name given to Natolia, by Solyman, sultan of the Turks, when he invaded and became master of it, in the 11th century. It is now chiefly applied to a part of Asiatic Turkey, extending from the Mediterranean to the Black sea, eastward of Caramania and Natolia, and westward of Armenia and the government of Diarbekir, including the governments of Sivas, Adana, and Marasch.

Roum *Kala*, a small town and fort of Persia, in the pachalic of Orfa, situated on the western bank of the Euphrates, and inhabited by Turks and Arabs. It was formerly called Zeugma, from a Grecian term signifying a bride, and was the great passage for the Roman armies into Macedonia. There were two small towns, one on each side of the river; the former was called Zeugma, and the latter Apamea. A few miles farther down the river, the caravans travelling from Aleppo to Orfa, pass the Euphrates on a bridge of boats, at a place called "Bir," which, according to M. D'Anville, represents the ancient Bèrtha, 144 miles from Aleppo and 67 from Orfa, in N. lat. 36° 58′. (See Bir.) It is situated on an eminence on the bank of the Euphrates, protected by a citadel and a wall in a dilapidated condition. At this town, the houses of which are in a ruinous state, a tax is levied on all travellers and merchants who cross the Euphrates, which is here deep, rapid, and about 130 yards broad.

ROUMIEU, a town of France, in the department of the Gers; six miles E. of Condom.

ROUND, Rotundus, in *Geometry*. See Circle, Globe, and Sphere.

Round, in *Anatomy*. See Rotundus.

Round, in *Music*. A round in catch-books is sometimes called *a canon in the unison*, and sometimes, but erroneously, *a catch*: but it is distinct from both, being no more than a song of as many strains or sections, as parts; which, instead of being begun together, are performed after each other.

other, always ſinging different words and different notes in harmony with the reſt; till a ſignal is given, by holding up the hand, for finiſhing upon the perfect chord of the key note, where the author has placed this final mark, ⌒.

Round is alſo uſed in muſic to denote a ſpecies of fugue. See Roundelay.

Round, in *Military Language*, ſignifies a walk or turn, which an officer, commiſſioned or non-commiſſioned, attended with ſome ſoldiers, commonly ſix, takes in a garriſon, or fortified place, *around* the ramparts in the night-time, to liſten if any thing be ſtirring without the works, and to ſee that the ſentinels are watchful, and do their duty, and all things are in good order.

In ſtrict garriſon the rounds go every half hour, that the rampart may be always furniſhed. The ſentinels are to challenge at a diſtance, and to port their arms as the rounds paſs, and let no one come near them. All guards turn out, challenge, exchange the parole, and preſent their arms, &c.

Rounds are ordinary and extraordinary. The ordinary rounds are three; the *town-major's round*, the *grand round*, and the *viſiting round*.

Rounds, *Manner of going the*. When the town-major goes his round, he comes to the main guard, and demands a ſerjeant and four or ſix men to eſcort him to the next guard; and when it is dark one of the men is to carry a light.

As ſoon as the ſentry at the guard perceives the round coming, he ſhall give notice to the guard, that they may be ready to turn out when ordered; and when the round is advanced within about twenty or thirty paces of the guard, he is to challenge briſkly; and when he is anſwered by the ſerjeant who attends the round, *town-major's round*, he is to ſay, *ſtand, round!* and port his arms; after which he is to call out immediately, *ſerjeant, turn out the guard! town-major's round*. Upon the ſentry calling the ſerjeant to turn out the guard, he immediately draws up the men in good order with ſhouldered arms, and the officer places himſelf at the head of it, with his ſword drawn. He then orders the ſerjeant and four or ſix men to advance towards the round, and challenge; the ſerjeant of the round is to anſwer, *town-major's round;* upon which the ſerjeant of the guard replies, *advance, ſerjeant, with the parole!* at the ſame time ordering his men to reſt their arms. The ſerjeant of the round advances alone, and gives the ſerjeant of the guard the parole in his ear, that none elſe may hear it; during which period, the ſerjeant of the guard holds the ſpear of his halbert or pike at the other's breaſt. The ſerjeant of the round then returns to his poſt, whilſt the ſerjeant of the guard, leaving his men to keep the round from advancing, gives the parole to his officer. This being found right, the officer orders his ſerjeant to return to his men; ſays, *advance town-major's round!* and orders the guard to port their arms; upon which the ſerjeant of the guard orders his men to wheel back from the centre, and form a lane through which the town-major is to paſs (the eſcort remaining where it was) and go up to the officer and give him the parole, laying his mouth to his ear. The officer holds the point of his ſword at the town-major's breaſt while he gives the parole.

Rounds, *Grand*, the rounds which are gone by general officers, governors, commandants, or field-officers. When there are no officers of the day on picquet, the officer of the main guard in garriſon may go the grand rounds.

Rounds, *Viſiting*, rounds gone by captains, ſubalterns, and the town-majors of garriſons.

The grand rounds generally go at midnight; the viſiting rounds at intermediate periods, between ſun-ſet and the reveillé. The grand rounds receive the parole, and all other rounds give it to the guards.

There is alſo a ſpecies of baſtard rounds, if we may be permitted the expreſſion, which are gone by a corporal and a file of men; and which are in reality nothing more than a patrole. When challenged, they anſwer *pat. rounds*.

N. B. The governor of a garriſon can order the rounds to go as often as he may judge expedient. Extraordinary rounds are reſorted to when any particular event or occurrence is expected, and in caſes of tumult, &c.

Round *Robbin*, a compact of honour which officers enter into, (when they have cauſe of complaint againſt their ſuperior officer) to ſtate their grievances, and to endeavour to obtain redreſs, without ſubjecting one more than another to the odium of being a leader or chief mover. The term is a corruption of *ruban rond*, which ſignifies a round ribbon. It was uſual among French officers when they ſigned a remonſtrance, to write their names in a circular form, ſo that it was impoſſible to aſcertain who ſigned firſt. Hence to ſign a *round robbin* againſt any perſon, is for any ſpecific number of men to ſign, one and all, a remonſtrance againſt him. Colonels of regiments have been ſometimes treated in this manner. Great judgment, directing motives grounded upon ſtrong facts, ſhould always influence on theſe nice occaſions.

Rounds, *Way of the*. See Way.

Rounds, *Counter*. See Counter-*Round*.

Round, *Quarter*. See Quarter-*Round*.

Rounds, among *Maſons*, denote the broken pieces of ſtatues.

Round-*Heads*. See Whig and Tory.

Round-*Head Nails*. See Nail.

Round-*Houſe*, in *Ship-Building*, that part of the ſhip abaft, next above the quarter-deck, fitted up with cabins, &c. for the accommodation of the captain.

Round-*Houſes* at the head, conveniencies, or ſeats of eaſe, for the officers.

Round-*Houſe* alſo denotes a kind of priſon, for the nightly watch to ſecure perſons in, till they can be carried before a magiſtrate. See Watch.

Round-*In*, or *Round-Aft*, at *Sea*, a term belonging to the main and fore-ſail. When the wind largeth, they ſay, *Let riſe the main-tacks*, or *the fore-tacks! Hale aft the fore-ſheet to the cat-head; and the main-ſheet to the cub-bridge-head!* And when theſe ſheets are thus haled down, they keep them from flying up with the paſſarado rope. This work is called *rounding-in*, or *rounding-aft the ſail*.

Round *Aft*, in *Ship-Building*, the ſegment of a circle which the ſtern partakes of from the wing-tranſom upward.

Round *Stern*, the ſtern of a veſſel whoſe bottom, wales, &c. are wrought quite aft, and unite in the ſtern-poſt. Few Engliſh veſſels are built on this conſtruction, excepting ſmall veſſels, as hoys, &c.

Round-*up of the Tranſoms*, the ſegment of a circle to which they are ſided, alſo of the beams and rails of the ſtern, to which they are moulded.

Round *Niche*, *Roof*, *Seam*, *Shot*, *Splice*, *Table*, *Top*. See the ſubſtantives.

Round, in the *Academies*, denotes a circular piſte or tread.

Round *a Horſe*, *To*, is a general term for all ſorts of maneges, upon a volt, or circular tread.

Hence, to round a horſe upon a trot, gallop, &c. is to make him carry his ſhoulders and haunches roundly or compactly, upon a larger or ſmaller circle, without traverſing or bearing to a ſide.

Round

Round *Table*, the circular table at which the knights of old, who assembled together from different countries to perform the martial exercises of the tournament, were accustomed to eat, on such occasions, to prevent disputes about precedency. Such a table is seen fixed to the eastern wall of the county-hall at Winchester, being vulgarly called "Arthur's Round Table," though it does not appear to be more ancient than the reign of king Stephen. From the use to which these tables were appropriated, the diversion itself of the tournament, or tilting, was called the round table. "Illustris miles, Rogerus de Mortuo-mari apud Kenilworth ludum militarem quem vocant rotundam tabulam centum militum ac tot dominarum constituit." Th. Walsingham, Hist. p. 49.

Round *Towers*, those tall slender towers which are almost peculiar to Ireland (some few being found in Scotland), rising to the height of from 50 to 100 feet, or more, and containing not more than five or six feet in diameter in their upper chamber. They have a single entrance-door, of from five to fifteen feet from the ground, and a loop-hole, to give light to each story, of which there are generally six or seven in each round tower. The uppermost story, however, which was the usual dwelling-place of the solitary inhabitant, was furnished with four loop-holes or windows, corresponding with the four cardinal points of the compass. From the nature and situation of these singular structures, they being always very near to the scite of an ancient church, it appears that each of them was built for the habitation of a single *Inclusus*, or hermit, who, living in the highest chamber of it, enjoyed his beloved solitude as much as if he had dwelt in a desart. It appears from Giraldus Cambrensis, that Ireland was full of these towers in the 12th century, and there is reason to ascribe the erection of them to the sixth, seventh, and eighth centuries, namely, before the Danish invasions, and during the period of the Irish transmigration into various countries in quest of solitudes. The idea of them and their use were evidently borrowed from the columns and stylites of the East. See Stylites.

Round *Bay*, in *Geography*, a bay with good anchorage, on the W. coast of St. Lucia.

Round, *Cape*, a cape on the coast of Patagonia, in the straits of Magellan. S. lat. 53° 47′. W. long. 71° 32′.

Round *Hill*, an island in the North Pacific ocean, near the E. coast of Labrador. N. lat. 53° 25′. W. long. 55° 16′.

Round *Hill Bluff*, a cape on the N. coast of Jamaica, W. of Montego bay. N. lat. 18° 29′. W. long. 77° 58′.

Round *Heads*, Indians of North America, inhabiting the territory on Round river. The number of warriors is about 2000.

Round *Island*, a small island of England, in Pool harbour.—Also, a small island near the E. coast of Borneo, in the bay of Gunong Tellu. S. lat. 0° 28′. E. long. 123° 30′.

Round *Key*, a small island near the coast of West Florida, which is well timbered. N. lat. 30° 15′. W. long. 88° 28′.

Round *Rock*, one of the Virgin islands, in the West Indies. N. lat. 18° 10′. W. long. 62° 53′.

ROUNDELAY, or Roundo, a kind of ancient poem, thus called, according to Menage, from its form; and because it still turns back again to the first verse, and thus goes round.

The word is formed from *round* and *lay*. The French call it *rondeau*; the Spaniards *glosses*.

The common roundelay consists of thirteen verses, eight of which are of one rhyme, and five in another. It is divided into couplets; at the end of the second and third of which, the beginning of the roundelay is repeated; and that, if possible, in an equivocal or punning sense.

The roundelay is a popular poem among the French, but little known among us. Marot and Voiture have succeeded the best in it.

Rapin observes, that if the roundelay be not very exquisite, it is intolerably bad. In all the ancient roundelays, Menage observes, that the verse preceding has a complete sense, and yet joins agreeably with that of the close; without depending necessarily on it. This rule, well observed, makes the roundelay more ingenious, and is one of the finesses of the poem.

Some of the ancient writers speak of the roundelay, or roundel, as a kind of air appropriated to dancing; and in this sense the term seems to indicate little more than dancing in a circle, with the hands joined. See Rondeau.

ROUNDELET. See Rundlet.

ROUNDING, in *Sea Language*, denotes certain old ropes wound firmly and closely about that part of a cable which lies in the hawse, or under the ship's bow, or athwart the item. It is used to prevent the surface of the cable from being chafed or fretted in those places.

Rounding-*in* generally implies the act of pulling upon any rope which passes through one or more blocks, in a direction merely horizontal; as round-in the weather-braces, &c. It seems to be derived from the circular motion of the rope about the sheave or pulley through which it passes.

Rounding-*up* is expressed of a tackle which hangs in a perpendicular position, without sustaining or hoisting any weighty body; in which case it is the operation of pulling the blocks closer to each other, by means of the rope which passes through them, to compose the tackle; and is opposed to over-hauling, by which the blocks are drawn farther asunder.

ROUNDNESS, Rotundity, in *Physics*. See Sphericity.

ROUNDO, or Roundelay, in *Music*, a kind of burden or ritornello; where the beginning of each couplet is repeated at the end of it.

ROUNDSTONE Bay, in *Geography*, a harbour of the county of Galway, Ireland, in Ballinahinch. It is separated from Birterbui bay by the island of Inishkeele, lying on the west of it.

ROUNREAK, a town of Pegu, on an island formed by the Ava; 42 miles S. of Lundsay.

ROUP, in *Commerce*, a silver coin of Turkey, containing 10 paras, the para being equal to 3 aspers, and 40 paras being equal to the dollar or piastre.

Roup, in *Poultry*, is a filthy boil or swelling upon their rumps, known by the staring, or turning back of the feathers.

The roup, if not soon remedied, will corrupt the whole body; to prevent which, the feathers are to be pulled away, the swelling laid open, and the matter pressed out; after which the part is to be washed with salt and water, or brine.

ROUPALA, in *Botany*, a name of Aublet. See Rhopala.

ROUPEYROUX, in *Geography*, a town of France, in the department of the Aveyron; 7 miles S.E. of Villafranche.

ROUPIA, or Rupee. See Rupee.

ROUREA, in *Botany*, a name of Aublet's. See Rourgia.

ROUSAY, in *Geography*, one of the Orkney iſlands, Scotland, is ſituated to the north-weſt of the Mainland of Orkney, from which it is ſeparated by a ſtrait about a mile in breadth. It conſiſts chiefly of a ridge of lofty hills declining on all ſides towards the coaſt. The beſt cultivated parts of this iſland are its eaſtern and ſouth-weſtern ſides; but there is a narrow ſtrip of arable land extending round the whole ſhore. The hills are moſtly covered with heath, intermixed with various kinds of graſſes, which afford ſuſtenance to a great number of ſheep, ſwine, and black cattle. Oppoſite to the Mainland, in a romantic ſituation, ſtands the houſe of Weſtneſs, which in remote ages was the abode of the celebrated earl Sigard, who fell in the famous battle of Clontarf in Ireland, and is ranked by hiſtorians among the greateſt heroes of his age. On a flat tract of land, cloſe to the ſhore, about a quarter of a mile weſtward from the place, are ſeveral "immenſe piles of ſtones, evidently the ruins of ſome ancient ſtructure, around which are to be ſeen graves formed with ſtones ſet on edge, as in ſome other places; and the name of Swendrow, which it bears, points it out, with great probability, as the ſcene of the capture of earl Paul, by Swein, the ſon of Aſleif, and the ſlaughter of his attendants, when he was, with the baſeſt intention, carried a priſoner into Scotland." The ridge known by the whimſical name of the camp of Jupiter Fring, is ſituated about two miles eaſtward from Weſtneſs. Several ſtanding ſtones are to be met with in different parts of the iſland; and there are ſome tumuli on the ſouth ſide, near the Freit, alſo a few Picts-houſes.

Contiguous to Rouſay, on the north-weſt, is the ſmall iſland of Eagleſhay, which yields to none of the Orkney iſles in beauty of appearance, or conveniency of ſituation. This iſland is about two miles long and one broad, and, in conjunction with Rouſay, forms one pariſh; which, according to the population cenſus of 1811, contained 189 houſes, and 965 inhabitants. Eagleſhay is remarkable in hiſtory for having been the ſcene of the unjuſt and barbarous murder of St. Magnus, the tutelary ſaint of the Orkney iſlands. The church, which is very ancient, is ſaid to occupy the ſpot on which the aſſaſſination was committed. Owing to the natural attractions of this iſland, ſeveral of the counts of Orkney made it their uſual place of reſidence, and their example was followed in later times, when it became the property of the Douglaſes and the Monteaths. Hiſtory of the Orkney Iſlands, by the Rev. Dr. Barry, 2d edit. by the Rev. James Headrick, 4to. London, 1808.

ROUSE *up a Hare*, among *Hunters*. See HUNTING.

ROUSE, *To*, among *Falconers*, is when a hawk lifts up and ſhakes himſelf.

ROUSHOLM HEAD, in *Geography*, a cape on the S.W. coaſt of the iſland of Stronſa. N. lat. 58° 56′. W. long. 2° 34′.

ROUSSE, *Grand* and *Petit*, rocks in the Engliſh Channel; 5 miles N.E. from the iſland of Jerſey.

ROUSSEA, in *Botany*, was ſo called by the writer of the preſent article, in memory of the celebrated Jean Jacques Rouſſeau. Botany had ſpread a charm over the latter years of this diſtinguiſhed man, and ſoothed their real or imaginary ills. Whenever he touches on this favourite ſubject, he communicates the ſame charm to his readers. Such has been the effect of his example, perhaps above all others, that he would now no longer have to deplore "the groſs ignorance and barbariſm" of the French, who, about fifty years ago, ſtared at a botaniſt with ſovereign contempt. His letters on the ſcience have rendered the Linnæan ſyſtem popular all over Europe. He correſponded with Linnæus, who had dedicated a genus to his name; which the younger Linnæus, through miſapprehenſion, publiſhed as *Ruſſelia*, and which is now called *Vahlia*, there being already a *Ruſſelia*, named by Jacquin. What we are about to deſcribe was therefore ſelected as a very fine and ſingular genus, and it has been generally adopted, both in France and elſewhere.—Smith Plant. Ic. faſc. 1. 6. Schreb. Gen. 792. Willd. Sp. Pl. v. 1. 607. Mart. Mill. Dict. v. 4. Juſſ. in Sims and Kon. Ann. of Bot. v. 2. 568. Lamarck Illuſtr. t. 75.—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Campanaceæ*, Linn. Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in four deep, equal, widely ſpreading, tongue-ſhaped, permanent ſegments. *Cor.* of one petal, externally rugoſe; tube nearly globular, almoſt as long as the calyx; limb in four equal, lanceolate, acute, revolute ſegments. *Stam.* Filaments four, erect, equal, linear, flattened, ſomewhat tapering upwards, longer than the corolla; anthers terminal, ſmall, arrow-ſhaped. *Piſt.* Germen ſuperior, pyramidal, quadrangular; ſtyle terminal, ſquare, permanent, the length of the ſtamens; ſtigma funnel-ſhaped. *Peric.* Berry? pyramidal, quadrangular, of one cell? with a coriaceous coat. *Seeds* very numerous, lenticular, imbedded in pulp.

Eſſ. Ch. Calyx in four deep ſegments. Corolla bell-ſhaped, four-cleft, inferior. Berry? quadrangular, with many ſeeds.

1. R. *ſimplex*. Sm. Ic. t. 6. Willd. n. 1.—Gathered by Commerſon in the iſland of Mauritius, and communicated by Thouin to the younger Linnæus, with about 1500 fine plants beſides. This appears to be a *ſhrub*, of a fleſhy habit, climbing over moſſy rocks, or ſtems of trees, in moiſt ſituations. The *ſtem* is thick and knotty. *Leaves* oppoſite, in pairs croſſing each other, ſtalked, ſimple, obovate, rather fleſhy, diſtantly toothed, pointed, quite ſmooth on both ſides, with a ſolitary rib, and many fine tranſverſe veins; their length about three inches; breadth one, or one and a half. *Footſtalks* an inch long, even, channelled, ſmooth. *Stipulas* oppoſite, between the footſtalks, triangular, acute, membranous. *Flowers* ſolitary, axillary, large, fleſhy, on drooping round *ſtalks*, rather ſhorter than thoſe of the leaves, accompanied at the baſe of the ſtalk by ſeveral crowded, membranous, acute *bracteas*, very like the *ſtipulas*. *Calyx* ſmooth, an inch long. *Corolla* ſomewhat downy at the outſide; of its colour we have no means of judging. The *fruit* appears to be a coriaceous berry, about an inch in diameter, but we have not ſeen it fully formed, nor has Commerſon left any note reſpecting the qualities of the plant. In the texture, and external downineſs, of the *corolla*, this genus accords not ſo much with *Campanula* itſelf, as with others of the ſame order, *Goodenia*, *Scævola*, &c. To ſome of theſe the form of its *ſtigma* approaches, while the *anthers*, ſo widely differing among themſelves in this order, are, in the preſent inſtance, very unlike moſt of the other genera. The oppoſite *leaves*, and intermediate *ſtipulas*, evince, as M. de Juſſieu obſerves, an approach in habit to the natural order of RUBIACEÆ. See that article.

ROUSSEAU, JOHN BAPTIST, in *Biography*, a French poet of conſiderable celebrity, was born at Paris in 1671. His father, though only a ſhoe-maker, contrived to give him a liberal education. By his literary talents he obtained, while very young, admiſſion among perſons of rank and taſte. In 1688 he attended the French ambaſſador to the court of Denmark, in quality of page. After this he went with marſhal Tallard to England, where he contracted an intimacy with Saint Evremond. In 1703 he was domiciliated with M. Rouillè, director of the finances, whom he accompanied to court, and elſewhere, living in tranquillity in

in the midſt of ſplendour, and cultivating the Muſes, to the neglect of thoſe opportunities which occurred to him of making his fortune. When he was at the height of his reputation, he involved himſelf in an affair which put an end to his happineſs, and rendered him wretched for the remainder of his life. A number of men of letters were accuſtomed to meet at a coffee-houſe in Paris, among whom were Rouſſeau and La Motte, when, in 1708, the opera of Heſione made its appearance. Rouſſeau wrote ſome verſes upon the authors of the words, the muſic, and the ballet of the piece, which were highly ſatirical. Theſe were anonymous, and were imputed to Rouſſeau, who not only denied them, but attempted to fix the blame upon M. Saurin, a man of ſcience and letters, who, from a Calviniſt miniſter, had become a convert to Popery, and reſided in Paris. The nature of this diſcuſſion it is not neceſſary to go into, it is ſufficient to ſay, that by an arrêt of parliament, in 1712 Rouſſeau was condemned to perpetual baniſhment from the kingdom, not only as a ſuborner in the accuſation of Saurin, but as the author and diſtributor of the ſatirical verſes. He had already retired to Switzerland, where he was protected by the count de Luc, the French ambaſſador to the Cantons. He publiſhed in Soleure the firſt edition of his collected works, in the preface to which he ridiculouſly gives himſelf the air of one who wrote verſes for mere amuſement, although it was by his poetry alone he obtained public notice and the favour of the great. When De Luc went to Baden, in 1714, as plenipotentiary for concluding peace with the emperor, Rouſſeau accompanied him. He there became known to prince Eugene, and by him was taken to Vienna. Here he reſided three years, but not being able to reſtrain himſelf from exerciſing his ſatirical talent, he was obliged to quit that capital for Bruſſels, in haſte. At Bruſſels he became acquainted with Voltaire, with whom he formed a confidential intimacy, which however did not laſt very long: jealous of each other's fame, they became bitter enemies, not only endeavouring to blacken each other's moral character, but each, at the expence of his own judgment, depreciating the literary merit of his adverſary. Rouſſeau longed much to reviſit Paris, and made interceſſion with the regent duke of Orleans, who granted him letters of recall, but the poet inſiſted upon a previous reviſion of his trial, which he could not obtain. In 1721 he came to England, where he prepared a new edition of his works. This was publiſhed in 1723, in two vols. 4to. and produced him 10,000 crowns, which he placed in the fund of the Oſtend company. The failure of this company ſunk all his fortune, and he was reduced, in the decline of life, to ſubſiſt on the benevolence of his friends. Boutet, a notary of Paris, ſupplied his moſt urgent wants, but he met with more effectual aſſiſtance from the duke d'Aremberg, who, when he quitted Bruſſels in 1733, ſettled upon him a handſome penſion, beſides giving him an apartment and his table in his palace. Rouſſeau diſpleaſed this patron, by calumniating Voltaire, and determined to go to Paris, with the hope of finally obtaining a repeal of his baniſhment. He had prepared his way by two epiſtles to perſons of weight in that city, and by an ode to the praiſe of cardinal Fleury on the peace. His efforts were, however, unſucceſsful. He could not even obtain a ſafe-guard for paſſing a ſingle year in Paris: he accordingly returned to Bruſſels, where he died in March 1741, at the age of 70. In his laſt moments he declared he was not the author of the couplets for which he had been baniſhed. The eſtimate of his moral character depends ſo much on the belief of his guilt or innocence, in the points reſpecting which he was accuſed, that nothing can be more different than its ſtatement by his friends and enemies. There is more agreement in the opinions of his countrymen relative to his poetical character, and it is pretty generally acknowledged that he ſtands at the head of the ode writers in the French language. "To theſe compoſitions," adds his biographer, "he brought great fire and force of expreſſion, copiouſneſs, and grandeur of imagery, and all the harmony of which his language is capable; but the ſentiment is generally common, and nothing indicates a ſoul of the ſuperior order." Of his "Odes" there are four books, of which the firſt conſiſts of ſacred topics, taken from the Pſalms. He wrote two books of "Epiſtles" in verſe; "Cantatas;" "Allegories;" "Epigrams;" "Miſcellaneous Poems;" "Four Comedies in Verſe and three in Proſe;" and a "Collection of Letters." Theſe are ſaid to give an unfavourable idea of his temper, but ſome allowance ſhould be made for a man who was ſo long an object of the perſecution of his enemies, and of whom it was ſaid in his epitaph, that "thirty years he was an object of envy, and thirty of compaſſion." M. Seguy, in concert with M. the prince of la Tour Taſſis, has given a beautiful edition of his works, agreeably to the poet's laſt corrections. This edition was printed at Paris in 1743, in three vols. 4to. and in four vols. 12mo. containing nothing but what the author acknowledged as his own. Ferron ſpeaks of Rouſſeau as uniting in himſelf the excellencies of Pindar, Horace, Anacreon, and Malherbe. He was in habits of correſpondence with the abbè d'Olivet, the two Racines, the celebrated Rollin, and other illuſtrious French characters.

Rousseau, Jean Jacques, was born at Geneva in the year 1712. His father was a watch-maker. At his birth, which, he ſays, was the firſt of his misfortunes, he endangered the life of his mother, and he himſelf was for a long time in a very languiſhing ſtate of health; but as his bodily ſtrength increaſed, his mental powers gradually opened, and afforded the happieſt preſages of future greatneſs. His father, who was a citizen of Geneva, was a well-informed man, and in his ſhop, he always kept by him ſome literary works of authority, among which were Plutarch's Lives, with which he intermixed ſuch converſations as might be expected from an ardent republican. In his "Confeſſions," to which all the biographers of Rouſſeau muſt go for information, he has recorded ſeveral circumſtances, which, in his opinion, exerted a laſting influence upon his character; but it is more probable that his ruling propenſities were determined by his bodily conſtitution. This he repreſents as of the warmeſt kind, burning with ſenſuality from his very birth. His ſchool education was very imperfect, and he grew up in habits of idleneſs, and in the vices of a weak unſteady temper. He was firſt put apprentice to an attorney, who ſoon diſcharged him for his negligence: after this he was put out to an engraver, who diſguſted him by his harſhneſs. The fear of chaſtiſement, which he probably well merited, rendered him a fugitive from his maſter, when he was in his 15th year, at which time he was a reſtleſs diſcontented being, conſumed with deſires of which he knew not the object, and careſſing his fancies for want of realities. He went into Savoy, where he was hoſpitably entertained by a pariſh prieſt, who pleaſed himſelf with the idea of making a proſelyte from the Genevan reformed church. For this purpoſe he ſent the youth to Annecy, to a Madame de Warrens, an ingenious and very amiable lady, who had, in 1726, left part of her wealth, and the Proteſtant religion, in order to throw herſelf into the boſom of the church. This generous lady ſerved in the triple capacity of a mother, a friend, and a lover to the new proſelyte, whom ſhe regarded as her ſon. For farther inſtruction ſhe ſent him to a ſeminary at Turin, where his converſion was completed, and

and he got twenty florins in exchange with his new religion. When this money was ſpent, he found no better reſource than to enter into the ſervice of a counteſs: here he committed a crime, which he acknowledges, in his "Confeſſions," with the moſt heartfelt remorſe. He ſtole a ribbon, and when it was found in his poſſeſſion, he not only denied the theft, but charged an innocent and amiable young woman in the houſe with it, to whom, in fact, he meant to have preſented the ribbon. After the death of the counteſs, he entered into the family of a nobleman, whoſe ſon, a literary man, took pains to inſtruct him, and treated him rather as a companion or pupil than a ſervant. But the flattering proſpects opened to him by this connection he deſtroyed by his imprudence and miſconduct, and being turned out of doors, after paſſing ſome time as a vagabond, he returned to Madame de Warrens. This lady had found means to ally her devotional turn of mind with the indulgence of amorous propenſities, of which young Rouſſeau was an object, though not the only one. Through her intereſt he obtained a place as ſecretary to a commiſſion, appointed by the king of Sardinia for ſurveying lands, and in this employ he continued two years, during which he applied himſelf to the ſtudy of arithmetic and geometry. Muſic, however, became his paſſion, and growing diſguſted with his other occupation, he renounced it, and took up the profeſſion of muſic-maſter at Chamberry. Here he paſſed eight years, intimately connected with Madame de Warrens, though not without following her example of occaſional deviations to other favourites. At length a coldneſs took place, and Rouſſeau was recommended by her to the office of tutor to the children of M. Mably, at Lyons. He did not retain this ſituation very long, but went to Paris, where he lived in obſcurity till 1743, when he obtained the appointment of ſecretary to the French ambaſſador to the republic of Venice. It was not long before he quarrelled with his ſuperior, and returning to Paris, with an improved knowledge and taſte in muſic, he lived by it, at the ſame time employing his leiſure in the ſtudy of natural philoſophy and botany. He was for ſome time clerk to a farmer-general, and with part of the profits which he gained in this ſituation he repaid ſome of the pecuniary aſſiſtance he had received from Madame de Warrens, who now ſtood in need of it. In 1748 he began to feel the attacks of a painful diſorder, which troubled him during the remainder of his life, and by incapacitating him for active employments, might perhaps be a remote cauſe of his literary fame. The year 1750 was the commencement of his literary career. The academy of Dijon had propoſed the following queſtion, "Whether the revival of the arts and ſciences has contributed to the refinement of manners." Rouſſeau, it is ſaid, at firſt inclined to the affirmative ſide of the queſtion; but by the perſuaſion of Diderot he was induced to ſupport the negative, as moſt likely to attract notice. His diſcourſe againſt the advantages of the ſciences accordingly having been found to be the beſt written, and replete with the deepeſt reaſoning, was publicly crowned with the approbation of this learned body, and was generally read with the intereſt uſually inſpired by a ſplendid paradox. Several anſwers appeared againſt it, one of which was written by Staniſlaus, king of Poland: it was enough for Rouſſeau to have made his name known with ſo much diſtinction in the literary world. The part which he took ſeems to have made a laſting impreſſion upon him, in preference of the ſavage to the civilized life, which was ſo frequent a ſubject of his declamation. Among other attacks which this diſcourſe drew upon him, was that of being ridiculed on the ſtage of Nancy, by Paliſſot, in his "Comedié des Philoſophes." The king of Poland, then duke of Lorraine, was ſo much diſpleaſed with this inſult, that he cauſed a letter of apology to be written to Rouſſeau, at the ſame time acquainting him that he had deprived Paliſſot of his place at the academy of Nancy, and it is highly to the credit of the philoſopher, that he immediately interceded for him and obtained his reſtoration.

In 1752 Rouſſeau wrote a comedy, entitled "Narciſſe, ou l'Amant de lui-même." He alſo compoſed a muſical entertainment of "Le Devin du Village," which was repreſented with the greateſt ſucceſs at Paris. His next piece was "Lettre ſur la Muſique Françoiſe," which was to prove that the French had no ſuch thing as vocal muſic, and that, from the defects in their language, they could not have it. The letter was written with much taſte, and ſhewed a deep knowledge of the ſubject of which he was treating, but it brought down upon his head a ſtorm of reſentment, even to the burning of him in effigy. In 1754 he returned to Geneva, where he abjured the Catholic faith, and was reſtored to the rights of citizenſhip. For this favour he made a return by the patriotic, and truly eloquent dedication to the republic, of his "Diſcours ſur les Cauſes de l'Inégalité parmi les Hommes, et ſur l'Origine des Sociétés." No one could give better advice to his fellow-citizens than Rouſſeau has done in his dedication. The work itſelf is full of almoſt unintelligible maxims and wild ideas; and was written with a view to prove that mankind are equal; that they were born to live apart from each other; and that they have perverted the order of nature in forming ſocieties. He beſtows the higheſt praiſe on the ſtate of nature, and deprecates the idea of every ſocial compact. It is, however, rhetorical rather than argumentative, and is over-run with much idle declamation in praiſe of a ſavage, and depreciation of a civilized ſtate, which the author repeated ſo often till he probably believed the paradox. Our author did not remain long at Geneva, but returned to France, and lived ſome time at Paris, after which he retired to Montmorency, as a ſtudious ſolitary, and publiſhed, in 1758, his "Lettre" to M. D'Alembert on the deſign of eſtabliſhing a theatre at Geneva. This tract is written with great force of reaſoning, and ſhews that the author had made the moſt profound obſervations on life and manners; and he ſeems to have carried his point in proving that a theatre could not be neceſſary in a place circumſtanced as Geneva was. This work is thought to have laid the foundation of that hatred which Voltaire never ceaſed to entertain for the Genevan philoſopher. Replies were written by D'Alembert and Marmontel.

In 1760 Rouſſeau publiſhed his celebrated novel, entitled "Lettres de deux Amans, &c." but generally known by the title of "Julie, ou la Nouvelle Héloiſe." This epiſtolary romance, of which the plot is ill-managed, and the arrangement bad, like all other works of genius, has its beauties as well as its defects. Some of the letters are, indeed, admirable, from the force and the warmth of expreſſion, from an effervescence of ſentiments, from the irregularity of ideas which always characterize a paſſion carried to its height. By one critic it has been aſſumed that none of the perſonages of this novel are really intereſting. "That of St. Preux is weak, and often forced. Julia is an aſſemblage of tenderneſs and pity, of elevation of ſoul, and of coquetry, of natural parts and pedantry. Wolmar is a violent man, and almoſt beyond the limits of nature. In fine, when he wiſhes to change his ſtyle, and adopt that of the ſpeaker, he does not long ſupport it, and every attempt embarraſſes the author and cools the reader. In the Heloiſe, Rouſſeau's talent of rendering every thing problematical, appears very conſpicuous, as, in his arguments in favour of, and againſt, duelling, which afford an apology for ſuicide, and a juſt condemnation

demnation of it; of his facility in palliating the crime of adultery, and his ſtrong reaſons to make it abhorred; on the one hand, in declamations againſt ſocial happineſs, on the other in tranſports in favour of humanity; here in violent rhapſodies againſt philoſophers; there by a rage for adopting their opinions; the exiſtence of God is attacked by ſophiſtry, and Atheiſts confuted by the moſt irrefragable arguments; the Chriſtian religion combated by the moſt ſpecious objections, and celebrated by the moſt ſublime eulogies." In the preface to this work the author attempts to juſtify his conſiſtency; he ſays public ſpectacles are neceſſary for great cities, and romances for a corrupted people. "I have," he adds, "viewed the manners of my age, and have publiſhed theſe letters. Why did I not live at a time when I ought to have thrown them into the fire." He affects alſo to ſay that they were not intended for an extenſive circulation, and that they will ſuit but few readers. With regard to their effects on the female ſex, he pretends to ſatisfy his conſcience with ſaying "No chaſte young woman ever reads romances; and I have given this book a deciſive title, that on opening it a reader may know what to expect. She who, notwithſtanding, ſhall dare to read a ſingle page is undone; but let her not impute her ruin to me—the miſchief was done before." This is mere rant, and the extreme of vanity. Rouſſeau rendered his work as ſeductive as poſſible, and would have been mortified beyond meaſure could he have believed that it could readily have been laid aſide by any one who had opened it. Beſides, had he been that moral man which he would affect to be, he ought, knowing its tendency, to have committed it to the flames, inſtead of ſending it to the preſs. In truth, he aſſumes in it the tone of a moral teacher of the higheſt order, nor will it be denied that, amidſt much improper matter, it contains many leſſons of domeſtic prudence and exalted virtue. "In warmth of painting, and eloquence of ſentiment, it muſt be allowed to have no ſuperior in its claſs; in moral inconſiſtency and improbability, ſcarcely an equal. With a profound knowledge of the human heart, it joins great ignorance of life and manners; with much ſober and uſeful truth, all the extravagance of exaggerated feeling. It is a dangerous work, but has been the parent of others ſtill more dangerous, becauſe affording eaſier objects of imitation."

Rouſſeau's next work was entitled "Du Contrât Social, ou Principes du Droit Politique," which was ſaid to be a mere extract from one on a much larger ſcale, which he had commenced, but which he had long ſince abandoned as beyond his powers. In this he is the fearleſs and intrepid vindicator of republicaniſm, and is ſuppoſed to have done much to excite the late diſaſtrous French revolution. The work was prohibited in France and Switzerland; and from its publication may be dated that warfare between the author, and the ſupporters of exiſting eſtabliſhments, civil and religious, which expoſed the remainder of his life to perſecution.

In 1762 Rouſſeau publiſhed his "Emilie, ou de l'Education," which may be regarded as his principal work, as it was that in which he moſt boldly attacked or oppoſed the commonly received opinions, and, in conſequence, excited againſt himſelf the greateſt maſs of hoſtility. The fundamental idea of Rouſſeau in education is to ſuffer the youthful mind to develope by itſelf, rather preventing it from imbibing any thing miſchievous, than haſtening to impreſs it with leſſons of preceptive inſtruction; preſenting to it objects of nature rather than of art, and regulating the conduct more by reſtraints of neceſſity than of principle, till a foundation is laid for the operation of reaſon unbiaſſed by habit and prejudice. Rouſſeau's pupil is to follow nature in every thing; the precepts of the philoſopher are expreſſed with the force and dignity of a mind full of the leading truths of morality. If he himſelf has not always been virtuous, nobody has felt its force more, or made it appear to more advantage; and he merits great applauſe for the manly and independent ſpirit, the contempt for luxurious indulgencies and idle parade, which he every where inculcates. The author excited againſt himſelf almoſt all the religious world, by the manner in which he ſpoke of the attempts to furniſh the youthful mind with theological ideas. Yet no one could more eloquently extol the morals of the goſpel and the character of its founder than he has done; by this praiſe, and his ſentiments of piety, he diſpleaſed the French philoſophers, ſo that there was ſcarcely any party of men to whom he did not ſtand in oppoſition. Of theſe, however, the moſt formidable of his antagoniſts were thoſe poſſeſſed of authority. The French parliament condemned this book in 1762, and entered into a criminal proſecution againſt the author, which forced him to a precipitate retreat. He directed his ſteps to his native country, but Geneva ſhut her gates againſt him. Both at Paris and Geneva, the "Emile" was burnt by the common hangman: ridiculous attempt of ridiculous governments to ſtop the circulation of opinions! The book ſtill exiſts, and, notwithſtanding the many and ſerious objections to which it is liable, deſerves to exiſt, while its tyrannical perſecutors have long ſince been forgotten, and their puny efforts laughed at by every man poſſeſſed of an underſtanding ſuperior to that of an idiot. Rouſſeau was for a time allowed to take ſhelter in Switzerland, where he was moſt hoſpitably treated by marſhal Keith. He there publiſhed a letter to the archbiſhop of Paris, in anſwer to his *Mandement* for the burning of the "Emile:" and alſo his "Lettres de la Montagne," which contained a ſevere remonſtrance againſt the proceedings of the republic of Geneva in his condemnation, the citizenſhip of which ſtate he formally renounced. That he thought very highly of this work is evident from the following paſſage: "How," ſays he, "can I enter into a juſtification of this work? I who think that I have effaced by it the faults of my whole life; I, who place the evils it has drawn upon me as a balance to thoſe which I have committed; I who, filled with confidence, hope one day to ſay to the ſupreme Arbiter, 'Deign in thy clemency to judge a weak mortal:' I have, it is true, done much ill upon earth, but I have publiſhed this writing." In theſe letters he again expreſſed his ſentiments concerning revealed religion, in a manner that excited againſt him great indignation among the clergy of Neufchatel. A conſiſtory was aſſembled to take his opinions into conſideration, but government interfered to ſtop its proceedings. The protection of the government was not, however, ſufficient to reſcue him from the obloquy which the clergy excited againſt him. They preached againſt the philoſopher, and their ſermons excited an uproar among the people. In September 1765, ſome miſguided zealots attacked his houſe and his perſon, and he ſought an aſylum in Berne, which was denied him. Neither the broken ſtate of his health, nor the approach of winter, could ſoften the hearts of his enemies: he entreated them to ſhut him up in their common priſon, which favour they even denied, and he was under the neceſſity of ſetting out on a long journey, in the beginning of a very inclement ſeaſon; he contrived, however, to reach Straſburg in a very deſtitute condition. He received from marſhal de Contade, who was then commander of that place, every accommodation that could be expected from humanity, compaſſion, and generoſity. Here he waited till the weather became more auſpicious, when he ſet out for Paris, where he appeared in the habit of an Armenian. The celebrated Hume was at this

this time a refident in that capital, as chargè d'affaires from the Englifh court, and having been applied to in favour of Rouffeau, who was defirous of making England his afylum, he willingly undertook to conduct him thither in the beginning of the year 1766. "At this period," fays one of his biographers, "the perfecutions which he had undergone, the hoftility which he had experienced, and with which he had been hunted from place to place; the acrimony of his numerous opponents, and the ferment which his prefence had excited in the different places of his refidence, had fo agitated his fufceptible mind, and inflamed his vanity, that he imagined himfelf not only the moft important, but almoft the only important perfonage in Europe, and fancied that a general confederacy was formed againft him of all fects and parties. This notion filled him with abfurd fufpicions, and rendered him prone to view every thing in a wrong light, and to magnify trifles into matters of great moment. In fhort, he was under the influence of a perverfion of temper and intellect, nearly amounting to mental derangement: a malady which, indeed, in a certain degree, feems to have attended him through life, and which alone can account for his fingularities and inconfiftencies." Without this clue, his conduct to Mr. Hume muft appear the extreme of bafenefs and ingratitude. This gentleman, fenfibly affected with his various misfortunes, procured for him an agreeable fituation in England, but Rouffeau was not long fatisfied with the new place. He had wifhed for peace, but peace and quiet he was utterly incapable of enjoying. He did not make fuch an impreffion upon the minds of the Englifh as he had done upon the inhabitants of other countries. The freedom of his opinions, and the fettled melancholy of his temper, were not deemed very remarkable or fingular here. He was regarded only as an ordinary man: in the public prints he was fatirized; his principles and conduct were repreefented as quite adapted to a modern Diogenes. He was rather regarded as an object of ridicule than of terror to any of the prevailing parties in England. Rouffeau now imagined there was a plot between Hume and the French philofophers to deftroy his glory. He fent a letter to him, filled with the moft violent abufe, and at the fame time refufed to accept a penfion from the crown, which had been obtained through the intereft of Mr. Hume. He did not remain long in England after this, but went to France in the year 1767, where he met with various protectors, with whom he paffed his time in different provinces. At this period he publifhed his "Dictionnaire de Mufique," which, though an excellent work, brought upon the author much feverity of criticifm. In the following year he refumed his botanical purfuits, by collecting and ftudying the plants which he found on the mountains of Dauphinè. In the year 1769, he married a lady with whom he had lived many years, and by whom he had already had five children, all of whom he had bafely fent to the orphan hofpital. This has been juftly efteemed in this country as one of the greateft ftains upon his character, though his foreign biographers take little notice of it, and feem to think he was juftified by the indigence in which he lived. But how could a man venture to talk of morality, and write upon education, who had abandoned his own children? Notwithftanding his other merits, he muft in this refpect be held in abhorrence by every feeling mind. During the year 1770, he appeared at a coffee-houfe in Paris in his ordinary drefs, and took much pleafure in the plaudits of the furrounding crowd. Though he affected the love of folitude, yet he was never eafy unlefs he could in fome way or other occupy the public attention. He could neither accommodate himfelf to the world, nor be content to live out of it. Nevertheleefs, fome of his latter years he feems to have paffed more tranquilly than any former period of his life, having, in a good meafure, renounced all farther difcuffion of thofe controverted topics which had involved him in fo many difficulties, and determined to keep his philofophy for his own ufe. Still he fufpected that a confederacy was making againft him, and he gladly accepted, in May 1778, an invitation from the marquis de Girardin, to retire with his wife to a fmall houfe near his beautiful feat of Ermenonville, where he died in the month of July in the fame year, at the age of 66. His friend and patron, the marquis, erected a monument for him in the Ifle of Poplars, in his pleafure grounds, with an infcription, to which Rouffeau was by no means entitled: "Ici repofe l'Homme de la Nature et de la Veritè."

After the death of this philofopher, his "Confeffions" were publifhed, which give a minute account of every thing that happened to him till the 30th year. This fingular piece of biography is itfelf a ftriking exemplification of character, for there is hardly any work in which circumftances fo degrading and humiliating are related with fo little referve, while the air of importance given to the moft trivial incidents in which he was any way concerned, and the contempt of fhame implied by exhibiting himfelf thus naked to the world, prove it to have been dictated more by vanity and felf-importance than by contrition. He would have paffed for a better man if this work had not been publifhed, but then he could not have had any pretext for talking fo much of himfelf. "His Confeffions," fays M. Sennebier, author of the Literary Hiftory of Geneva, "appear to me a very dangerous book, and paint Rouffeau in fuch colours as we fhould never have ventured to apply to him. The excellent analyfes which we meet with of fome fentiments, and the excellent anatomy which he gives of fome actions, are not fufficient to counterbalance the deteftable matter which is found in them, and the unceafing obliquities every where to be met with." There is no doubt that he has done much mifchief to the intereefts of morality by thefe "Confeffions," as well by the bafenefs of the vices which he has difclofed, as by the manner in which he united them with the virtues. Among the other pieces of Rouffeau, not already noticed, and which were publifhed after his death in a new edition of his works, are, 1. The Reveries of a folitary Wanderer, being a journal of the latter part of his life. In this he confeffes that he preferred fending his children into hofpitals deftined for orphans, than to take upon himfelf the charge of their maintenance, and endeavours to palliate this fhameful dereliction of duty. 2. Confiderations upon the Government of Poland. 3. The Adventures of Lord Edward, a novel, being a fort of fupplement to his Heloife. 4. Various memoirs and fugitive pieces, with a great number of letters. 5. Emilia and Sophia. 6. An opera and a comedy. 7. Tranflations of the firft book of Tacitus' Hiftory, &c. &c. Like all the other writings of Rouffeau, there are in thefe pofthumous pieces many admirable and ufeful things; but at the fame time they abound with contradictions, paradoxes, and ideas very unfavourable to religion. In his letters efpecially, we fee a man chagrined with misfortunes, which he never attributes to his own want of conduct: he is fufpicious of every body about him, calling and believing himfelf a lamb amidft wolves. All his works are marked with a peculiar warmth and energy of ftyle, and with great vigour of thinking. He was one of the firft writers who exercifed the greateft influence upon the opinions of the age, and in the early periods of the French revolution, they were referred to as of the higheft authority in political matters, and his memory was almoft deified. His reputation has fince been much in the wane; but as long as the French language

language remains, he must be regarded as one of its great authors. The best edition of his works collectively is in 27 vols. 4to. The principal authorities for the life of Rousseau, independently of his own Confessions, are Sennebier Hist. Lit. de Geneve, and Nouv. Dict. Hist.

In 1768, Rousseau's animated and instructive Musical Dictionary was published, collected chiefly from his musical articles in the Encyclopédie; and as he gave no quarter in it to French music, the admirers and defenders of that music have treated his opinions with equal severity. It is, however, the business of true critics not only to point out the errors of a work, but, if it has any, the merit. There may be mistakes in Rousseau's Dictionary, but are there no *good* articles, no marks of refined taste and nice observation in speaking of dramatic music? No short, clear, and happy definitions of musical technica? And is every thing he has said of French music thought so absurd and paradoxical at present, even in France, as it was thirty years ago? The abbé Roussier, and his disciple M. de la Borde, who treat as *absurd* and stupid whatever seems unfavourable to their doctrines, were awed perhaps by the thunder of Rousseau's eloquence, while alive; but no sooner were they sure that the lion was dead, than they plucked up a courage, and boldly attacked him at all points.

We must add, in justice to Jean Jacques, that more good taste, intelligence, and extensive views are to be found in his original articles, not only than in any former musical dictionary, but in all the books on the subject of music which the literature of France can boast. And his "Lettre sur la Musique François," may be safely pronounced the best piece of musical criticism that has ever been produced in any modern language.

It must, however, be confessed, that his treatment of French music is very sarcastic, not to say contemptuous; but the music, the national character *avantageux*, and exclusive admiration of their own music, required strong language. It had been proved long since, that they were not to be laughed out of their bad taste in any one of the fine arts: the national architecture, painting, and sculpture, were, in general, bad, and not what a traveller returning from Italy could bear to look at: though there have been now and then individual French artists of every kind, who have travelled and studied antiquity as well as the great masters of the Italian school; and it is now said, that at the Institute they are trying seriously to correct their errors, and to establish a classical taste throughout the empire.

Yet, after all our sincere encomiums on Rousseau as a musical critic, particularly in the melodrama, and though we subscribe to most of his musical opinions, and defend them, yet we must leave him in the hands of his enemies with respect to Blainville's *new mode*, in recommending which he is totally indefensible. But in the year 1751 he was young in musical theory, and the laws of composition; he had read little, and not studied much; but in 1768, after working so long for the Encyclopédie, in which labour to teach others he must have educated himself, nothing but the state of war between him and the intolerant adherents to Rameau and the old school, could have blinded him so far as not to see the absurdity of Blainville's pretensions to the merit of having invented a new mode, or third key in music, different from the major and minor modes in common use.

It may perhaps be alleged, even by the friends and admirers of his musical writings, that he was more unwilling, than so acute and perspicacious a logician ought to have been, to relinquish his new system of *musical notation*, which he published under the title of "Dissertation sur la Musique moderne," in 1743, when very young, and his knowledge of music superficial. Forty years had not weaned him from his partiality for this juvenile production; for he not only republished it in 1768, in his Musical Dictionary, but near the end of his life, in 1778, he still persisted in explaining and recommending its adoption: as Fontenelle, at near 100, wrote and published a tract in favour of the Cartesian, and Troubillons against Newton's system of gravitation.

Lord Stanhope, and Mr. Baldwyn of Cheshire, are now (1804) at work on a new method of notation, expressing by letters of the alphabet what Rousseau did by numerical figures, with great confidence of success. But neither Rousseau, nor subsequent ingenious framers of a new musical notation, could or would see the inconvenience and even mischief it would occasion to the art, if ever it was generally adopted, by rendering all former music unintelligible, unless every musician and musical student were at the pains of learning two gamuts, or systems of musical notation, instead of one.

Music is at present an universal language throughout Europe. All nations use the same characters, and write and read them with equal facility. Suppose a tyrant in any one kingdom only, were to insist upon the inhabitants relinquishing at once their native language, and adopting another of which they were utterly ignorant, it is hardly possible to imagine that his mandate would or could be obeyed; but if the despot's will were attempted to be complied with in his particular dominions, would all the rest of Europe burn their books, and set about learning a new alphabet, a new spelling-book, a new grammar, and the art of writing this new language? nothing but its general and universal adoption could render it useful to any one nation upon earth.

ROUSSEL, William, a learned French Benedictine monk of the congregation of St. Maur, was born at Conches, a small town within the diocese of Evreux, in Normandy in the year 1658. He became a member of the congregation in the year 1680, and directed his attention principally to those studies which would qualify him for the office of a preacher. Having fine talents, he became very popular, and the general theme of commendation at Paris, but preferring retirement, he withdrew to Rheims, and afterwards to Argenteuil, where he spent the remainder of his life in devotion and study. He died in the year 1717. He published an excellent translation of the Letters of St. Jerome, in 3 vols. 8vo. the first two of which appeared in 1704; and the third, containing the critical letters of that father on the Holy Scriptures, in 1707. They are accompanied with a preface and learned notes. He was author of an *éloge* on father Mabillon. He had employed many years of his life in making preparations for composing "A Literary History of France," but death put an end to his labours, and his papers were placed in the hands of father Rivet, a member of the same congregation, who made use of them without acknowledging his obligation.

ROUSSELAER, in *Geography*, a town of France, in the department of the Lys, situated on the river Mandel; 10 miles S. of Bruges.

ROUSSIER, the *abbé*, in *Biography*, a profound writer on the theory of music, was born at Marseilles in 1716. He is author of a considerable number of musical tracts, of which the following are the titles:

1. A Treatise on Chords and their Succession, 1764.
2. Observations on different Points of Harmony, 1765.
3. Memoir on the Music of the Ancients, 1770.
4. A Letter, in two parts, to the author of the Journal of the Arts and Sciences, concerning the division of the zodiac, 1770. The second part to the same concerning the Institution of the Planetary Week, 1771.

5. Practical Harmony, or Examples in Illustration of the Treatise on Chords, 1776.

6. He was engaged, in 1779, as editor of a memoir on the music of the Chinese, by the abbé Amiot, missionary at Pekin. The learned abbé has enriched this memoir with a great number of notes, observations, and a copious index. See CHINESE *Music*.

All this profound writer's treatises are built upon the principles of Rameau, but Rameau sublimed. The abbé's favourite discovery and systematic principle is the triple progression, upon which he endeavours to prove that the musical systems of the Egyptians, Greeks, and Chinese were founded. By triple progression is meant a series of perfect fifths, so that the word temperament equally disturbs his system and his temper. It is to be feared that the good abbé in this particular, and in his principles in general, is too rigid and inflexible a theorist for the fanciful melody, and licentious modulation of modern composers.

The French are always to have champions, *une homme armé*, to combat the music and musical writers of all other countries. At the beginning of the last century, Bonnet was the redoubted champion of the votaries of Lulli in the middle of that century. The abbé Roussier, with less fury, but more intelligence, threw down the gauntlet for Rameau and his basse fondamentale; and at the end of the century, the abbé Faitu, the most valourous and invincible of them all, has not only bid defiance to the enemies of Lulli and Rameau, but to the whole universe: a perfect Drawcansir, that spares nor friend nor foe, who dares be of a different opinion from himself.

ROUSSILLON, in *Geography*, a province of France before the revolution, once belonging to Spain, bounded on the N. by Languedoc, on the E. by the Mediterranean, on the S. by Catalonia, and on the W. by the Pyrenees, about 18 leagues in length, and 12 in breadth, and consisting of land that is generally fertile. Its principal rivers are the Tet and the Tech, and its capital is Perpignan. It now forms the department of the Eastern Pyrenees.

ROUSSILLON, a town of France, in the department of the Isere, and chief place of a canton, in the district of Vienne; 9 miles S. of Vienne. The place contains 963, and the canton 11,107 inhabitants, on a territory of 225 kiliometres, in 21 communes.—Also, a town of France, in the department of the Saone and Loire; 9 miles N.N.W. of Autun.

ROUSSIN, in the *Manege*, is a strong well-knit, well-stowed horse, such as are commonly brought into France from Germany and Holland.

ROUSSING, in *Sea Language*, is the act of pulling together upon a cable, hawser, &c. without the assistance of tackles, capsterns, &c. It is particularly used in the exercise of removing a ship from one place to another, by means of ropes and anchors.

ROUT, ROUTE, a public road, highway, or course; especially that which military forces take.

The word is French, *route*, formed from the Latin *rupta*, or *ruta*; or the French *roux*, an old word for *horse*; or rather from the old Celtic *rout*, *road*.

Sanson and Ogilby have made maps of the routs and post-roads of France and England. Soldiers are prohibited going out of their routs. Routs are frequently cut in parks, forests, &c. both for ornament, and for the conveniencies of hunting.

Some use route for a path cut across a wood; in opposition to *way*, which is a great road.

ROUT, in *Navigation*. See COURSE.

ROUT is also used for the defeat and flight of an army.

ROUT, in *Law*, is an assembly or combination of three or more persons, upon a common quarrel, going forcibly to commit an unlawful act: such as breaking down fences upon a right claimed of common, or of way, though they do not actually perform it.

If they go, ride, or move forwards, after their meeting, thus making some advances towards the execution of their purpose, it is a rout, though they do not put their purpose in execution; if they do, it is a riot.

A rout, therefore, seems to be an unlawful assembly; and a riot the disorderly fact committed thereby.

Two things, however, there are in common to *rout*, *riot*, and *unlawful assembly*; the one, that there be at least three persons together; the other, that, being together, they disturb the peace, either by words, shew of arms, turbulent gesture, or actual violence.

For the punishment incurred by routs, &c. see RIOT.

ROUT *of Wolves*, among *Hunters*, denotes a herd of those wild beasts.

ROUTIER, in *Navigation*. See WAGGONER.

ROUTOT, in *Geography*, a town of France, in the department of the Eure, and chief place of a canton, in the district of Pontaudemer; nine miles E. of it. The place contains 1169, and the canton 14,721 inhabitants, on a territory of 110 kiliometres, in 21 communes.

ROUTOU, a town of Thibet; 255 miles E.N.E. of Latac.

ROUVRAY, a town of France, in the department of the Côte d'Or; 11 miles S.W. of Semur en Auxois.

ROUVRE, a town of France, in the department of the Upper Marne; 15 miles S.W. of Langres.

ROUVRES, a town of France, in the department of the Vosges; four miles W. of Mirecourt.

ROUVROY, a town of France, in the department of the Somme; 15 miles E. of Peronne.

ROU-WADDE. See RUAD.

ROUX, CAPE, a cape of Africa, on the coast of Tunis. N. lat. 37° 10′. E. long. 8° 22′.

ROUXIERE, LA, a town of France, in the department of the Lower Loire; eight miles N.E. of Ancenis.

ROUY, a town of France, in the department of Nievre; 15 miles E. of Nevers.

ROW, a town of Scotland, in the county of Dumbarton; nine miles W. of Dumbarton.—Also, a town of Hindoostan, in Bahar; 20 miles S. of Bahar. N. lat. 24° 55′. E. long. 85° 52′.

ROW-*Culture*, in *Agriculture*, that method in which the crops are sown in rows or drills, and afterwards cultivated according to that system. See DRILL *Husbandry*.

This sort of cultivation is commonly divided into the narrow and distant kinds, the former comprising all sorts of grain, and some other kinds of crops, which are sown in rows at not more than six, eight, ten, and twelve inches apart; the latter, all those which have large spaces or intervals between the rows, as from a foot to a foot and a half, two feet and more, such as beans, peas, turnips, cabbages, beets, potatoes, carrots, parsneps, and many others. They all require to be wrought between suitable tools, such as hoes and ploughs, at different times, while they are growing upon the ground.

ROW-*Galley*, a long, low, flat-built vessel, furnished sometimes with a deck, and navigated with sails and oars, particularly in the Mediterranean.

ROWAH, in *Geography*, a town of Hindoostan, in Bahar; eight miles N.W. of Bettiah.

ROWALE, or KOWALE, a town of the duchy of Warsaw; 36 miles S. of Wladislaw.

ROWAN, a county of America, and one of the most populous

populous of North Carolina, in Salisbury district; bounded N. by Iredell, and S. by Cabarrus, and containing 21,543 inhabitants.

ROWE, Elizabeth, in *Biography*, a lady greatly distinguished for her piety and poetical talents, was daughter of the Rev. Walter Singer, a dissenting minister near Frome, in Somersetshire. Under the disgraceful reign of Charles II. this gentleman was imprisoned on account of his non-conformity at Ilchester, where he married, and where his daughter Elizabeth was born in 1674. From her childhood she discovered a passion for reading, together with a devotional turn of mind. At the age of twelve, she began to write verses, and practised music and drawing. Her poetical talents excited notice in the neighbourhood, and gave her an introduction to lord viscount Weymouth, by whose son, the honourable Mr. Thynne, she was instructed in the French and Italian languages. In her 22d year, at the request of her friends, she published a volume of miscellaneous poems, by which she is advantageously known. Possessing an agreeable person, and a large share of the accomplishments of her sex, she attracted the attentions of many admirers, but she appears to have been in no hurry to marry, and it was not till 1710 that she gave her hand to Mr. Thomas Rowe, a very amiable man, a scholar, and a poet, with whom she lived in the enjoyment of a large portion of conjugal felicity. This happiness was not lasting; Mr. Rowe, who was of a consumptive habit, died at Hampstead in 1715, and left his widow overwhelmed with grief, which nothing but her sentiments of pious resignation could enable her to support. From this time she passed her days, for the most part, in retirement at Frome, but making occasional visits to the countess of Hertford. Her manners and attainments rendered her perfectly suited to the best company; and though she adhered to the last to the principles of the Dissenters, she was entirely free both from narrowness of sentiment, and from any forbidding austerity of behaviour. Mrs. Barbauld has, in a few lines, given the manner in which she employed herself, and the persons with whom she associated.

"Yet in no useless gloom she wore her days,
She loved the work, and only shunned the praise:
Her pious hand the poor, the mourner, blest;
Her image lived in every kindred breast,
Thynne, Carteret, Blackmore, Orrery approved,
And Prior praised, and noble Hertford loved.
Seraphic Kenn, and tuneful Watts were thine,
And Virtue's noblest champions filled the line."

Mrs. Rowe composed several works in her retreat, especially those letters from the dead to the living, which her own heavy loss doubtless had suggested. She was blessed with a good constitution, and passed through life with very little interruption of health. She died suddenly in February 1737, in the 63d year of her age. A pious book was found lying open by her, and in her cabinet were found letters to several of her friends, which she intended for them after her death. Her works were, "The History of Joseph," an heroic poem; "Friendship in Death," &c.; "Devout Exercises of the Heart;" "Miscellaneous Works," in two volumes. Few characters have been more justly esteemed than that of Mrs. Rowe. With respect to her poetical works, the general character is correct and melodious versification, flowing language, and tender elevated sentiments. Among her prose compositions the most popular was that entitled "Friendship in Death, in twenty Letters," supposed to be written from the dead to the living. These are the works of a lively and a feeling heart, exercised in pious meditations, and they are always read with pleasure by the young, and those who are susceptible of good impressions. They have passed through many editions, and are usually accompanied by other pieces of the author's of a moral and religious kind. All her writings, though not calculated to stand the test of exact criticism, inspire a favourable idea of the writer.

Rowe, Thomas, the husband of the foregoing, was the son of a dissenting minister, who afforded him all the advantages of an excellent education, and he would probably have become a distinguished literary character, had not his early marriage been followed by a premature death. He wrote some excellent pieces of poetry, one of which was a tender ode to his wife, some years after their marriage. History was his favourite pursuit, and he formed a design of writing the lives of illustrious characters in antiquity, omitted by Plutarch, of which eight were finished, and were published after his death. He died in 1715, at the age of 28. Some of his original poems and translations were printed with Mrs Rowe's "Miscellaneous Works."

Rowe, Nicholas, an eminent English poet, the son of John Rowe, esq. serjeant at law, was born in 1673, at Little Berkford, in Bedfordshire. After a preliminary education at Highgate, he was placed in Westminster school under the noted Dr. Busby, as a king's scholar, and pursued classical studies with eagerness and success. His poetical exercises in Latin and Greek were particularly admired. He was removed from school at the age of 16, and entered a student in the Middle Temple, and proceeded so far in the pursuit of the law, as to be called to the bar; but the death of his father, when he was only 19, gave him liberty to follow his own inclination, and he devoted himself to poetry and polite literature. At the age of 25 he produced his first tragedy, entitled "The Ambitious Step-mother;" the story of which appears to be founded on that of Solomon elevated to the throne by the machinations of his mother Bathsheba, but the scene and circumstances are totally different. It was acted at Lincoln's Inn-Fields, and was very successful, which is said to have rendered the author a decided deserter from the law. His next dramatic work was "Tamerlane," which was acted in 1702. This was intended to convey important political impressions: the tyrant and despot Bajazet being intended as the type of Lewis XIV., then considered as the enemy of liberty, civil and religious, and the Tartar Tamerlane was metamorphosed into a perfect prince, intended to characterize the immortal William III. of England. In all the portraits there was much exaggeration, but the purpose of the piece, and its many elevated and liberal sentiments, caused it to be received with great applause. It was frequently acted during that and the following reign, till the year 1710, when different political opinions coming into fashion, it was for a time intermitted, but the accession of the house of Hanover restored it to the stage, and it was for a great number of years represented on the anniversary of king William's landing. In 1703, Mr. Rowe produced his "Fair Penitent," which is thought to be his most striking piece; it is highly interesting, and abounds with poetry and fine sentiments. Mr. Rowe made an attempt at comedy in 1706, but did not succeed. From this time to 1715, he brought out, in succession, the tragedies of "Ulysses;" "The Royal Convert;" "Jane Shore," and "Lady Jane Gray." Of these, the two last have survived on the stage. Jane Shore is now occasionally acted; always when performed engages some of the best actors, and never fails to be viewed with the deepest interest. During this interval he appeared as an editor of Shakspeare's plays, prefixing to this edition an account of the life of that transcendant genius. Rowe was not exclusively engaged in literary pursuits,

he was a man of buſineſs, and did not neglect thoſe opportunities of entering into public life, which his reputation and connections afforded. He had joined the Whig party, and when the duke of Queenſberry was made ſecretary of ſtate, he was appointed by that nobleman his under ſecretary. This poſt he held about three years, when the duke died, and his ſervices were no more required during the reign of queen Anne. It is ſaid he went, one day, to pay his court to the lord-treaſurer Oxford, who aſked him if he underſtood the Spaniſh language. He replied in the negative, but added, that he did not doubt but he could make himſelf maſter of it, ſuppoſing his lordſhip intended to give him employment at the court of Madrid. The earl ſeemed to approve his intention of ſtudying the language: Rowe took his leave, and retired a few weeks or months to learn it, and then waited on his lordſhip to acquaint him with what he had done: "then, ſir," replied the courtier, "I envy you the pleaſure of being able to read Don Quixote in the original," and diſmiſſed him. On the acceſſion of George I. the place of poet laureat was conferred upon him, and he was alſo made one of the land ſurveyors of the cuſtoms of the port of London. The prince of Wales conferred upon him the clerkſhip of his council, and the lord chancellor Parker made him his ſecretary for the preſentations. The emoluments of theſe offices, with his own fortune, enabled him to ſupport a very reſpectable ſtation in ſociety, but he did not live long to enjoy theſe acceſſions to his fortune. He died in 1728, at the age of 45, and was interred among the poets in Weſtminſter-Abbey. Mr. Rowe was twice married, and had a ſon by his firſt wife and a daughter by the ſecond. He was a handſome and genteel man; and his mind was as amiable as his perſon. He lived beloved, and at his death was lamented by Pope, in an epitaph which is to be found in Pope's works, though it is not affixed on the monumental marble at Weſtminſter. Mr. Rowe is chiefly known to the public as a tragic poet; if he does not poſſeſs in a very high degree the principal parts of tragic invention, ſuch as the nice diſcriminations of character, and the ſkilful developement and varied play of paſſion; his diction is poetical without being bombaſtic or affected, his verſification is ſingularly ſweet, and his plays abound with ſentiments, given with ſuch force and elegance as are calculated to dwell upon the mind. In his Jane Shore he profeſſes to be the imitator of Shakſpeare, but nothing can be more diſſimilar than the mode and colour of writing in the two poets, as nothing could be leſs reſembling than their genius. Mr. Rowe is well known alſo by his poetical tranſlations. He gave verſions of the Golden Verſes of Pythagoras, and of the firſt book of Quillet's "Callipædia," ſee QUILLET; but his chief labour in this way was a tranſlation of Lucan's "Pharſalia," which was not publiſhed till 1728, ten years after the tranſlator's death, and which Dr. Johnſon calls "one of the greateſt productions of Engliſh poetry;" but if critically compared with the original, it will be found frequently very diffuſe. The "Poetical Works" of Mr. Rowe, conſiſting of his plays and miſcellaneous poems, were publiſhed collectively in three vols. 12mo. in 1719; and his tranſlation of the Pharſalia was publiſhed ſoon after his death, with a dedication to the king by his widow.

ROWE, in *Geography*, a townſhip of America, in the N.W. corner of Hampſhire county, Maſſachuſetts, bounded N. by Vermont; watered by Deerfield river, and containing 839 inhabitants; 115 miles N.W. of Boſton.

ROWEL, among *Farriers*, a kind of iſſue, made by drawing a ſkain of ſilk, thread, hair, or the like, through the nape of the neck, or other part of a horſe; anſwering to what in ſurgery is called a *ſeton*.

The ROWELLING *of Horſes* is a method of cure frequently had recourſe to, in caſes of inward ſtrains, eſpecially about the ſhoulders or hips; as alſo for hard ſwellings not eaſily to be reſolved.

The operation is thus: a little ſlit being made through the ſkin, about a hand's breadth below the part aggrieved, big enough to put a ſwan's quill in; the ſkin is raiſed from the fleſh, the end of the quill put in, and the ſkin blowed from the fleſh upwards, and all over the ſhoulder.

Then the hole being ſtopped by the finger, the place blown is beaten with a hazel ſtick, and the wind ſpread with the hand all over, and then let go.

This done, a ſkain of horſe-hair, or red ſarſenet, half the thickneſs of the little finger, is put in a rowelling needle ſeven or eight inches long; the needle is put into the hole, and drawn through again ſix or ſeven inches higher; then the needle is drawn out, and the two ends of the rowel tied together; anointing it every day, as well as before the putting it in, with ſweet butter and hog's greaſe, and drawing it backwards and forwards in the ſkin, to make the putrid matter diſcharge itſelf more plentifully.

Others, diſliking theſe rowels, as making too great a ſore and ſcar, uſe the French rowel, which is a round piece of ſtiff leather, with a hole in the midſt, laying it flat between the fleſh and ſkin, the hole of the rowel juſt againſt that in the ſkin; ſewing it with a needle and thread drawn through the hole in the ſkin; cleaning it once in two or three days, and then anointing it afreſh.

ROWELS *of a Spur*. See SPUR.

ROWEN, in *Geography*, a town of Bohemia, in the circle of Chrudim; 10 miles S.E. of Chrudim.

ROWEN-*Tree*, in *Huſbandry*, a term improperly applied to the mountain aſh.

ROWENSKO, in *Geography*, a town of Bohemia, in the circle of Boleſlaw; 6 miles S.E. of Turnau.

ROWET, a name ſometimes applied to rouen. See ROUEN.

ROWETY-WOOL, among wool-dealers, a term applied to the young wool of ſome ſorts of ſheep, which riſes below the old fleece.

ROWING, is the action of impelling a boat or veſſel along the ſurface of the water by oars, which are managed in a direction nearly horizontal. See OAR, BOAT, &c.

ROWING-*Guard*. See GUARD-*Boat*.

ROWLE, in a *Ship*, is a round piece of wood or iron, in which the whip goes, being made to turn about, that it may carry over the whip the eaſier from ſide to ſide.

ROWLEY, in *Biography*, a monk, who is ſaid to have flouriſhed at Briſtol in the 15th century, and whoſe poems, or thoſe attributed to him, were publiſhed, many years ago, by the unfortunate CHATTERTON. See his article.

ROWLEY, WILLIAM, who ſtands in the third claſs of dramatic writers, lived in the reign of James I., and was one of the company of players belonging to the prince of Wales. Little is known of him, except that he was in cloſe connection with all the principal wits and poetical geniuſes of that age, with ſome of whom he joined in their writings. By Wood he is ſtyled "the ornament for wit and ingenuity of Pembroke-hall, Cambridge." He was a conſiderable benefactor to the Engliſh ſtage, having left five plays of his own compoſing, and lent his aſſiſtance to ſeveral authors in the compoſition of many others. The titles of all theſe are given in the Biographia Dramatica; which ſee.

ROWLEY, in *Geography*, a town of Hindooſtan, in Oude; 18 miles S. of Bahraitch.

ROWLEY, a townſhip of America, in Eſſex county, Maſſachuſetts;

fachufetts; the inhabitants, amounting to the number of 1682, are moftly farmers; incorporated in 1639, and fituated 4 miles N.W. by W. of Ipfwich.

Rowley *Rag*, in *Mineralogy*, a bafaltic ftone from Rowley, near Dudley, in Staffordfhire. It is ufed for polifhing in fome of the manufactures of Birmingham, and has been particularly recommended for grinding the fpecula of reflecting telefcopes. On this variety of bafalt, the fine-grained grunftein of Werner, fome moft intereftting experiments were made by the late Mr. Gregory Watt, to determine the important queftion refpecting the igneous or aqueous origin of bafaltic rocks. Perhaps few experiments in the laft fifty years throw more light on fome of the myfterious operations of nature in the mineral kingdom, and have a better claim to the profound attention of philofophers, or are more deferving of being repeated and diverfified. (See Phil. Tranf. for 1804, p. 279.) Before a fhort account of thefe experiments, it may be proper to give a defcription of the ftone itfelf. Rowley rag is a fpecies of fine-grained bafalt, of a confufed cryftallized texture; its fracture, in fmall pieces, is uneven; in the large, conchoidal. Its hardnefs is fuperior to common glafs, but inferior to felfpar; its tenacity is confiderable; its action on the magnetic needle is ftrong, but without figns of polarity; its fpecific gravity is 2.868. The general colour of Rowley rag is a very dark grey, approaching to black: it reflects light from a variety of brilliant points, fome of which feem to be felfpar, the others hornblende. According to the analyfis of Dr. Withering, 1000 parts contain 475 filex, 325 argillaceous earth, and 200 of the oxyd of iron. The magnetic property of thefe rocks was firft obferved by Dr. Plott, who fays they turned the needle 6° from its proper direction. The fame power of affecting the magnet has fince been difcovered in feveral bafaltic mountains, particularly in the Giant's Caufeway in Ireland. This ftone is fimilar to the bafalt of the Clee hills, in Shropfhire, and the bafaltic ftones in various parts of Great Britain. In its characters and chemical compofition it nearly refembles fome of the compact lavas from Ætna and Teneriffe. It is eafily fufible into an opaque black glafs, which, however, tranfmits light through very minute fragments. The texture of this glafs is completely vitreous, with a few air-bubbles. Its fracture is conchoidal and undulated; the hardnefs is fuperior to felfpar, but inferior to quartz. This glafs poffeffes fcarcely any action on the magnetic needle. The fpecific gravity is 2.749.

For the purpofe of afcertaining the effect of a high degree of temperature on a confiderable quantity of this ftone, one of the common reverberatory furnaces, ufed in iron founderies for the fufion of pig-iron, was ftrongly heated by a fire maintained feveral hours. About feven hundred-weight of amorphous Rowley rag was broken in fmall pieces, and depofited gradually on the elevated part of the interior of the furnace, between the fire and the chimney; from whence, as it melted, it flowed into the deeper part, in which, in ordinary operations, the iron is collected. It was obferved by the perfons attending, that it did not require half the quantity of fuel to fufe the bafalt that would have been neceffary to melt an equal weight of pig-iron. When the whole was melted, it formed a liquid glafs, rather tenacious, from which a large ladleful was taken, which, being allowed to cool, retained the characters of perfect glafs. The fire was maintained, though with gradual diminution, for more than fix hours; after which time, the draught of the chimney was intercepted, the furface of the glafs was covered with heated fand, and the furnace was filled with coals, which were confumed very flowly. It was eight days before the mafs in the furnace was fufficiently cool to be extracted, and even then it retained confiderable heat.

The form of the mafs being given by the bottom of the furnace, approached to the fhape of a wedge. It was nearly three feet and a half long, and two feet and a half wide; about four inches thick at one end, and above eighteen inches at the other. Owing to this inequality of thicknefs, and alfo to the unequal diftribution of heat in the furnace, Mr. Watt ftates that the cooling of the mafs had been too irregular to permit it to attain an homogenous texture; but this circumftance fortunately difclofed fome very remarkable peculiarities in the arrangement of the particles of bodies, paffing from a vitreous to a ftony ftate.

Thefe peculiar changes were difcovered, by infpecting the various parts of the wedge-fhaped mafs, which had progreffively cooled, as they were more remote from the fire, and nearer to the fmall extremity. This circumftance, not being very diftinctly ftated by Mr. Watt, has led fome of the readers of the paper to believe that the changes were obferved by taking a portion of the fubftance out of the furnace at different times, during the procefs: hence they have not fufficiently attended to a moft important fact which this experiment difclofes, namely, that the particles of bodies in a folid ftate, and at a temperature much below that of fufion, are capable of a kind of internal motion, and of affuming a cryftalline arrangement, in all the various ftages from fluidity to a perfectly folid ftate.

The tendency towards arrangement in the particles of the fluid glafs is firft developed by the formation of minute globules, which are generally nearly fpherical, but fometimes elongated, and which are thickly difeminated through the mafs. The colour of thefe globules is confiderably lighter than that of the glafs; they are commonly greyifh-brown, fometimes inclining to chocolate-brown; and when they have been formed near the interior furface of the cavities in the glafs, they project and refemble a cluftor of fmall feeds. Their diameter rarely exceeds a line, and feldom attains that fize; as, in general, they are fo near to one another, that their furfaces touch before they can acquire confiderable magnitude. In the procefs of cooling, they adapt their form to their confined fituation, fill up every interftice, and finally prefent a homogenous body, wholly unlike glafs, and equally unlike the parent bafalt. When the union of the little globules has been imperfectly effected, the fracture of the mafs indicates its ftructure, by numerous minute conchoidal fractures, which difplay the form of each globule. But if the arrangement has extended a little farther, all thefe fubdivifions are entirely loft; the mafs becomes perfectly compact, has an even or a flat conchoidal fracture, is nearly of the fame hardnefs as the glafs, is commonly of a chocolate colour, graduating into a brownifh-black, and the intenfity of the colour increafes in proportion to the degree to which the arrangement has extended. Its afpect is rather greafy; and it much refembles fome varieties of jafper, in the compactnefs of its texture, and its opacity. Its magnetic action is extremely feeble. Its fpecific gravity appears to be 2.938. From this refemblance to jafper, Mr. Watt denominates the mafs in this ftate jafpideous.

If the mafs were now rapidly cooled, it is obvious, fays Mr. Watt, that the refult would be the fubftance I have juft defcribed; but if the temperature adapted to the farther arrangement of its particles be continued, another change is immediately commenced; by the progrefs of which it acquires a more ftony texture, much greater tenacity, and its colour deepens as thefe changes advance, till it becomes abfolutely black. Sometimes this alteration is effected

effected by a gradual tranſition, the limits of which cannot be aſſigned; but more generally by the formation of ſecondary ſpheroids, in the heart of the compact jaſpideous ſubſtance. Theſe ſpheroids differ eſſentially from thoſe firſt deſcribed: the centres of their formation are more remote from each other, and their magnitude is proportionably greater, ſometimes extending to a diameter of two inches, and ſeeming only to be limited by contact with the peripheries of other ſpheroids. They are radiated with diſtinct fibres: ſometimes the fibres reſemble thoſe of brown hæmatites, and ſometimes they are faſciculated irregularly, ſo as to be very ſimilar in appearance to the argillaceous iron ores, rendered priſmatic by torrefaction. They are generally well defined, and eaſily ſeparable from the maſs they are engaged in; and often the fibres divide at equal diſtances from the centre, ſo as to detach portions of the ſpheroid in concentric coats. The tranſverſe fracture of the fibres is compact and fine-grained; the colour black; and the hardneſs ſomewhat inferior to that of the baſaltic glaſs. When two of the ſpheroids come in contact by mutual enlargement, no intermixture of their fibres ſeems to take place: they appear equally impenetrable; and as neither can penetrate, both are compreſſed, and their limits are defined by a plane, at which a ſeparation readily takes place, and each of the ſides is inveſted with a ruſty colour. When ſeveral ſpheroids come in contact on the ſame level, they are formed by mutual preſſure into pretty regular priſms, whoſe diviſion is perfectly defined; and when a ſpheroid is ſurrounded on all ſides by others, it is compreſſed into an irregular polyhedron.

The tranſition from this fibrous ſtate to a different arrangement, ſeems to be very rapid, for the centre of moſt of the ſpheroids becomes compact before they attain the diameter of half an inch. As the fibrous ſtructure propagates itſelf by radiating into the unarranged maſs, the compact nucleus, which ſupplies its place, gradually extends till it finally attains the limits of the ſpheroids; and the ſame arrangement pervades the matter comprehended between them. The maſs has now aſſumed a compact ſtony texture, and poſſeſſes great tenacity. Its hardneſs is ſomewhat inferior to that of the glaſs from which it was formed. Its action on the magnetic needle is very conſiderable. Its ſpecific gravity is 2.938. Its colour is black, inclining to ſteel grey; it is abſolutely opaque, and only reflects light from a few minute points. Though the diviſions between the ſpheroids are rendered imperceptible to the eye, they are not obliterated, and their ruſty ſurfaces are often diſcloſed by an attempt to fracture the maſs.

A continuation of the temperature favourable to arrangement ſpeedily induces another change. The texture of the maſs becomes more granular, its colour rather more grey, and the brilliant points larger and more numerous; nor is it long before theſe brilliant particles arrange themſelves into regular forms; and finally the whole maſs becomes pervaded by thin cryſtalline laminæ, which interſect it in every direction, and form projecting cryſtals in the cavities. The hardneſs of the baſis ſeems to continue nearly the ſame; but the aggregate action of the baſis and of the imbedded cryſtals on the magnetic needle, is prodigiouſly increaſed. It appears to poſſeſs ſome polarity, and minute fragments are ſuſpended by a magnet. Its ſpecific gravity is ſomewhat increaſed, as it is now 2.949. The cryſtals contained in it, when examined by a microſcope, appear to be faſciculi of ſlender priſms, nearly rectangular, terminated by planes perpendicular to the axis; they are extremely brilliant, but their colour is greeniſh-black; they are harder than glaſs, and fuſible by the blowpipe; they are ſuſpended by the action of a magnet. They are arranged nearly ſide by ſide, but not accumulated in thickneſs, ſo that they preſent the appearance of broad thin laminæ; they croſs one another at all angles, but always on nearly the ſame plane; and the laminæ thus formed are often three or four lines long, and from a line to a line and a half broad, but extremely thin.

It ſeems obvious that an equalized temperature would have rendered the whole ſimilar to the ſubſtance laſt deſcribed; and it may be fairly inferred, that by a continuance of heat the minute cryſtals would have been augmented in their dimenſions by the acceſſion of ſimilar particles ſtill engaged in the baſis, or by the union of ſeveral cryſtals, till they acquired ſufficient magnitude for their nature to be abſolutely determined by the uſual modes of inveſtigation. It is poſſible, however, if ſuch precautions had been taken as might have ſecured this degree of perfection in the ulterior reſult, that the maſs would only have exhibited an uniform aſpect, and that the intereſting initial phenomena would not have been diſcovered.

The appearances here deſcribed ſeem deſerving of conſideration in ſeveral points of view. Few things can be more at variance with commonly received opinion, than the diverſified ſucceſſion of changes of ſtructure which this glaſs exhibits in its paſſage to a cryſtallized ſtate. The generation of the globules which unite to form the jaſpideous ſubſtance, is what we might be prepared to expect by obſerving the cooling of a common iron furnace ſlag. But it appears not very obvious to common apprehenſion that the ſpecies of arrangement requiſite to form this intermediary ſubſtance, could be compatible with any fluidity permitting farther motion of the ultimate particles of the maſs; yet immediately after the completion of this arrangement, they receive a new diſpoſition, and the radiated fibrous ſtructure commences. Sometimes this pervades even the unaltered glaſs; but Mr. Watt preſumes this only to happen where the minute globules firſt formed were ſcattered ſo far aſunder that their centres became fibrous before their peripheries came into contact. This view of the ſubject is juſtified by the analogous operation of the formation of cryſtals ſimilar to thoſe deſcribed in the heart of the radiated ſpheroids, while their exterior ſtill retained the fibrous texture.

If it be conſidered as extraordinary that a change ſhould be effected, converting an apparently ſolid and homogeneous maſs into an accumulation of radiated ſpheroids, and that theſe radii ſhould loſe their fibrous ſtructure, and aſſume the texture, aſpect, and tenacity, of a compact, hard, and homogenous ſtone, it is certainly much more extraordinary that this ſtone ſhould permit farther arrangement to proceed, and ſhould enable the cryſtalline molecules which it contains in a ſtate of confuſed aggregation, to arrange themſelves, and to form regular cryſtals, which, although minute, are equal, in the perfection of their forms, and in the brilliancy of their natural poliſh, to the moſt precious products of cryſtallization. It is alſo well deſerving of obſervation by how regular a march the magnetic influence of the ſubſtance keeps pace with the perfection of its arrangement, till it becomes ſo powerful that fragments of the regenerated ſtone are ſuſpended by the magnet.

It has been moſt juſtly remarked by Mr. Smithſon, that ſolution, far from being neceſſary to cryſtallization, effectually prevents its commencement; for while ſolution ſubſiſts, cryſtallization cannot take place. It may remain a queſtion whether previous ſolution be eſſential as a preparatory means of obtaining, by ſubſequent evaporation or cooling, the ſmall parts of bodies diſengaged, ſo that they may unite to form regular cryſtals. If, by ſolution be only meant that ſimple action of heat, or water, which merely counteracts

teracts the force of aggregation, and relieves the molecules from their bonds of union with each other, it certainly is a requiſite; but if by ſolution be meant that action of affinities, by which not only the force of aggregation is overcome, but the combinations which conſtitute the molecules are deſtroyed, it obviouſly is not only unneceſſary, but prejudicial, to cryſtallization. Mechanical ſuſpenſion in a fluid medium of ſuch denſity that the cryſtalline polarity may be enabled to counteract the power of gravity, is, with juſtice, conſidered by Mr. Smithſon the only requiſite for the formation of cryſtals. The circumſtances here detailed appear an additional confirmation of this remark, and perhaps go ſtill farther, by ſhewing that even the fluidity (in the common ſenſe of the word) of the ſuſpending medium is not an indiſpenſible condition. For it appears impoſſible to annex the idea of fluidity to the union of the minute globules which form the jaſpideous ſubſtance, ſtill leſs to that ſubſtance when formed, or to thoſe ſpheroids whoſe obſtinate impenetrability is ſo ſtrongly defined. And if, by any power of imagination, theſe can be ſuppoſed to be fluid at the time they retain this conformation; how can it be ſuppoſed that the compact, hard, tenacious ſtone into which they are changed, could retain theſe characters in a fluid ſtate? Yet the ſubſequent formation of cryſtals proves that either all theſe contradictions muſt be, or that the particles of bodies apparently ſolid, muſt be capable of ſome internal motion, enabling them to arrange themſelves according to polarity, while they are ſolid and fixed, as far as they have reference to the ordinary characters of fluidity.

Inſtances, even more remarkable, of the motion of the particles of bodies in a ſolid ſtate, have very long been known and authenticated, though perhaps they have not been generally regarded with the attention they deſerve. Glaſs veſſels are well known to be convertible into Reaumur's porcelain by the internal arrangement of their particles without loſing their external form, and conſequently at a temperature very much below that requiſite for their fuſion. The change of glaſs into Reaumur's porcelain does not ariſe from an evaporation of the alkali, as has been alleged, but from a regular arrangement of the particles of the glaſs. It commences by the formation of fibres perpendicular to the ſurface of the glaſs, and penetrating into it. At nearly the ſame time ſmall radiated globules are formed in the interior of the glaſs, and the union of theſe with the fibres, by their mutual increaſe, forms the whole into a new ſubſtance; and if the requiſite temperature be longer maintained, the fibres diſappear, and the whole becomes fine-grained and almoſt compact. This ſubſtance, from the improved ſtate of its aggregation, is much ſtronger and more tenacious than before, and is not fuſible at a heat ſufficient to fuſe the glaſs it was formed from; but if that aggregation be once deſtroyed, the glaſs reſulting from its fuſion is equally fuſible with the original glaſs; and a repetition of the proceſs will again form Reaumur's porcelain, which may be again fuſed, and ſo on repeatedly; for the quantity of alkali evaporated during the operation is extremely ſmall. The hardneſs and brittleneſs of metals rapidly cooled, contraſted with the ſoftneſs and tenacity reſulting from their gradual refrigeration, are all analogous inſtances; and all the proceſſes in which annealing is employed, and more remarkably the tempering of ſteel, offer ſtrong proofs of the internal motions and arrangements of the particles of matter at temperatures very much below the heat requiſite for their fluidity. Mr. Watt further adduces the ſtructure and texture of calcareous ſtalactites as offering proofs of the internal motion of the particles of ſolid bodies at the common temperature of the atmoſphere. Succeſſive depoſitions of calcareous carbonate form a ſtalactite which at firſt is fibrous. A continuance of the proceſs cauſes the fibrous ſtructure to diſappear, and the ſtalactite becomes irregularly cryſtalline. The irregularities afterwards vaniſh, and it becomes perfect calcareous ſpar, diviſible into large rhomboids, with the form peculiar to that mineral, and all the gradations may be found in the ſame ſpecimen. For a more particular account of theſe experiments, and the ingenious obſervations of Mr. Watt, we muſt refer the reader to the volume of the Philoſophical Tranſactions above cited. The proofs and illuſtrations of the arrangements which take place in the internal particles of ſolid bodies, offer the only plauſible explanation, which has yet been given, of the formation and decompoſition of cryſtals under various circumſtances in which they occur in mineral veins, and alſo of the priſmatic forms obſervable in currents of lava, and in baſaltic and other rocks. See TRAP, and VOLCANIC *Products*.

ROW-LOCKS, among *Ship-Carpenters*, ſmall ſpaces left in the gunwale, where two thoals are let in, at ſuch a diſtance from each other, as to admit the oar, at the end of the loom, to lie on to row the boat.

In the ſides of the ſmalleſt veſſels of war, a number of little ſquare holes, called *row-ports*, are cut for this purpoſe parallel to the ſurface of the water.

ROWNING, JOHN, in *Biography*, an Engliſh mathematician and philoſopher of conſiderable ingenuity, was fellow of Magdalen college, Cambridge, and afterwards rector of Anderby, in Lincolnſhire. He was chiefly known for mechanical contrivances and inventions. In 1738 he publiſhed a compendious ſyſtem of natural and experimental philoſophy, in 2 vols. 8vo. which was frequently referred to thirty or forty years ago, and which has paſſed through many editions, but is now ſuperſeded by many other ſimilar works of more value. He has likewiſe two pieces in the Philoſophical Tranſactions, one containing a deſcription of a barometer, in which the ſcale of variation may be increaſed at pleaſure; the other, giving directions for making a machine for finding the roots of equations univerſally. He publiſhed likewiſe "A Preliminary Diſcourſe on the Fluxionary Method." Mr. Rowning died in November 1771, in the 72d year of his age.

ROWRAH, in *Geography*, a town of Hindooſtan, in the circar of Gohud; 10 miles S. of Raat.

ROWS *of Trees*. See PARALLELISM.

ROWSING, in *Sea Language*, denotes pulling upon a cable or rope, without the aſſiſtance of capſterns, &c.

ROWT, in *Rural Economy*, a term ſignifying to low as cattle.

ROWTEE, in *Geography*, a town of Hindooſtan, in the circar of Sumbul; 15 miles S.S.W. of Nidjibabad.

ROWTOMPOUR, a town of Hindooſtan, in Oude; 16 miles S.S.W. of Kairabad.

ROWTY, in *Agriculture*, a term ſignifying over-rank, or too ſtrong.

ROXBOROUGH, in *Geography*, a townſhip of Philadelphia county, in Pennſylvania.

ROXBURGH, a village in Roxburghſhire, Scotland, was formerly a place of conſiderable importance, as may be conjectured from the circumſtance of its having given name to the county. It was for ſeveral centuries a royal burgh; and was regarded as one of the firſt towns in the Scottiſh kingdom, for opulence, and magnificence of appearance. It was totally deſtroyed by king James II., and never afterwards recovered; and as its ſcite is now converted into arable fields, the plough has nearly obliterated all traces of its exiſtence. Some remains of its ancient caſtle, however, are yet viſible about two miles eaſtward from the village. Theſe

Thefe occupy the fummit of a bold eminence, which rifes from the plain, near the junction of the Tweed and the Teviot. This fortrefs, in ancient times, was of great ftrength, and was accounted the moft important ftrong-hold on the Scottifh borders. It was environed by a deep ditch, which could be filled at pleafure by the garrifon with the waters of the Teviot, and over which a drawbridge was thrown. Interior to the ditch was a wall, of which only a few fragments are ftanding, but enough to atteft its prodigious thicknefs and folidity. Roxburgh caftle, Pennant informs us, in his Tour in Scotland, was anciently called Marchidon, Marchmont, or the Hill on the Marches. The name of its founder is unknown, as is the period of its erection. The earlieft mention of it in hiftory occurs in 1132, when a treaty of peace is ftated to have been concluded here, between king Stephen of England and king David I. of Scotland. In 1174, after king William the Lion was made a prifoner by the Englifh, this caftle, with four others, was delivered up to king Henry II. as a fecurity for his royal hoftage doing homage for his crown on his releafe from captivity. The fucceffor of Henry reftored it to the Scots, but it was again taken by king Edward I. in 1296. It was recovered doubtlefs by king Robert I., but appears to have been foon after poffeffed by the Englifh, as it is recorded to have been furprifed, in 1342, by fir Alexander Ramfay, who was appointed governor; an honour which the envious Douglas did not allow him to enjoy long. The Scots again loft this fortrefs in the reign of Edward III., who twice celebrated his birth-day here. After this period it was taken and retaken feveral times; but the moft diftinguifhed fiege was that by king James II., when it was captured by the Scots; though, previous to the victory, the king was killed by the burfting of a piece of ordnance. A hollow tree is faid to ftand on the fpot where the monarch fell, on the north fide of the Tweed, and at a fhort diftance below Fleur's houfe. The queen, who was with the army when this event took place, obferving that the foldiers were difheartened, and that the commanders were difpofed to raife the fiege, ufed every exertion to excite their courage; and, among other things, told them, that though their king had fallen, he was but one man, and that fhe would foon give them another king, her fon, James III., who next day arrived in the camp, and was crowned at Kelfo, in the 7th year of his age. This heroic and well-timed addrefs produced the defired effect; the fpirits of the whole army were roufed, and the attack having been renewed with redoubled ardour, the garrifon furrendered in a few days. From that period the caftle has remained in ruins, though it was in fome degree repaired by the lord protector, Somerfet, in the reign of Edward VI. of England.

The parifh of Roxburgh extends eight miles in length, and about four in breadth. The general appearance is flat and floping, and the foil is generally a rich loam, well calculated, either for the growth of wheat, or for the turnip husbandry. According to the parliamentary returns of 1811, it contains 225 houfes, and 946 inhabitants. The Statiftical Account of Scotland, by fir John Sinclair, bart. vol. x. 1797. Pennant's Tour in Scotland, vol. iii. 4to. 1779. Beauties of Scotland, vol. ii. 8vo. 1805.

ROXBURGHIA, in *Botany*, received that name, at the fuggeftion of the right honourable fir Jofeph Banks, from the pen of the late Mr. Dryander, in juft commemoration of the difcoverer of this genus, Dr. William Roxburgh, F.L.S., member of the Afiatic Society. The refearches of this indefatigable and enthufiaftic obferver of nature, among the botanical treafures of Hindoftan, and his liberal communications to his friends at home, have added very extenfively to our knowledge of Indian plants. The Eaft India Company have publifhed his *Coromandel Plants* in a ftyle worthy of the materials. From the remote fituation of the author, many genera and fpecies were left by him for the determination of his learned editor, to whom all the fources of literary information in Europe were open. But as the name of this editor is entirely kept out of fight, a French writer, De Theis, has been led into the miftake of charging Dr. Roxburgh with the unexampled arrogance of dedicating a genus to his own honour. No man can be further, than our candid and unaffuming friend, from fuch prefumption, and we feel it a duty to wipe away the unmerited reproach.—Dryand. in Rox. Coromand. v. 1. 29. Willd. Sp. Pl. v. 2. 321. Ait. Hort. Kew. v. 2. 347. Sm. Exot. Bot. v. 1. 111.—Clafs and order, *Tetrandria Monogynia* (*Octandria;* in Hort. Kew.) Nat. Ord. *Sarmentacea*, Linn. *Afparagi*, Juff.

Gen. Ch. *Cal.* none, unlefs the corolla be taken for fuch. *Cor.* Petals four, inferior, lanceolate, equal, ribbed, coloured chiefly on the upper fide, permanent. *Stam.* Filaments four, oppofite to the petals, and nearly as long, awl-fhaped, fleffy, with a double cell at their inner fide, near the bafe; anthers two-lobed, oblong, lodged in the cells of the filaments, and each crowned with a fimple lanceolate appendage, much fhorter than the naked fummit of the filaments. *Pift.* Germen fuperior, fmall, feffile, ovate; ftyle none; ftigma roundifh. *Peric.* Capfule of one cell, with two concave valves. *Seeds* numerous, erect, cylindrical, furrowed, each fupported on a ftalk clothed with little veficles.

Eff. Ch. Petals four, fpreading. Filaments lanceolate, keeled, bearing the anthers on their infide, near the bafe, crowned with an appendage. Capfule fuperior, of one cell, with two valves, and many feeds.

1. R. *viridiflora.* Green-flowered Roxburghia. Sm. Exot. Bot. v. 1. 111. t. 57. (R. gloriofoides; Dryand. in Ait. Hort. Kew. v. 2. 348. Roxb. Coromand. v. 1. 29. t. 32? R. gloriofa; Curt. Mag. t. 1500. Ubium polypoides album; Rumph. Amb. v. 6. book 9. 364. t. 129.) —Native of low moift woods and thickets in the valleys of Hindoftan and Amboyna, flowering in the cold feafon. Roots being fent by Dr. Roxburgh to the late lady Amelia Hume, they bore flowers in April 1805, for the firft time in Europe. Each *root* confifts of many oblong fleffy knobs. The *ftem* climbs fpirally to the height of many feet, without tendrils, and is branched, angular, fmooth and leafy. Lower *leaves* alternate to the height of five feet, the reft oppofite; all fpreading, on fmooth, channelled *footftalks*, ovate or partly heart-fhaped, pointed, entire, fmooth, thin and pliable, with about feven or nine ribs, and innumerable fine tranfverfe veins. *Stipulas* none. *Flower-ftalks* axillary, folitary, fhorter than the leaves, fmooth, deflexed, racemofe, each bearing two, three, or four flowers. *Bracteas* lanceolate, folitary, under each partial ftalk. *Flowers* afcending, large, fetid like corrupted water, or the Stinking Morel. (See PHALLUS.) *Petals* near two inches long, coriaceous, green, with purplifh ribs, efpecially on the upper fide. *Stamens* violet in the lower part; their points green. The *pollen*, confifting of highly polifhed globules, falls to the bottom of the flower, rolling about like quickfilver.

The figure given by Dr. Roxburgh differs from our plant, in having much fmaller *flowers* with tawny *petals*, and yellow *anthers*. He thinks it likely that there may be more than one fpecies of this genus, which he did not diftinguifh in India. Rumphius defcribes two, his *Ubium polypoides album* and *nigrum*. The former feems beft to agree with our plant, except that his figure has folitary *flowers*. He fays its *ftems* extend to the length of 100 fathoms, and that the

roots,

roots, previouſly prepared with lime-water, are candied with ſugar, and taken with tea. Their flavour is inſipid.

Our friend Dr. Sims, in Curtis's Magazine, while he follows the ideas of preceding authors reſpecting the characters and affinities of this ſingular plant, avows a preference for the very different view which we have taken; and we derive much confidence from his ſanction. It is to be regretted, that, with the beſt poſſible intention, he has been miſled by the French botaniſts, to change a faulty ſpecific name much for the worſe. The word *glorioſa*, whether deſignedly or not, ſerves but to perpetuate their unjuſt ideas of Dr. Roxburgh, as having, by an unexampled inſtance of *vain-glory*, inſcribed a genus to himſelf. We moſt wonder at Dr. Sims's continuing to apply a ſpecific name which, by his own confeſſion, appears to belong to a different plant, whoſe flowers are "hardly half the ſize." For this, the original ſpecies, we would, as the leaſt evil that preſents itſelf, retain the name of *glorioſiformis*, which is at leaſt correct, and very expreſſive. We had long ago detected Rumphius's ſynonym. It agrees beſt with our *viridiflora*.

ROXBURGHSHIRE, in *Geography*, one of the ſouthern counties of Scotland, is ſituated between N. lat. 55° 7′, and 55° 42′, and between W. long. 1° 39′, and 2° 36′, from the meridian of London. It is bounded on the ſouth by Cumberland and Northumberland, in England; on the eaſt by the latter county only; on the north and north-eaſt by Berwickſhire; and on the weſt and north-weſt, by the counties of Dumfries, Selkirk, and Midlothian. In point of ſhape, it is ſo extremely irregular, that it is difficult to define its extent. Its greateſt length, from the junction of the Mare-burn with the Liddel, to the junction of Carham-burn with the Tweed, is 41 miles; and its greateſt breadth, on a line interſecting the above at right angles, is 29 miles. Its medium length is about 30, and its medium breadth a little more than 22 miles, making its contents about 672 ſquare miles, or 430,080 ſquare acres; of which, at the time of the laſt ſurvey, in 1796, nearly three-fifths were in ſheep paſture, and the remainder in arable cultivation, or occupied by woods, pleaſure-grounds, towns, and villages. Politically ſpeaking, this county comprehends twenty-nine entire pariſhes, and a portion of five others, which, united, contain, according to the parliamentary returns of 1811, 6518 houſes, and 37,230 inhabitants.

Hiſtorical Events.—To narrate all the military tranſactions which hiſtory and tradition affirm to have occurred within this county, would be to occupy our pages with an almoſt endleſs detail of petty conflicts and depredatory excurſions. Roxburghſhire being a border diſtrict, and uniting, for above 60 miles, with England, was, for ſeveral centuries, a perpetual ſcene of border warfare; ſo that there is ſcarcely a ſpot throughout its whole extent, where ſome feat of valour, or deed of deſtruction, has not happened. Every pariſh preſents, to the diſcerning eye of the antiquary, ſome relic of thoſe wretched days when the reſtraints of law were ſet at defiance, and rapine and butchery conſtituted the chief delight both of the lord, and of his vaſſal peaſantry. Of thoſe events which do not bear the character of predatory warfare, the moſt prominent are the ſiege of Roxburgh caſtle, by king James II., before-mentioned, and the battle of Jedburgh, in which the Scots were completely defeated by the Engliſh under the earl of Surrey. The latter event happened in the year 1523.

General Aſpect of the County.—The ſurface of Roxburghſhire is finely diverſified, and exhibits many ſcenes that are truly beautiful, but few that are romantic or ſublime. It is commonly conſidered as divided into four natural diſtricts; Hawick, Jedburgh, Kelſo, and Melroſe. Of theſe, the diſtrict of Hawick is the moſt mountainous; and there is alſo a chain of hills along the ſouthern boundary of the county. The other diviſions preſent to the eye a ſucceſſion of hills and vallies. The hills have moſtly ſloping ſides, and are covered with a green ſward to their very ſummits. Very few of them are bleak, and none of them rugged or tremendous. The proſpects from their higheſt points are extenſive, variegated, and delightful. The numerous vales, whether of narrow, or of wide extent, are all watered by limpid ſtreams; many of them naked, and others fringed with wood. Some afford excellent paſture, and others are in high cultivation. They are in general incloſed by very gentle declivities, though ſeveral are hemmed in by ſteep banks, over-run with bruſh-wood, or adorned with lofty trees, which form a ſcenery rather agreeable than magnificent. In a county ſo extenſive, and, on the whole, ſo much elevated, the proportion of heath and moſs is very inconſiderable, but cannot be calculated with any degree of exactneſs, as they are ſcattered every where in portions of unequal ſize. In Liddeſdale, where improvement has made the leaſt progreſs, patches of moſs are ſeen by the edges, and even in the middle of fertile vales. There are indications of this having been formerly the caſe in other parts of the county, on which induſtry has now wrought a happy change.

Mineralogy.—Roxburghſhire derives little importance from its mineral products. Coal has been diſcovered in ſeveral places, but is wrought only in one ſpot, near the ſouthern extremity of the diſtrict of Liddeſdale. Hence the county labours under the ſerious diſadvantage of a want of fuel, which muſt be brought from Northumberland, or Midlothian, by land-carriage. Throughout the whole ſhire lime-ſtone is abundant, but little of it is calcined for ſale, except in the neighbourhood of the Liddeſdale collieries. Free-ſtone alſo is plentiful. The principal ſtratum extends in a north-eaſt direction from the fartheſt point of Liddeſdale to the neighbourhood of Spronſtoun, where it is of a fine, hard, and durable nature. Different kinds of whinſtone appear every where on the ſurface, in the beds of brooks, and in inexhauſtible quarries. Vaſt beds of ſhell marle lie ſcattered throughout the contiguous pariſhes of Roberton, Aſhkirk, Wilton, Minto, Lilliesleaf, Bowden, Galaſhiels, and Selkirk. There are likewiſe large marle pits at Eckford and Ednam; and ſome leſs conſiderable ones in various places. Pebbles are found in vaſt multitudes in the vicinity of the Cheviot hills. In the pariſh of Hobkirk, there is a place called Robert's Linn, where there are large rocks of pebbles, which are manufactured into ſeals and buttons of various kinds. Moſt parts of theſe rocks are of a light blue colour; but ſome portions of them are finely varied with ſtreaks of red and yellow; and ſo much are they eſteemed, that great numbers of them are conveyed to Sheffield, Birmingham, and other towns.

Rivers, &c.—No county in Great Britain can boaſt of more numerous, or more beautiful rivers and brooks. One flows through, and enlivens every little vale. The principal of them are, the Teviot, the Jed, Tweed, Rule, Kale, Oxnam, Gala, Slittridge, Ale, Caſta, Borthwick, Ednam, Bowmont, Allan, Leader, Ettrick, Hermitage, and Liddel. The two laſt are diſcharged into the Eſk, which runs into the Solway frith; the others fall into the Tweed, which empties itſelf into the ſea. This river holds a majeſtic courſe along banks which, in ſeveral places, are ſteep and bold, jutting out, at Old Melroſe, into a promontory, and forming around Dryburgh abbey a peninſula. It partly bounds, and partly interſects, the county; receiving on the north the Gala, which is the boundary with Selkirkſhire and Mid-lothian for five miles; the Leader, which, for nearly the

the ſame ſpace, is the boundary with Berwickſhire; the Allan, a paſtoral rivulet; and the Eden, which takes its riſe in Berwickſhire, but runs a conſiderable way along the ſkirts, and through the lower diſtrict of this county. Ettrick, alſo a boundary of Selkirkſhire for two miles, falls into the Tweed on the ſouth. Teviot riſes in the weſtern part of the county, in a very elevated diſtrict, and deſcends at firſt from the mountains with a rapid courſe; but it afterwards flows with many delightful windings through a ſucceſſion of rich, extenſive, and well cultivated vallies, till it loſes itſelf in the Tweed between Roxburgh caſtle and Kelſo, one of the moſt enchanting ſpots which can be well imagined. The Ale and Borthwick are the northern branches of Teviot. Both of them have their ſources in Selkirkſhire, and in ſome places bound that county and Roxburghſhire. On the ſouth the Teviot is augmented by the Oxnam, the Jed, and the Kale. The two laſt iſſue from the border hills. The Kale frequently overflows the greater part of an expanded and valuable plain, adorned by clumps of trees; while the Jed, ruſhing along a rocky channel, through narrow and thick wooded vales, waſhes the bottom of ſeveral high precipices, winds round the town of Jedburgh, and terminates another, and ſtill more extenſive plain, called Crailinghaughs, through the centre of which the Oxnam finds its way to Teviot. Nearer to its ſource, the laſt-mentioned river receives the Rule, the Slittridge, and the Allan, all of which riſe on the confines of Liddeſdale. In the number and value of its trees, Rule may vie with "Silvan Jed," though not in wild and pictureſque ſcenery. Slittridge is not without the beauties of green hills, natural wood, and hollow vales. Southern Allan, like the ſtream of the ſame name north of Tweed, flows entirely through ſheep-walks. Bowmont, alſo a paſtoral river, has its ſource in the ſouth-eaſt diſtrict of the county, and after a rapid courſe of nine or ten miles, enters England. But of all the waters in Roxburghſhire, none are more indebted to nature, or might be more improved by art, than Hermitage, which riſes in the ſouthern declivity of the ſame ridge, whence the Allan and the Slittridge iſſue in different directions, and tumbling over a bottom of rough, ſhapeleſs ſtones, amidſt green hills, whoſe baſes are generally ſkirted with copſe-wood, loſes itſelf in the Liddel, and imparts its natural ornament to that larger ſtream which is celebrated by Armſtrong in the following ſtrains:

"——————————— Such the ſtream
On whoſe Arcadian banks I firſt drew breath,
Liddel, till now, except in Doric lays,
Tun'd to her murmurs by her love-ſick ſwains,
Unknown in ſong; tho' not a purer ſtream
Through meads more flowery, more romantic groves,
Rolls towards the weſtern main. Hail ſacred flood!
May ſtill thy hoſpitable ſwains be bleſt
In rural innocence; thy mountains ſtill
Teem with the fleecy race; thy tuneful woods
For ever flouriſh; and thy vales look gay
With painted meadows, and the golden grain."

There are no lakes of any great extent in this county, but there are ſeveral pre-eminent for the beauty of their ſcenery, and the abundant ſupply of fine perch and pike which they contain. Alemuir-loch, which ranks firſt among the Roxburghſhire lakes, is ſomewhat more than two miles in circumference. Trouts of various ſizes and flavour abound in all the rivers, and the Tweed and Teviot, but particularly the former, are crowded with griſe and ſalmon.

Climate.—In a county of ſuch extent as Roxburghſhire, the climate muſt of courſe be extremely various. In proportion to the elevation of the ground, the air is more moiſt and ſharp. The warmeſt and dryeſt months of the year are July and Auguſt, but prodigious thunder ſhowers are very frequent. In September and October the weather admits of every poſſible variation. It is often ſerene and pleaſant; but exceſſive rains, winds, and froſts, and even hail and ſnow, are by no means uncommon; and frequently do incredible damage to the crops. November is nearly of the ſame complexion; and what ſeems ſingular, in December the weather in general is moderate and uniform. Froſt and ſnow are ſeldom ſevere or of long duration before Chriſtmas. January and February are the months when ſnow is moſt common, and froſt moſt intenſe. With ſome ſhort interruptions they very frequently remain till diſſipated by the ſun in March. Cold eaſterly winds prevail much in April and May, and often even in June, either bringing conſtant rain for a ſucceſſion of days, or exhaling moiſture ſo rapidly from the earth, as to ſtint the tender ſtalks both of corn and graſs. But theſe aſſertions, though generally true, are at times reverſed. After an open and ſoft winter, great quantities of ſnow have fallen in March, April, and May. In other years April has been wonderfully mild, May and June the warmeſt, July and Auguſt the wetteſt, and September and October the moſt ſettled months.

Soil.—In the paſture diſtrict of Roxburghſhire the ſoil is dry, wet, or heathy. To the eaſtward of Jed Water, the hills are chiefly compoſed of red granite, and covered with a rich ſward of ſweet graſs: there is very little heath: the marſhes are few and not extenſive, and are interſected by numerous drains. To the weſt of Jed Water, including Liddeſdale, the dry ſoil either reſts upon lime-ſtone or gravel. In this diſtrict are many moſſes and much fenny land; likewiſe a large tract of ſtrong clayey ſoil, lying on a cold tilth, or hard clay, which is impervious to water. In the arable diviſion of the county the ſoil is partly light and partly heavy. The light conſiſts of a rich loam, or mixture of loam and ſand, of loam and gravel, of ſand, or gravel and clay, in every various proportion. The heavy ſoil is chiefly clay of different depths and degrees of ſtiffneſs or mixtures, where clay prevails placed on tilth, or other matter retentive of water. In very few ſpots this ſurface lies on a dry bottom; and not unfrequently different and oppoſite ſoils are ſtrangely blended in the ſame field. The light ſoil, however, is in general formed on low and level lands, near the beds of rivers, and their branches, and alſo on ſeveral eminences of conſiderable extent, eſpecially in the pariſhes of Linton, Crailing, Ancrum, Maxton, and Melroſe. The heavy ſoil rarely appears in the vallies, and chiefly occupies the higher grounds. The largeſt tract of it lies immediately ſouth of Eildon Hills, including nearly the whole pariſhes of Minto, Lilliesleaf, and Bowden, a portion of Melroſe, St. Boſwell, Ancrum, Maxton, and Roxburgh pariſhes. It comprehends in all about 10,000 acres, of which at leaſt one half is ſhallow, cold, and unkindly, difficult to labour and uncertain in its produce; on which many acres of it have been planted with trees. In the other half there is much rich and fertile land, which bears luxuriant crops both of corn and graſs, and not a little of a middle nature between theſe extremes. In the pariſhes alſo north of the Tweed, the heavy ſoil is rather moſt prevalent, and is, in general, of a good quality. Another conſiderable portion of it runs along the higher grounds ſouth of the Tweed, in the pariſhes of Spronſtoun, Kelſo, Roxburgh, and Exford, and there are detached fields of it in other parts of the diſtrict. In the boſom, or deeply in-

dented into the ſides of theſe clayey tracts, are pieces of dry land of an admirable quality for producing either white or green crops. Of the arable diſtrict at large, at leaſt two-thirds may be deſignated light and dry.

Agriculture.—Farms in Roxburghſhire are of every ſize, from 50 to 6000 acres; yielding from 50*l.* to nearly 3000*l.* annual rent. The arable farms include, in general, from 200 to 500 acres, but there are ſome far leſs and ſome much more extenſive. One tenant frequently poſſeſſes two or three farms, and there are inſtances of the ſame perſons leaſing both an arable and a ſheep farm, to obtain the double profit ariſing from rearing ſheep to a larger ſize, by wintering them on after-graſs and turnips, and fattening both them and their lambs earlier, and better, for the market. With the breeders of that valuable animal, turnips have been for many years a greater object than formerly, and hence ſome farmers have engaged more deeply in arable huſbandry, inſtead of accumulating, as before, paſture farms. The character of farmers in this county, like the extent of the farms, admits of much variety: but it may be truly ſaid, that the greater part of them are men of reſpectability and of agricultural enterprize. Rents are in every caſe paid in money. One or two clergymen, who have a right to tythes, have been accuſtomed from time immemorial to accept of a ſmall ſum in lieu of them. Leaſes differ in duration and conditions in the paſture and arable diſtricts. In the former they extend only from ſeven to fifteen years; but in the latter they are given for nineteen or twenty-one years.

Conſiderable tracts of land here, particularly in the extenſive diſtrict of Liddeſdale, remain in a ſtate of nature. The cold wet ſoil, already noticed, and the expoſed ſituation, afford no encouragement for attempting agricultural improvements. This large tract is therefore wholly under ſheep paſturage, except a few ſtrips of land on the banks of the Hermitage and the Liddel. The moſt ancient agriculture in this county would appear to have been very different from the preſent. The marks of the plough, and of regular ridges, are ſtill every where to be ſeen upon lofty mountains, where no grain can now be produced, and upon a ſoil which has ceaſed to be regarded as entitled to the appellation of arable land. Theſe facts prove that the ſurface of the country muſt have formerly been in a very different ſtate from that in which it now appears. The modern improvements in agriculture are all adopted here by the arable farmers. The firſt perſon who ſet the example of ſpirited exertion was William Dawſon, eſq. a farmer's ſon, who, after receiving a liberal education, was ſent by his friends into England, for the purpoſe of obtaining a knowledge of the practical agriculture of that part of the united kingdom. He returned to his native country in 1753, and immediately introduced the practice of the turnip huſbandry. At firſt his improvements were conſidered as raſh and ſpeculative, but his ſucceſs ſoon effected a change of opinion. Mr. Dawſon's neighbour perceiving the advantages of the new plan, became eager to underſtand and adopt it. The hinds which had once been in his ſervice, were ſure to find employment; his ploughmen were in the utmoſt requeſt; they were tranſported to Eaſt Lothian and even to Angus, and every where diffuſed the improved practice of that valuable art. Roxburghſhire became the ſcene of the moſt active agricultural enterpriſes; and Mr. Dawſon, independently of having acquired a large property, had the ſatisfaction to live to ſee himſelf regarded, and hear himſelf called, the father of agriculture in the ſouth of Scotland.

The rotation of crops uſed in this county have nothing peculiar, or particularly requiring notice. On a dry ſoil, it is conſidered an object of importance to throw a large quantity of land under turnip or graſs, eſpecially after lime. One part of Roxburghſhire has long been celebrated for an early ſpecies of oats, denominated Blainſly oats, from the circumſtance of their having been cultivated for time immemorial at Blainſly, a large diſtrict in the pariſh of Melroſe, near the northern extremity of the county: the average produce there is ſix to one, but when they are grown on a rich dry ſoil, it is ſometimes 16 or 18 to one. They are ſold at an average of 3*s.* 6*d.* *per* boll dearer than common oats, and are only objectionable in one point of view, *viz.* that they are apt to ſhake out. Abundant crops of wheat are reared in the lower and more fertile diſtricts of the county. Bear is likewiſe raiſed in conſiderable quantities; but the culture of peas and beans has become very limited, ſince the practice of turnip feeding has been ſo generally introduced. Of potatoes, comparatively few are cultivated; neither are great crops of hay frequent in this county, on account of the want of towns in which they might find a ready ſale. Little flax is grown, except as an object of domeſtic manufacture. It is a remarkable fact, and a ſubject of curioſity in agricultural hiſtory, that this county was at one time likely to have become noted for the cultivation of tobacco. It was introduced by Mr. Thomas Mann, and was tried both at Newſtead and at Kelſo with ſuch ſucceſs, that the legiſlature deemed it requiſite to interfere, and put an end to its culture.

Live Stock.—Very conſiderable numbers of cattle are fed in Roxburghſhire, but ſheep is the ſtaple animal of the county. The latter are eſtimated at nearly 300,000 in number, and are moſtly of the Cheviot breed. A large quantity of ewe-milk cheeſe, of the beſt quality, has long been an object of manufacture here, but the practice is now on the decline. The horſes employed and bred here are either of the Engliſh or of the Lanarkſhire breed. Swine are reared by almoſt every cottager and farm-ſervant who is married; alſo vaſt quantities of poultry. Several cart-loads of the eggs of dunghill fowls are weekly collected by "egglers," who ſell them in Berwick for the London market.

Incloſures.—A very ſmall proportion of the lands in this county are incloſed. The fence chiefly uſed is ditch and hedge, of which there are two kinds, namely, the double and the ſingle. The double conſiſts of two ditches, having a hedge planted in the embankment between them. Where ſtones can be eaſily procured, ſtone-dike incloſures are preferred to the hedge and ditch. One of the moſt ſubſtantial fences of this kind in the county incloſes about 600 acres, called the "Deer park of Holydean," on the Roxburgh eſtate. It is traditionally ſtated to have been conſtructed before the year 1500. It is about four feet high, and though built of whinſtone only, without lime or mortar, continues to be a good fence. In a few places dikes are formed of alternate layers of ſtone and turf.

Towns, Villages, and Fairs.—There is only one royal borough in this county, that of Jedburgh, which, along with the boroughs of Haddington, Lauder, Dunbar, and North Berwick, elects a member to ſerve in parliament. This place is the county town, and makes a conſiderable figure in the hiſtory of the border wars. (See JEDBURGH.) The other principal towns and villages are, Hawick, which is ſituated at the confluence of the Teviot and Slittridge, near the lower part of the upper, or moſt mountainous diſtrict of the county; Kelſo, which ſtands on the northern bank of the Tweed; and Melroſe, celebrated for its abbey, each of which the reader will find deſcribed under their reſpective names.

The greateſt fair in the county is held in the pariſh of

 Leſſudden,

Leſſudden, or St. Boſwell, whence it is called St. Boſwell's fair. It takes place on the 18th of July, and is the principal mart for ſheep and lambs in the ſouth of Scotland; but horſes, linen, and woollen cloths, are likewiſe ſold in conſiderable quantities. The cuſtoms of this fair belong to the duke of Buccleugh, and may be eſtimated at about 50*l.* *per annum.* Another great fair is held in the vicinity of Kelſo. It is called St. James's fair, from the circumſtance of its being holden within the ancient pariſh of that name, which is now merged in the pariſh of Kelſo.

Antiquities.—The veſtiges of ancient times ſtill viſible in Roxburghſhire are numerous. Mutilated encampments, and ruinated buildings of ſtrength, are diſcovered in a great variety of ſituations, and particularly in the high diſtrict of the county. In the pariſhes of Cavers, Hawick, and others, remnants may be traced of what is called the Cat-rail, which is conjectured to have been a boundary rampart, ſimilar to the Wanſdike and Offa's dike in England; but whether erected by the Romans, Saxons, or Britons is uncertain; though Whitaker, in his Hiſtory of Mancheſter, contends ſtrongly that it is of Britiſh origin. In the pariſh of Roberton, near the ſource of the Teviot, is a large ſquare encampment, which is ſtill denominated *Africa*, and in the vicinity are ſeveral ſmaller ſemi-circular intrenchments. There are likewiſe encampments on the Eildon hills, on Carberry hill, Sidehill, at Ancrum, and on the farm of Flight, in the pariſh of Clintwood. In the ſame pariſh are likewiſe numerous fortifications, called Picts' works, which are of a circular form, and conſtructed of large ſtones. On the farm of Millburn is a ſmall circle of nine upright ſtones, ſurrounded by a ditch, which is ſuppoſed to have been a Druidical temple. Cairns appear in different parts of the county. Of theſe, the moſt remarkable is at Whiſgills. The quantity of ſtones is immenſe, and they are moſtly of a very large ſize. Near it is a large upright ſtone, called the "ſtanding ſtone." This cairn is ſituated in the centre of an extenſive and deep moſs, where not a ſtone is to be diſcovered except thoſe employed in its conſtruction. Another immenſe cairn is placed on an eminence between the pariſhes of Caſtleſtown and Canonby. It is eighty-ſix yards long, and conſiſts of maſſes of free-ſtone, of great magnitude. A ſtanding ſtone, thirteen feet in circumference, and ſeven feet above ground, is fixed at the north end of it; and there are five other ſmaller ones, forming, with the larger ſtone, a circle round the cairn forty-five yards in diameter. How theſe enormous maſſes were originally collected, or for what purpoſe, it is very difficult to determine. At Milnholm, in the pariſh of Canonby, ſtands an ancient croſs, formed of one ſtone, eight feet four inches high, on which are ſculptured a ſword and ſome ancient writing; but the latter is ſo much mutilated, that it cannot be read. On the banks of the Ale Water, near Ancrum, is a ſeries of caves, ſome of which ſtill preſerve veſtiges of fire-places, and holes for the paſſage of ſmoke. Similar eaves are diſcovered on the banks of the Jed.

Roxburghſhire formerly abounded with towers, or petty fortreſſes, erected by the border chieftains, for the defence of the country from the incurſions of the Engliſh borderers. Few of theſe, however, now remain; indeed the only ones entire are Delphiſtone tower, and another at Moſsburnford. Of the larger caſtles, the principal are Clintwood caſtle, Goldieland caſtle, Goſsford caſtle, and Roxburgh caſtle, the laſt of which is mentioned under ROXBURGH. In this county are ſituated the ruins of three monaſteries, among the moſt important in Scotland, *viz.* Melroſe, Kelſo, and Jedburgh abbies. See MELROSE, KELSO, and JEDBURGH.

Eminent Natives.—Roxburghſhire boaſts to have been the birth-place of ſeveral characters diſtinguiſhed in the annals of literature and military glory. Of theſe, the moſt noted were Thomſon, author of the Seaſons; Armſtrong, author of the "Œconomy of Love," and various miſcellaneous poems; Gavin Douglas, who tranſlated ſeveral of the works of the Latin poets into Scottiſh verſe; and general Elliot, afterwards lord Heathfield, the gallant defender of Gibraltar, when it was attacked in 1786, by the combined powers of France and Spain. Beauties of Scotland, vol. ii. 1805. Agricultural Survey of the Counties of Roxburgh and Selkirk, by Robert Douglas, D.D., 8vo. 1800.

ROXBURY, a pleaſant town of America, in Norfolk county, Maſſachuſetts; 1 mile S.W. of Boſton. It is now divided into three pariſhes, and was ſettled in 1630. The three pariſhes contain 3669 inhabitants. The firſt of theſe pariſhes has been lately connected with Boſton harbour by a canal. The famous John Eliot, called the apoſtle of the Indians, was the firſt miniſter who ſettled in this place. He tranſlated the Bible, and other pious books, into the Indian language; and founded many religious ſocieties among the Indians. Some few remain to this day. He died in 1670, after being paſtor 60 years.—Alſo, a townſhip in the W. part of Orange county, Vermont, containing 361 inhabitants.—Alſo, a townſhip of Morris county, New Jerſey, on Muſconecunk river, 25 miles from its confluence with the Delaware, and 45 miles N. of Trenton; containing 1563 inhabitants. Near it is a mineral ſpring.—Alſo, a town in Litchfield county, Connecticut, containing 1217 inhabitants.—Alſo, a townſhip of Waſhington county, in the ſtate of Ohio, containing 408 inhabitants.

ROXCESTER. See WROXETER.

ROXEN, a lake of Sweden, in Eaſt Gothland; 100 miles W.S.W. of Stockholm.

ROXO, CAPE, a cape on the S.W. coaſt of Porto Rico. N. lat. 18° 1′. W. long. 65° 50′.—Alſo, a cape of Spain, on the coaſt of Valencia. N. lat. 37° 53′. W. long. 0° 50′.—Alſo, the S.E. point of a ſmall iſland in the gulf of Mexico, ſituated before the mouth of the river Panuco. N. at. 22° 30′. W. long. 100° 11′.—Alſo, a cape on the W. coaſt of Africa. N. lat. 12° 15′. W. long. 16° 35′.

ROY, LOUIS LE, in *Biography*, a learned profeſſor, born at Conſtance, in Normandy, about the beginning of the 16th century. After having ſtudied in Italy and other places, he ſettled at Paris, where, in 1570, he was appointed to the profeſſorſhip of Greek. After this he ſtudied the law four years at Toulouſe; he frequented the bar at the parliament of Paris, in which he exerciſed ſome kind of magiſtracy. He ſometimes followed the armies; and had viſited the courts of the emperor, and king of England. His inattention to domeſtic affairs reduced him at laſt to depend upon the liberality of others for his daily ſubſiſtence. He died at an advanced age in the year 1571, leaving behind him, as monuments of his learning, many works in the Latin and French languages. In the former he gained conſiderable reputation, by an elegantly written life of the learned Budæus. He gave good tranſlations into the French of the works, or part of them, of Plato, Ariſtotle, and Demoſthenes, which he enriched with learned commentaries.

ROY, JULIEN-DAVID LE, an architect and antiquary, born at Paris in 1728, was the ſon of Julien le Roy, a celebrated mechaniſt, who excelled particularly in the art of watchmaking, ſo much ſo, that his time-pieces acquired the ſame celebrity in France as thoſe of Graham in England; he died at Paris in 1759, at the age of 74, leaving four ſons; of whom Julien, the ſubject of this article, was educated for the profeſſion of an architect, in which he became eminent. He is well known in the literary world by the following works;

works; "Ruines des plus beaux Monumens de la Grèce;" this obtained for the author admiſſion into the Academy of Inſcriptions; "Hiſtoire de la Diſpoſition et des Formes differentes des Temples des Chretiens;" "Obſervations ſur les Edifices des anciens Peuples;" "De la Marine des anciens Peuples." He publiſhed two other works on the conſtruction of the ſhips of the ancients; and a memoir on cutting maſts in the Pyrenées. This ingenious man died at Paris in the year 1803, at the age of 75.

Roy, Peter, brother of the above, was watch-maker to the king, and publiſhed memoirs for the clock-makers of Paris,—Etrennes Chronometiques—Treatiſe on the Labours of Harriſon and le Roy for the Diſcovery of Longitude at Sea. He died in 1785. It is well known, ſays a contemporary biographer, that the Engliſh, on account of their numerous diſcoveries in this art, had enjoyed ſuch a reputation for the excellence of their clocks and watches, that they found every where a market, in preference to any others, and that the French themſelves were obliged to come to England for their time-pieces. Julien le Roy, the father, had the honour of removing, in part, this pre-eminence, and of transferring it to the French. He made many diſcoveries in the conſtruction of repeating-clocks and watches: in ſecond and horizontal watches he invented an univerſal compaſs with a ſight;—an extremely uſeful and ſimple contrivance for drawing a meridional line, and finding the declination of the needle; and alſo a new univerſal horizontal dial. It is to him we are indebted for the method of compenſating for the effects of heat and cold in the balances of chronometers, by the unequal expanſion of different metals, a diſcovery which has been brought by our Engliſh artiſts to a ſtate of great perfection, although it had been thrown aſide by the inventor's ſon, Peter.

Roy, in *Geography*, a town of Sileſia, giving name to a lordſhip in the principality of Teſchen; 6 miles N. of Teſchen.

ROYA, El, a town of Spain, in Old Caſtile; 10 miles N.N.W. of Soria.

ROYAL, *regal*, ſomething relating to a king.

The word is French, formed from the Latin *regalis*, of *rex*, *king*.

In this ſenſe we ſay, the royal family, the royal blood, royal line, &c.

In England, the prince and princeſs of Wales, the king's brothers, &c. are addreſſed under the title of *royal highneſs*.

Royal *Abbey*, denotes an abbey founded by a king, or by a prince who is ſucceeded by a king.

Royal *Academy of Arts*. See London.

Royal *Academy of Sciences*, &c. See Academy.

Royal *Academy of Muſic*. See Opera.

Royal *Antler*, among *Hunters*, expreſſes the third branch of the horn of a hart or buck, that ſhoots out from the rear or main horn above the back-antler.

Royal *Army*. See Army.

Royal *Aſſent*, is that aſſent or approbation which the king gives to a thing done by others; as the election of a biſhop by dean and chapter, or to a bill paſſed in both houſes of parliament.

The royal aſſent in parliament being given, the bill is indorſed with theſe words, *Le roy le veut*; that is, *it pleaſes the king*. If he refuſes it, thus, *Le roy s'aviſera*, q. d. *the king will adviſe upon it*. See Parliament.

Royal *Boroughs*. See Borough.

Royal *Crown*, is that worn by kings. See Crown.

Royal *Charter*. See Charter.

Royal *African Company*. See Company.

Royal *Exchange*, the burſe or meeting-place of the merchants in London.

It was firſt built in 1566, at the charge of ſir Thomas Greſham; and in a ſolemn manner, by herald with ſound of trumpet, in preſence of queen Elizabeth, proclaimed the Royal Exchange. Till that time the merchants met in Lombard-ſtreet.

It was built of brick, yet then eſteemed the moſt ſplendid burſe in Europe. A hundred years after its building, at the great fire, it was burnt down; but it was ſoon raiſed again in a ſtill more magnificent manner, the expence of it amounting to 50,000*l*.

One half of this ſum was diſburſed by the chamber of London, the other by the company of mercers; who, to reimburſe themſelves, let to hire a hundred and ninety ſhops above ſtairs, at twenty pounds each; which, with other ſhops, &c. on the ground, yielded a yearly rent of above four thouſand pounds; yet the ground it ſtands on does not exceed three-fourths of an acre; whence it is obſerved to be much the richeſt ſpot of ground in the world.

It is a quadrangular building, with walks around, in which the merchants of the reſpective countries aſſociate themſelves. In the middle of the area, or court, is a fine marble ſtatue of king Charles II., in the habit of a Roman Cæſar, erected by the ſociety of merchant-adventurers; the workmanſhip of Grinlin Gibbons. Around are ranged the ſtatues of the ſeveral kings ſince the Norman Conqueſt. See London.

Royal *Fiſhes* are whales and ſturgeon, and ſome add porpoiſes too; which the king, by his prerogative, is to have, whenever caſt on ſhore, or wrecked, in all places of the realm; unleſs granted to ſubjects by expreſs words.

Royal *Foot*, *Fort*, *Franchiſe*, *Hoſpital*. See the ſubſtantives.

Royal *Oak*, was a fair-ſpreading tree at Boſcobel, in the pariſh of Donnington, in Staffordſhire, the boughs of which were all covered with ivy; in the thick of which king Charles II. ſat in the day-time with colonel Careleſs, and in the night lodged in Boſcobel-houſe; ſo that they are miſtaken who ſpeak of it as an old hollow oak; it being then a gay flouriſhing tree, ſurrounded with many more. The poor remains of it are now fenced in with a handſome wall, with this inſcription over the gate, in golden letters: FELICISSIMAM ARBOREM, QUAM IN ASYLUM POTENTISSIMI REGIS CAROLI II. DEUS OP. MAX. PER QUEM REGES REGNANT, HIC CRESCERE VOLUIT, &c. Phil. Tranſ. N° 310.

Royal *Oak*, *Robur Carolinum*, in *Aſtronomy*, one of the new ſouthern conſtellations, the ſtars of which, according to Sharp's Catalogue, annexed to the Britannic, are 12. See Conſtellation.

Royal *Officers*. See Officer.

Royal *Parapet*, or *Parapet of the Rampart*, in *Fortification*, is a bank about three fathoms broad, and ſix feet high, placed upon the brink of the rampart, towards the country; to cover thoſe who defend the rampart.

Royal *Poop*. See Poop.

Royal *Port*. See Port *Royal*.

Royal *Society of England*, is an academy, or body, of perſons of eminent learning; inſtituted by king Charles II. for the promoting of natural knowledge.

This illuſtrious body had its original in an aſſembly of ingenious men, reſiding in London, who, being inquiſitive into natural, and the new and experimental philoſophy, agreed, about the year 1645, to meet weekly on a certain day, to diſcourſe upon ſuch ſubjects. Theſe meetings, it is ſaid, were ſuggeſted by Mr. Theodore Haak, a native of the Palatinate in Germany; and they were held ſometimes at Dr. Goddard's lodgings in Wood-ſtreet, ſometimes at a convenient place in Cheapſide, and ſometimes in or near Greſham

Gresham College. This assembly seems to be that mentioned under the title of the "Invisible, or Philosophical College," by Mr. Boyle, in some letters written in 1646 and 1647. About the years 1648 and 1649, the company, which formed these meetings, began to be divided: those in London continued to meet there as before; and those who were removed to Oxford occasionally joined them. The latter, *viz.* Dr. Wilkins, Dr. Wallis, and Dr. Goddard, in connection with others, continuing their assemblies in Oxford, brought the study of natural and experimental philosophy into fashion there; meeting first in Dr. Petty's lodgings, afterwards at Dr. Wilkins's apartments in Wadham College, and, upon his removal, in the lodgings of the honourable Mr. Boyle. The greatest part of the Oxford society coming to London about the year 1659, they met once or twice a week in term-time, at Gresham College, till they were dispersed by the public distractions of that year, and the place of their meeting was made a quarter for soldiers. Upon the Restoration, in 1660, their meetings were revived, and attended with a larger concourse of persons, eminent for their character and learning.

They were at length taken notice of by the king, who was pleased to grant them an ample charter, dated the 22d of April 1663, by which they were erected into a corporation, "consisting of a president, council, and fellows, for promoting natural knowledge."

Their manner of electing fellows is by ballotting. Their council are in number twenty-one, including the president, vice-president, treasurer, two secretaries, and secretary for foreign correspondence; eleven of which are continued for the next year, and ten more added to them; all chosen on St. Andrew's day. Each member, at his admission, subscribes an engagement, that he will endeavour to promote the good of the society; from which he may be freed at any time, by signifying to the president, that he desires to withdraw.

The charges are five guineas paid to the treasurer at admission; and thirteen shillings *per* quarter, so long as the person continues a member; or, in lieu of the annual subscription, a composition of twenty-six guineas in one payment.

Their design is, to "make faithful records of all the works of nature or art, which come within their reach; so that the present, as well as after-ages, may be enabled to put a mark on errors which have been strengthened by long prescription; to restore truths that have been neglected; to push those already known to more various uses; to make the way more passable to what remains unrevealed," &c.

To this purpose they have made a great number of experiments and observations on most of the works of nature; eclipses, comets, meteors, mines, plants, earthquakes, inundations, springs, damps, subterraneous fires, tides, currents, the magnet, &c. Also numbers of short histories of nature; arts, manufactures, useful engines, contrivances, &c. The services they have been of to the public are very great. They have improved naval, civil, and military architecture; advanced the security and perfection of navigation; improved agriculture; and put not only this kingdom, but also Ireland, the plantations, &c. upon planting.

They have registered experiments, histories, relations, observations, &c. and reduced them into one common stock; and have, from time to time, published some of the most immediate use, under the title of Philosophical Transactions, &c. and laid the rest up in public registers, to be nakedly transmitted to posterity, as a solid ground-work for future systems. See TRANSACTIONS.

They have a library adapted to their institution; towards which Mr. Henry Howard, afterwards duke of Norfolk, contributed the Norfolcian library, and which is, at this time, greatly increased by a continual series of benefactions. The museum, or repository, of natural and artificial rarities, given them by Daniel Colwal, esq., and since enriched by many others, is now removed to the British Museum, and makes a part of that great repository. Their motto is, NULLIUS IN VERBA; and their place of assembling is Somerset-place, in the Strand. Sir Godfrey Copley, bart., left five guineas to be given annually to the person who should write the best paper in the year, under the head of experimental philosophy. This reward, which is now changed to a gold medal, is the highest honour the society can bestow. It is conferred on St. Andrew's day.

ROYAL *Society of Musicians.* See *Musical* FUND, and *Royal* SOCIETY *of Musicians.*

ROYAL *Spanish Academy.* See ACADEMY.

ROYAL *Sugar.* See SUGAR.

ROYAL, in *Sea Language,* is a name given to the highest sail which is extended in any ship. It is spread immediately above the top-gallant sail, to whose yard-arms the lower corners of it are attached. The sail is never used but in light and favourable breezes.

ROYAL *Stay.* See STAY.

ROYAL *Yard.* See YARD.

ROYALS, in *Artillery,* are a kind of small mortars, which carry a shell, whose diameter is five inches and a half. See MORTAR.

ROYAL *Bay,* in *Geography,* a bay on the N.E. of the island of Georgia, between Cape George and Cape Charlotte.—Also, a bay on the N. coast of Antigua, a little to the E. of Peyersan's Point.

ROYAL, or *Minong, Island,* an island about 35 miles long, and 12 wide, in the N.W. part of lake Superior. N. lat. 47° 52′. W. long. 89°.—Also, a small fertile island in the river St. Lawrence, 60 miles below lake Ontario. N. lat. 44° 46′. W. long. 75° 24′.

ROYAL *Reach,* a channel in the straits of Magellan, extending from Fortescue bay to Passage Point.

ROYAL *Sound,* a large bay on the coast of Kerguelen's land, between Cape George and the Prince of Wales's Foreland.

ROYAL'S *River,* a river of America, in Cumberland county, Maine, which runs into Casco bay, in the township of North Yarmouth.

ROYALSTON, a township of Worcester county, Massachusetts; 40 miles N.W. by N. of Worcester; incorporated in 1665, and containing 1415 inhabitants. Miller's river traverses this town from the east.

ROYALTIES, REGALITIES, the rights of the king; otherwise called the *king's prerogative,* and the *regalia.* See PREROGATIVE and REGALIA.

Of these, some the king may grant to common persons; others are inseparable from the crown.

ROYALTON, in *Geography,* a township of Windsor county, in the state of Vermont, N.W. of Hartford, on White river, containing 1748 inhabitants.

ROYAMUNGAL, a river of Bengal, which runs into the bay of Bengal, N. lat. 21° 35′. E. long. 89° 18′.

ROYAN, a town of France, in the department of the Lower Charente, on the Garonne; fortified by the Huguenots, and defended so vigorously against Louis XIII. in the year 1621, that he was compelled to withdraw his troops; but he afterwards avenged his disgrace, by demolishing it so entirely, that the present place is only the suburbs of the former; 12 miles S. of Marennes.

ROYAUMEIZ,

ROYAUMEIX, a town of France, in the department of the Meurte; 6 miles N. of Toul.

ROYBON, a town of France, in the department of the Isere, and chief place of a canton, in the district of St. Marcellin; 7 miles N.N.W. of St. Marcellin. The place contains 2412, and the canton 7373 inhabitants, on a territory of 190 kiliometres, in 11 communes.

ROYE, a town of France, in the department of the Somme, and chief place of a canton, in the district of Montdidier; 15 miles S.S.W. of Peronne. The place contains 3176, and the canton 14,027 inhabitants, on a territory of 195 kiliometres, in 39 communes. N. lat. 50° 8′. E. long. 2° 52′.

ROYENA, in *Botany*, named by Linnæus in honour of Adrian Van Royen, professor of Botany in the university of Leyden, who died in 1779, aged 74, and was succeeded by his nephew David, who died in 1799.—Linn. Gen. 221. Schreb. 299. Willd. Sp. Pl. v. 2. 631. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 61. Thunb. Prodr. 80. Juss. Gen. 156. Lamarck Dict. v. 6. 320. Illustr. t. 370. Gærtn. t. 94.—Class and order, *Decandria Digynia*. Nat. Ord. *Bicornes*, Linn. *Guaiacanæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, urn-shaped, five-cleft, permanent. *Cor.* of one petal; tube the length of the calyx; limb spreading, revolute, deeply cloven into five, ovate segments. *Stam.* Filaments ten, very short, springing from the corolla; anthers oblong, acute, twin, erect, as long as the tube. *Pist.* Germen superior, ovate, terminating in two styles, a little longer than the stamens; stigmas simple. *Peric.* Berry invested with the coriaceous calyx, fleshy, of four cells, two of them often abortive. *Seed.* Nuts solitary, ovate, somewhat triangular.

Ess. Ch. Calyx urn-shaped. Corolla of one petal, with a revolute limb. Berry of four cells, two of them mostly abortive.

1. R. *lucida*. Shining-leaved African Bladder-nut. Linn. Sp. Pl. 568. (Staphylodendron africanum sempervirens, foliis splendentibus; Commel. Hort. v. 1. 187. t. 96.)—Leaves ovate, roughish with hairs.—Native of the Cape of Good Hope, as indeed are all the remaining species. It flowers in May and June.—The *stem* of this evergreen *shrub* is eight or ten feet high, branched in all directions. *Leaves* generally alternate, on short stalks, ovate, pointed. *Flowers* axillary, along the branches, very inconspicuous. *Berry* red, and fleshy like an apple.

2. R. *villosa*. Heart-leaved Royena. Willd. n. 2.—Leaves heart-shaped, oblong, downy beneath.—It flowers in June and July.—Very similar to the last in habit, but its *branches* are more villous. *Leaves* elliptic or oblong; heart-shaped at the base; on short, hairy stalks. *Flowers* axillary, nodding, solitary, on villous stalks. *Bracteas* two, opposite, ovate, pointed, downy, large, deciduous.

3. R. *pallens*. Pale Royena. Willd. n. 3.—"Leaves longish-obovate, obtuse, smooth."—It flowers in June and July.—We know not of any description or figure of this species which stands on the authority of Thunberg, Aiton, and Willdenow, who merely give its specific character.

4. R. *glabra*. Myrtle-leaved African Bladder-nut. Linn. Sp. Pl. 568. (Vitis idæa æthiopica, buxi minoris folio, floribus albis; Commel. Hort. v. 1. 125. t. 65.)—Leaves lanceolate, smooth.—Flowers in September.—*Stem* shrubby, five or six feet high, sending out numerous slender, leafy, evergreen *branches*, covered with a purplish *bark*. *Leaves* rather small, ovate, pointed, entire, bright green. *Flowers* axillary, along the branches, white. *Berry* roundish, purple, ripening in our greenhouses in the winter.

5. R. *hirsuta*. Hairy-leaved African Bladder-nut. Linn. Sp. Pl. 568. "Jacq. Collect. suppl. 110. t. 13. f. 1. fragm. t. 1. f. 2."—Leaves oblong-lanceolate, rather villous.—Flowers in July.—*Stem* strong and woody, seven or eight feet high, alternately branched, with a grey *bark*. *Leaves* an inch long, covered with soft hairs. *Flowers* on short stalks, axillary, small, of a faded purple colour.

6. R. *polyandra*. Oval-leaved Royena. Linn. Suppl. 240. Willd. n. 6.—Leaves elliptical. Flowers polyandrous, polygamous.—Time of flowering unknown.—The *stem* has knotty, irregular *branches*. *Leaves* somewhat obovate, coriaceous, finely downy on both sides. *Flowers* in short, axillary, downy clusters.

7. R. *angustifolia*. Willow-leaved Royena. Willd. n. 7.—Leaves lanceolate, acute, somewhat hairy beneath. It flowers in June and July.—This species is adopted on the authority of Willdenow, who observes, that it differs from all the foregoing ones, in having narrow, lanceolate *leaves*, sharp at both ends, and somewhat hairy underneath.

Royena is very nearly allied to Diospyros; the chief points of difference consisting in the latter genus having from six to twelve cells in the fruit, and sometimes five or six divisions in the calyx. Linnæus's description of the fruit of *Royena* is erroneous. See Diospyros.

Royena, in *Gardening*, contains plants of the shrubby evergreen exotic kind for the greenhouse, of which the species cultivated are; the shining-leaved royena, or African bladder-nut (R. lucida); the heart-leaved royena, or African bladder-nut (R. villosa); the myrtle-leaved royena, or African bladder-nut (R. glabra); the hairy-leaved royena, or African bladder-nut (R. hirsuta).

Method of Culture.—These plants are often rather troublesome in raising, but their culture may be attempted by cuttings and layers. The cuttings should be made from the young shoots, and be planted in the early spring in small pots filled with a loamy earth, plunging them in a very moderate hot-bed, covering them carefully with hand-glasses, refreshing them often with water in small proportions. When they have stricken roots, and are begun to shoot, inure them gradually to the open air, and when they are well rooted remove them into separate small pots, managing them afterwards as other rather tender greenhouse plants, such as the orange-tree, &c.

And the layers may be made from the young bottom shoots, laying them carefully down by slitting them as for carnations, watering them often in the warm season, but very moderately in the cold. When they are become well rooted, take them off and plant them in separate pots in the same manner as the cuttings, giving them the same sort of management afterwards.

The last sort often sends up suckers from the roots, and may sometimes be increased by planting in the same way as the cuttings. They afford variety among other greenhouse plants.

ROYERRE, in *Geography*, a town of France, in the department of the Creuse, and chief place of a canton, in the district of Bourganeuf; 9 miles S.E. of Bourganeuf. The place contains 1476, and the canton 6675 inhabitants, on a territory of 290 kiliometres, in 11 communes.

ROYMATLA, a river of Hindoostan, which is one of the mouths of the Ganges.

ROYMUNGUL, one of the mouths of the Ganges.

ROYOC, in *Botany*. See Roioc.

ROYON, in *Geography*, a town of France, in the department of the straits of Calais; 10 miles N.W. of St. Pol.

ROYPOUR, a town of Hindoostan, in Oude; 25 miles N.W. of Manickpour.—Also, a town of Bengal; 30 miles

miles N.N.W. of Midnapour.—Alſo, a town of Hindooſtan, in the circar of Boggilcund; 20 miles E. of Rewah.

ROYSTON, a town ſituated partly in Cambridgeſhire, and partly within that of Hertford, is ſeated at the bottom of a hill, among the chalk downs. The name appears to have been derived from a croſs, erected in the beginning of the twelfth century by a lady Roiſe, or Roiſia, and thence called "Roiſe's Croſs;" near to which a monaſtery for Auſtin canons was afterwards built: the canons being competently endowed, houſes and inns were erected, and in time formed a town, called Roiſe's Town, which was afterwards contracted to Royſton. At the time of the Domeſday Survey, the town was ſituated in five pariſhes, and ſo continued till the 32d year of king Henry VIII., when it was conſtituted a diſtinct pariſh: and the church of the diſſolved priory being made parochial, was, agreeably to the letter of the ſtatute, denominated "The Pariſh Church of St. John Baptiſt in Royſton." The eſtates granted to the priory by the founders appear to have included nearly all the land on which the town now ſtands. In the firſt year of Richard I. the canons obtained the liberty of holding a weekly market, and alſo an annual fair during the whole of Whitſun week. Henry III. inveſted them with many additional privileges: and under theſe grants the trade and population of the town rapidly increaſed. The greater part of the houſes were deſtroyed by fire in the reign of Henry IV.; but the convenient ſituation of the place as a corn-market contributed to its ſpeedy reſtoration: and in the time of Henry VI., according to Hollinſhed, wheat was ſo plentiful here as to be ſold for twelve-pence the quarter. Camden mentions this town as being famous for the great reſort of maltſters and other dealers in grain; and for the incredible quantity of corn to be ſeen every market day on the adjacent roads. It is ſtill celebrated for its corn trade, notwithſtanding the great alteration which has taken place in the modes of traffic. The ſcite of the priory with its appurtenances and liberties, and three annual fairs, were granted by Henry VIII., in conſideration of 1761*l.* 5*s.* 0*d.* to Robert Cheſter, eſq. whoſe poſterity continued to poſſeſs the ſame for ſeveral generations: but theſe are now the property of the honourable Thomas Brand. Only a few remains of the priory buildings are now left, excepting the church, which conſiſts of a nave, chancel, and aiſles, with a low tower. Beſides the priory, there were two other religious foundations in this town. One of them, an hoſpital dedicated to St. Nicholas, was founded ſo early as king John's reign; but no particulars of it are now known. The other, which was alſo an hoſpital or free chapel, was dedicated to St. John and St. James, and was in exiſtence in the twelfth year of Henry III., as Walter de Gray, archbiſhop of York, then granted indulgences to ſuch as ſhould contribute to the ſupport of its ſick and weak brethren. Some remains of this hoſpital are yet extant in a dwelling-houſe. King James I. built a manſion here, as an occaſional reſidence for enjoying the amuſements of hawking and hunting. At the commencement of the civil wars Charles I. removed from Hampton-Court to this houſe. It is ſtill called the king's houſe, but is fallen to decay. Beneath the market-place is a *Cave*, or ſubterranous crypt or oratory, which has been dug out of the ſolid chalk, and had originally a perpendicular aperture riſing to the ſtreet, and communicating with the upper part of the cavity. This was of a circular form, about two feet in diameter, and had been cloſed by a mill-ſtone, which was accidentally diſcovered in Auguſt 1742. This aperture, or deſcent, had holes for the feet cut into the chalk on each ſide; but as the lower part of the crypt was found to be filled with looſe earth and rubbiſh, this paſſage was quickly enlarged, the curioſity of the town's-people being ſtrongly excited by the hope of diſcovering ſome concealed treaſure. About two hundred loads of earth were drawn out; but the zeal of the labourers was only repaid by finding a ſkull, and other human bones, greatly decayed. The interior of this ſingular ſubterraneous apartment is completely circular, finiſhed in a kind of dome above, broken only by the original entrance. Round the lower part of the ſides is a ſeries of rude carving of the crucifixion, ſeveral ſaints, and various other ſubjects from ſacred and profane hiſtory. The bottom of this cell is ſurrounded by a raiſed ſeat about one foot high, and between two and three wide, but divided on the eaſt ſide by a hollow place, called the Grave. The preſent entrance is by a regular deſcent or paſſage, nearly one hundred yards in length, formed in the chalk from an adjacent houſe. The diameter of the crypt is about twenty-five feet; and the height is between thirty and forty. The Roman road, called Ichnield Way, paſſed by this town. According to the population returns of the year 1811, the number of houſes in this pariſh was 284, containing 1309 inhabitants. The market is held on Thurſdays; and here are five annual fairs. Royſton is ſituated 20 miles N.E. from Hertford, and 37 miles N. from London. Beauties of England and Wales, vol. vii. by E. W. Brayley and J. Britton. Lyſons's Magna Britannia, Cambridgeſhire. Stukeley's Palæographia Britannica.

ROYTON, a chapelry or townſhip in the pariſh of Preſtwich-cum-Oldham, and county of Lancaſter, England, is two miles N. of the town of Oldham. This place abounds with cotton manufactories, which appear to have been ſettled here in conſequence of the abundance of coal obtained. According to the population report of 1811, this townſhip contained 625 houſes, and 3910 inhabitants. Royton-hall is the ſeat of Joſeph Pickford, eſq. but formerly belonged to the Byron family, who poſſeſſed conſiderable landed property in the neighbourhood. The houſe is ſeated in a deep valley, ſurrounded by high hills. Beauties of England, &c. vol. ix. by J. Britton.

ROZANNA, a town of Lithuania, in the palatinate of Novogrodek; 48 miles S.W. of Novogrodek.

ROZANS, a town of France, in the department of the Higher Alps, and chief place of a canton, in the diſtrict of Gap; 10 miles W. of Serres. The place contains 900, and the canton 5024 inhabitants, on a territory of 195 kiliometres, in 11 communes.

ROZAS, Las, a town of Spain, in New Caſtile; 10 miles N.W. of Madrid.

ROZE, Nicolas, in *Biography*, muſic-maſter of the church of the Holy Innocents at Paris, was born at Bourgneuf, in the dioceſe of Chalons-ſur-Saône, in 1745. At ſeven years old he was received as a choriſter in the collegiate church of Beaune, in Burgundy. Soon after, he had inſtructions from the abbé Rouſſeau of Dijon, muſic-maſter of Tournay. He had the misfortune to loſe this amiable maſter in two years time, who had taught him to ſing ſeveral motets or anthems in that ſhort period. He was afterwards a conſiderable time totally without inſtructions. And what was ſtill worſe, he was under the authority of perſons who prevented him from attempting compoſition.

The abbé Hornet, nephew to the maitre de chapelle of Notre-Dame, gave him leſſons in ſinging, but he was abſolutely forbidden compoſition by this maſter, for fear his application ſhould injure the fine voice which nature had given him. At twelve years old he again found himſelf without an inſtructor, and going to the college of Beaune

to

to finish his classical studies, and afterwards to the seminary of Autun, where, during two years' residence, he composed the chief part of the chants which at present are adopted almost throughout the diocese.

At twenty-two years old he went into orders at Beaune. In 1669, as soon as he was admitted into priest's orders, he composed a mass, which he carried to Paris and presented to M. d'Auvergne, master of the king's band. This able professor encouraged him to pursue composition, and made him compose under his own eye a motet for the Concert Spirituel.

It was at this period that the abbé Roze began to make himself known; and this motet procured him the place of maitre de chapelle of the cathedral of Angers, which he retained five years.

In 1775 he was appointed to the Holy Innocents, and from that time he has continued to furnish the Concert Spirituel with motets; and though his style is modern, he has never deviated from the grandeur and solemnity befitting sacred music.

The abbé Roze is one of the best singing masters, in point of taste, at Paris.

He has published a system of harmony, or accompaniment, in which he modestly pretends to no more than to assist the students in harmony with methodical elementary principles, so clear, that children of eight years old shall find no difficulty in them. It often happens that able composers are unable to teach children the first elements of music for want of a well digested method. This the abbé Roze's system will be found, with respect to accompaniment. He has traced the chords from the fundamental base or key-note, through all the combinations of harmony allowable by ancient rules in one key. Laborde, 1788.

ROZESTVEN, in *Geography*, a town of Russia; 32 miles S. of Petersburg. N. lat. 52° 20′. E. long. 29° 50′.

ROZESTVENSKOI, a town of Russia, in the government of Tobolsk; 16 miles S.E. of Kemskoi.—Also, a town of Russia, in the government of Archangel, on the Pinega; 4 miles S.E. of Pineg.

ROZETT, Cape, a cape on the western coast of France. N. lat. 49° 28′. W. long. 2°.

ROZIER, Francis, in *Biography*, an eminent writer in economics, was born at Lyons in 1734. His father, who was engaged in commerce, dying while he was young, and without property, he entered into the ecclesiastical order, though his taste led him to agricultural and botanical pursuits. He obtained the place of director of the school of Lyons. In this situation he joined La Tourette in publishing, in 1766, "Elementary Demonstrations of Botany," a work that passed through many editions. In 1771 we find him at Paris, where he began to publish the "Journal de Physique et d'Histoire Naturelle," which was conducted a considerable time with great reputation. In this work he gave clear and interesting accounts of all new discoveries in physics, chemistry, and natural history. Through the recommendation of the king of Poland, he was presented to a valuable priory, when, being completely at his ease, he turned his attention to his favourite project of drawing up a complete body of rural economy. He now purchased a domain at Beziers, in the finest part of France, and engaged actively in country labours, and at the same time employed himself in the abridgment of the great works from which his compilation was to be formed. This was at length finished, under the title of "Cours d'Agriculture," in 10 vols. 4to., of which the last did not appear till after the author's death. In 1788 he went to Lyons, and was admitted a member of the academy, while the government gave him the direction of the nursery ground of the Generality. On the unfortunate revolution, Rozier was one of its earliest partizans, but without ever entering into its excesses. He was, however, one of its victims; in September 1793, during the siege of Lyons, a bomb falling upon his bed, buried his body in the ruins of his house. He was author, likewise, of several treatises on the method of making wines, and distilling brandy, on the culture of turnip and cole-seed, on oil-mills, and other machinery.

Rozier, *Cape*, in *Geography*, a cape on the coast of Canada, in the gulf of St. Lawrence; 9 miles W. of cape Gaspe.

ROZIERES. See Rosieres.

ROZOY, a town of France, in the department of the Seine and Marne, and chief place of a canton, in the district of Coulommiers. The place contains 1507, and the canton 13,199 inhabitants, on a territory of 312½ kiliometres, in 28 communes.

Rozoy *en Thierache*, a town of France, in the department of the Aisne; 21 miles N.E. of Laon.

ROZVALINA, Totagai, a town of Russian Tartary, near lake Kargaldzin. N. lat. 52° 44′. E. long. 68° 54′.

RSESCHOW, a town of Austrian Poland, in Galicia; 70 miles W. of Lemberg.

RUA, La, a town of Spain, in Galicia; 25 miles N.E. of Orense.

RUAD, Rouad, or *Rou-Wadde*, an island of the Mediterranean, anciently celebrated under the name of Aradus or Arad. N. lat. 34° 42′. E. long. 35° 57′. See Arad.

RUADOK, or Rhiwaedog, a village of North Wales, in the county of Merioneth, where a battle was fought between the Welsh, under Llywarch Hen and the Saxons; 2 miles E. of Bala.

RUALGO, a town of Italy, in the Cadorin; 4 miles S. of Cadora.

RUANEL, a town of Ceylon; 38 miles S.S.W. of Candy.

RUARUS, Martin, in *Biography*, was born at Krempen, in Holstein, about the year 1587, and being designed for a Lutheran minister, he was educated in the principles professed by the disciples of Luther. But at Altdorf he became a convert to the Socinian doctrine, as taught in a private manner by professor Sonerus. When he was reproached and threatened by his family for deserting the principles of his forefathers, he justified his conduct, and defended the cause of free inquiry in matters of religion. Of his sincerity no doubt could be entertained, as he submitted to the loss of his patrimony rather than make a sacrifice of what he considered to be truth. He travelled over the greater part of Europe, and acquired respect and esteem wherever he went, by his great learning and excellent moral character. He was offered situations of trust and honour in England and Silesia, but declined them all. At length he became principal of the college of Racow in Poland; after which, about the year 1635, he became pastor to the Socinian church at Dantzic. In the year 1646, Calixtus used all his endeavours to bring him back to his original principles, but without effect. He died at Dantzic in 1657, at the age of 70. He wrote notes on the catechism of the Socinian churches in Poland, which were added to the addition of that work printed in 1665. Two volumes of his letters, each containing one hundred, were published after his death at Amsterdam. They are said to be curious and interesting, not only as they throw light on the history of Socinianism, but as they furnish the reader with valuable literary anecdotes. Among the author's corre-

correſpondents were father Merſenne, Hugo Grotius, and De Bergius.

RUATUN, or RATTAN, in *Geography*, an iſland in the bay of Honduras, about 30 miles in length and 12 in breadth, ſurrounded with rocks and ſhoals; with a harbour capable of containing a large fleet of ſhips. The Engliſh, in the year 1742, formed a ſettlement here for the purpoſe of carrying on the logwood trade, but it was ſoon abandoned. N. lat. 16° 24′. W. long. 87° 10′.

RUBASS, a town of Hindooſtan, in the ſubah of Agra; 14 miles W. of Fattipour.

RUBBER, a large coarſe file.

RUBBER *of Pencil Strokes*. See CAOUTCHOUC.

RUBBER, in *Electricity*. See ELECTRICAL *Machine*.

RUBBERS, among *Shepherds*, a diſeaſe in ſheep. See SCAB.

RUBBING-POST, a poſt ſet up for the purpoſe of cattle, hogs, or other animals, rubbing themſelves upon. Mr. Marſhall, in his "Rural Economy of Norfolk," ſays, it is an excellent cuſtom of the Norfolk farmer to erect rubbing-poſts in the different parts of the incloſure he is feeding or teathing; they keep the ſtock from the fences, and furniſh them, no doubt, with an agreeable, and perhaps a ſalutary, amuſement. Some he ſaw draw the crown of a tree, with the lower part of the boughs left on, into the middle of the cloſe: this is leſs trouble than putting down a poſt, is eaſily rolled out of the way of the plough, and ſeems to be ſtill more agreeable to the cattle. They are alſo uſeful in hog-ſties.

Theſe ſorts of poſts may probably be found of great ſervice in the feeding paſture, for the purpoſe of the fattening ſtock rubbing themſelves upon, as they tend to keep them eaſy and quiet, as well as to afford them that kind of agreeable feeling which may be of utility in promoting their progreſs towards a ſtate of fatneſs.

RUBBIO, in *Commerce*, a meaſure for corn in Italy, containing 8 lappa, which are equal to $7\frac{3}{4}$ Engliſh buſhels.

RUBBLE STONE, *Grauwacke* of Werner, *Gres gris* of the French, is a particular kind of ſand-ſtone, containing not only grains of quartz, ſiliceous ſchiſtus, or horn-ſtone, but alſo ſcraps of blueiſh argillite in a clayey cement, of which there is often no more than is barely ſufficient to hold the grains together, ſometimes with and ſometimes without mica; commonly compact, ſometimes ſlaty in the groſs. Its colour is yellowiſh, or blueiſh-grey, or dark reddiſh-brown mixed with grey. Fracture, in the ſmall, fine ſplintery, or earthy; hardneſs from 7 to 9, rarely 10. Sp. grav. from 2.64 to 2.685, but when withered only 2.60. See *Tranſition* ROCKS.

RUBECULA, in *Ornithology*, a ſpecies of *Motacilla*; which ſee.

RUBEFACIENT, in *Medicine*, from *rubor*, *redneſs*, and *facio*, *I make*, or *produce*, a term which is uſed to denote thoſe ſubſtances which, when applied externally, by friction or otherwiſe, excite the action of the ſuperficial veſſels, and, by filling them with red blood, occaſion a ſuffuſion of redneſs in the part.

The operation of a rubefacient is, therefore, analogous to that of a bliſter, but conſiderably leſs efficient as a remedy; ſince it produces, in fact, but a ſmall degree of the incipient effect of a bliſter, *viz.* a very ſlight and ſuperficial diſtenſion of the blood-veſſels, ſcarcely amounting to inflammation. Rubefacients are employed under the ſame indications as bliſters, and are intended, like them, to relieve ſome internal pain or inflammation, by exciting a counter-irritation, or, as ſome explain it, by revulſion; *i. e.* by drawing the fluids from the diſeaſed to the external parts. The friction, by means of which the rubefacient is uſually applied, contributes alſo to the ſame effect.

The ſubſtances, by which this effect is produced, are of an acrid or ſtimulating nature, ſuch as ammonia, turpentine, camphor, vinegar, the eſſential oils, ſpirits, &c.: and the diſeaſes, which they are ordinarily uſed to relieve, are the ſlighter degrees of local internal inflammation. Thus, for the relief of a ſlight ſore-throat, or inflammation of the tonſils, it is cuſtomary to rub the front of the neck with hot vinegar, or ammonia and oil; and the more external redneſs it produces, the more effectual is the internal relief. Slight pains in the cheſt are often materially alleviated by the uſe of a warm liniment or plaſter, or by the uſe of the ointment of tartarized antimony, which excites not only redneſs, but puſtules. And rheumatic affections of the joints are often more effectually removed by friction with a rubefacient, than by any other means. See REVULSION.

RUBELLIO, in *Ichthyology*, a name given by ſome authors to a ſmall ſea-fiſh of a red colour, caught in the Mediterranean, and more uſually called by writers on theſe ſubjects the *erythrinus*.

RUBELLITE, in *Mineralogy*, is conſidered as a ſub-ſpecies of tourmaline, of a reddiſh-violet colour. It differs from tourmaline, being infuſible under the blowpipe, but it loſes its colour and tranſparency. Its ſpecific gravity is 3.1. It contains, according to Klaproth,

Silex	43.5
Alumine	42.25
Soda	9
Oxyd of iron and manganeſe	1.5

A ſpecimen analyſed by Vauquelin gave 7 parts in the 100 of oxyd of iron and manganeſe. This ſtone is ſometimes uſed in jewellery. In the Greville collection of minerals in the Britiſh Muſeum, there is a magnificent ſpecimen of the red rubellite, originally preſented to Col. Symes by the king of Ava. It has been valued at 1000*l.*

RUBELLUS, in *Ichthyology*, a name given by ſome authors to the common roach, and by others to the rudd or finſcale.

RUBENACH, in *Geography*, a town of France, in the department of the Rhine and Moſelle, and chief place of a canton, in the diſtrict of Coblentz. The place contains 567, and the canton 6935 inhabitants, in 19 communes.

RUBENS, *Sir* PETER PAUL, in *Biography*. This moſt ſingularly accompliſhed man, and extraordinary painter, was the ſon of John Rubens and Mary Pipelings, both deſcendants of diſtinguiſhed families of the city of Antwerp. His father was one of the principal magiſtrates of that place, when civil war deſolated Flanders; and its calamities approaching the precincts of his abode, he left it for Cologne, in which city our artiſt was born in 1577. The day of his nativity was the feaſt of St. Peter and St. Paul, and from thence he received, at the baptiſmal font, the names of theſe apoſtles. From his infancy he diſcovered prompt and lively talents, which were cultivated by his parents with great care, in every branch of polite and claſſical literature; and he amply repaid their care by the high degree of ſucceſs he attained.

The views of his parents were otherwiſe directed than to the arts, and Rubens was placed, when his education was completed, as a page to the counteſs of Lalain; a ſituation too humble, and attended with occupation too trivial, to engage or detain long, in its obſequious frivolities, ſuch a mind as he poſſeſſed: and on the death of his father, which happened ſoon after, he obtained permiſſion of his mother to purſue the bent of his inclination, and became a painter.

To forward this view, he placed himſelf as a diſciple of Tobias Verhaecht, a landſcape painter of ſome note, but ſoon left him, to ſtudy hiſtory painting under Adam Van Oort. As the vulgar and brutal deportment of that artiſt were little congenial to the elevated and gentle mind and diſpoſition of Rubens, he ſoon quitted him alſo, and then entered the ſchool of Otho Venius, who poſſeſſed qualities, both as a man and an artiſt, far more ſuited to his taſte; and he became attached to this his laſt preceptor, in the warmeſt and moſt reſpectful degree.

When Rubens had attained his twenty-third year, Otho had the candour to tell him that he could no farther promote his progreſs; and adviſed him to travel to Italy, and gather the rich fruit of higher cultivation in art, at that rich ſtore-houſe and fertile nurſery of taſte and talent. This wiſe and parental advice of his maſter correſponded ſo entirely with his own inclination, that he immediately prepared for the journey; and having received ſtrong recommendatory letters from the archduke Albert, governor of the Netherlands, to Vincenzio Gonzaga, duke of Mantua, he ſet forth for Italy.

Devoting a ſhort time to the examination of the fine works at Venice, he proceeded to Mantua, where he received moſt marked attention from the duke, who was no leſs pleaſed with his polite accompliſhments, than with his ſkill as an artiſt, and ſoon after appointed him one of the gentlemen of his chamber. His reſidence with this prince afforded him every deſirable means of ſeeing and ſtudying the great works of Giulio Romano, in the palace del T, with which he is ſaid to have been peculiarly delighted; and he had continued with him two years, when he requeſted permiſſion to go to Venice, the empire of colouring, for the purpoſe of ſtudying ſtill farther the works of Titian and others, which had ſo much engaged his attention as he paſſed through that city. On his return to Mantua he evinced how much he had benefited by ſtudying the rich and brilliant productions of the Venetian ſchool, in the three magnificent pictures he painted for the church of the Jeſuits; which, in bravura of execution, and freedom of force in effect, rank nearly among his beſt productions. His patron afterwards gave him a commiſſion, which afforded him the means of purſuing his ſtudies at Rome, where he had not yet been, which was to make copies for him of ſome of the moſt celebrated pictures there, and he received it with gratitude and delight. During his reſidence there he executed ſeveral of theſe tranſcripts with uncommon ſucceſs, and they were eſteemed by the duke almoſt equal in value with the originals.

In 1605, Rubens was honoured by his friend with another commiſſion, which ſtill further aſſiſted to advance his knowledge of the art, whilſt it ſerved the views of the prince. He was ſent on an embaſſy from Mantua to the court of Spain, and went to Madrid, carrying with him magnificent preſents for the duke of Lerma, the favourite of Philip III. He executed his miſſion with the ſucceſs which attends ability and integrity; and while intent upon the political part of his employment, did not neglect to employ his pictorial talents with full power, gaining the eſteem and admiration of the king of Spain, whoſe portrait he painted, and from whom he received the moſt flattering marks of approbation.

Soon after his return to Mantua, he reviſited Rome, where he was engaged to adorn the tribune of Sta. Maria, in Valticella; there he painted three admirable pictures, in which he appears to have imitated the ſtyle of P. Veroneſe. From Rome he went to Genoa, where the reputation he had acquired greatly excited public curioſity, and he was engaged to paint many pictures. Among them he executed two for the church of the Jeſuits, the ſubjects of which were, the Crucifixion, and St. Ignatius performing a miracle, which gave univerſal ſatisfaction and delight.

Having been abſent from his native country eight years, he was ſummoned home by the reported illneſs of his mother; but though he haſtened with all ſpeed, he did not reach Antwerp in time to afford his beloved parent the conſolations of his preſence and affections. The loſs of her affected him deeply, and he intended, when he had arranged his private affairs, to go and reſide in Italy; but the archduke Albert, and the Infanta Iſabella, exerted their intereſt to retain him in Flanders, and in their ſervice. He conſequently eſtabliſhed himſelf at Antwerp, where he married his firſt wife, Elizabeth Brants, and built a magnificent houſe, with a ſaloon in form of a rotunda, which he enriched with antique ſtatues, buſts, vaſes, and pictures by the moſt celebrated painters: and here, ſurrounded by works of art, he carried into execution thoſe numberleſs productions of his prolific and rich invention, which once adorned his native country, but now are become the ſpoil of war, and the tokens of conqueſt and ambition, ſhining with equal luſtre among other ſuper-eminent productions of painting in the gallery of the Louvre.

The amazing ſucceſs of Rubens in his art, and the honours and wealth which were accumulated upon him, excited the envy and malignity of many among his rivals, who aſcribed the moſt meritorious parts of his works to the ability of his pupils, among whom were Jordaens, Van Uden, Snyders, Wilden, &c. and forgetting that ſuch men would not conſent to work for another whom they did not regard as pre-eminent to themſelves. Cornelius Schut abuſed him for lack of invention. Abraham Janſens had the audacity to defy him to a trial of ſtrength. Rubens anſwered, that he would contend with him when he had ſhewn himſelf to be a worthy competitor. A more friendly offer was rejected by him with equal wit. A chemiſt offered him a ſhare of his laboratory, and of his hopes of obtaining the philoſopher's ſtone. He carried the viſionary into his painting room, and told him his offer came twenty years too late, for ſo long, ſaid he, is it ſince I found the art of making gold with my palette and pencils. The abuſe of Schut and of Rombouts, who joined in it, he anſwered by relieving their neceſſities, and procuring them employment; and by engaging in thoſe varieties of art, landſcapes, lion and crocodile-hunting, and other miſcellaneous ſubjects, he decidedly eſtabliſhed his claim to the title of an univerſal painter, and covered his calumniators with ſhame and confuſion.

In 1620, when his talents had procured him univerſal renown, he received a commiſſion from Mary de Medici to adorn the gallery of the palace of the Luxembourg. There, in conſequence, he executed the works ſo well known; in which he repreſented, with the moſt rich and varied imagination, by very ingenious allegorical and emblematical deſigns, the principal events in the life of that princeſs. The whole were executed at Antwerp, except two pictures, which he painted at Paris in 1623, when he went there to arrange the whole in the gallery: and thus, in the ſhort ſpace of three years, amidſt innumerable other engagements, was this large ſeries of compoſitions, extenſive in their deſign, and rich in number of figures and in variety of colouring, completed: exhibiting an aſtoniſhing proof of the vivacity of his imagination, and the ſkill and dexterity with which he controlled the materials of his art. It was at this period that he became known to the duke of Buckingham, as that nobleman paſſed with his maſter, prince Charles, through France on his way to Madrid. He afterwards became the purchaſer of Rubens's

rich muſeum of works of art, for which he is ſaid to have given 10,000*l.* ſterling.

On the return of Rubens to Antwerp, he was honoured with ſeveral conferences with the Infanta Iſabella, and was by her diſpatched on a political miſſion to the court of Madrid, where he arrived in 1628, and was moſt graciouſly received by Philip IV. He acquitted himſelf in his novel capacity to the ſatisfaction of that monarch, and his miniſter, the duke de Olivares, by both of whom he was highly eſteemed; and while his talents as a diplomatiſt met with the ſucceſs they merited, thoſe of the painter were not neglected.

The duke de Olivares had juſt completed the foundation of a convent of Carmelites at the ſmall town of Loeches, near Madrid, and the king, as a mark of his favour to the miniſter, commiſſioned Rubens to paint four pictures for their church, which he executed in his grandeſt ſtyle, and the richeſt glow of his colouring. The firſt is an allegorical deſign of the triumph of the new Law, which he has perſonified by a figure of Religion, ſeated on a ſuperb triumphal car, drawn by four angels, with others bearing the croſs, with characteriſtic ſymbols; four figures, expreſſive of Infidelity or Ignorance, over which Religion is ſuppoſed to triumph, follow the car like ſlaves or captives bound in chains. The group is crowned with beautiful cherubims, that hover in the air with chaplets in their hands, diſpoſed with ſingular art and the moſt charming effect. The companion picture repreſents the interview of Abraham and Melchiſedech, who offers him bread and the tenth of his ſpoils. The other two pictures, of equal excellence with the above, repreſent the four doctors of the church, and the four evangeliſts, with their diſtinctive emblems: they are all of very large dimenſions, and in compoſition and expreſſion are not excelled by any of his works. He alſo painted eight grand pictures for the great ſaloon of the palace at Madrid, which are regarded among the moſt brilliant of his productions. Their ſubjects were the Rape of the Sabines; the battle between the Romans and Sabines; the Bath of Diana, Perſeus, and Andromeda; the Rape of Helen; the Judgment of Paris, Juno, Minerva, and Venus; and the Triumph of Bacchus. He alſo painted a large portrait of the king on horſeback, with other figures; and a picture of the martyrdom of the apoſtle St. Andrew, which was in the church dedicated to that ſaint. For theſe extraordinary productions he was richly rewarded, received the honour of knighthood, and was preſented with the golden key as gentleman of the chamber to the king. In 1629 he returned to Flanders, and thus, in the ſhort ſpace of little more than nine months, he deſigned and executed ſo extenſive a ſeries of pictures; a labour which, to any other artiſt not poſſeſſed of his extraordinary powers, muſt have required the exertion of many years. When he had rendered the account of his miſſion to the Infanta, ſhe diſpatched him to England, to ſound the diſpoſition of the government on the ſubject of a peace. There for a time he concealed the powers granted to him to negociate upon the ſubject. Charles, in the interim, honoured this great painter with his notice, and commiſſioned him to paint the ceiling of the banqueting-houſe at Whitehall, where he has repreſented the apotheoſis of king James I.

During one of the frequent viſits with which Charles honoured Rubens, whilſt he was engaged in this great work, the latter, with infinite addreſs, took a favourable opportunity of touching on the ſubject of peace with Spain; and finding that the monarch was no ways averſe to it, at length produced the credentials with which he was furniſhed. The king appointed ſome members of the council to negociate with him; and the buſineſs was ſpeedily brought to a concluſion. Charles, delighted both with the man and the artiſt, munificently rewarded Rubens, and on the 21ſt of February 1630, conferred upon him the honour of knighthood. Soon afterwards, the important object of his miſſion being happily effected, he returned to the Netherlands, where he was received with all the honours and diſtinctions due to exalted merit.

Rubens continued to enjoy his well-earned fame and honours, with uninterrupted ſucceſs, till he arrived at his 58th year, when he was attacked with ſtrong fits of gout, which debilitated his frame, and unfitted him for great exertions: he abandoned, therefore, all larger works, and confined himſelf to eaſel painting. Yet he continued to exerciſe his art until the year 1640, when he died, at the age of 63. He was buried, with extraordinary pomp, in the church of St. James at Antwerp, under the altar of his private chapel, which he had previouſly decorated with a very fine picture. A monument was erected to him by his wife and children, with an epitaph in Latin, eulogizing his talents and virtues, and diſplaying their ſucceſs.

The victorious yet barbarous irruption of the French republicans into the Netherlands, robbed Flanders generally, and no place more than Antwerp, of the fine hiſtorical works of Rubens, of which at this period the gallery of the Louvre exhibits a moſt aſtoniſhing diſplay; no leſs than fifty-two of his pictures, and among them ſeveral of the higheſt quality, being now expoſed to view there. It is difficult to ſay which branch of the art moſt ſucceſsfully employed his talents, in hiſtory, portraiture, animals, landſcape, or ſtill life: in all, his brilliancy of imagination, and wonderful ſkill in execution, are equally apparent. From his birth he had evinced a lively and uncommon portion of genius, which met the advantages furniſhed to him in his progreſs through life, with an ardour and ſucceſs of which hiſtory ſcarcely affords a parallel. Both the number and merit of the works of Rubens are calculated to excite extraordinary attention. His fame is extended over a large part of the continent, and it may be truly ſaid, that he has enriched his country, not only by the magnificent examples of art which he left, but alſo by what ſome may deem a more ſolid advantage, the wealth which continued till lately to be drawn into it, by the concourſe of ſtrangers from all parts of the world to view them.

Rubens is not one of thoſe regular and timid compoſers, who eſcape cenſure and deſerve no praiſe. He produced no faultleſs monſters; his works abound with defects as well as beauties, and are liable, by their daring excentricities, to provoke much criticiſm. But they have, nevertheleſs, that peculiar property, always the companion of true genius, that which ſeizes on the ſpectator, commands attention, and enforces admiration, in ſpite of all their faults. His productions ſeem to have flowed from his pencil with more than freedom—with prodigality: his mind appears to have been inexhauſtible; his hand never wearied: the exuberant fertility of his imagination was, therefore, always accompanied by a correſpondent ſpirit in the execution of his work.

> "Led by ſome rule, which guides but not conſtrains,
> He finiſhed more through happineſs than pains."

No man ever more completely laid the reins on the neck of his inclinations, no man ever more fearleſsly abandoned himſelf to his own ſenſations, and depending on them, dared to attempt extraordinary things, than Rubens. To this, in a great meaſure, muſt be attributed that perfect originality of manner, by which the limits of the art may be ſaid to have been extended. Endowed with a full comprehenſion

prehenſion of his own character, he waited not a moment for the acquiſition of what he perhaps deemed incompatible excellence: his theory once formed, he ſeldom looked abroad for aſſiſtance; there is conſequently in his works very little that appears to be taken from other maſters, and if he has occaſionally ſtolen any thing, he has ſo well digeſted and adapted it to the reſt of his compoſition, that the theft is not diſcoverable. But though it muſt be allowed that he poſſeſſed, in many reſpects, the true art of imitation, though he looked at nature with a painter's eye, and ſaw at once the characteriſtic feature by which every object is diſtinguiſhed, and rendered it on canvas with a vivacity of touch truly aſtoniſhing; though his powers of grouping and combining his objects into a whole, and forming his maſſes of light and ſhadow and colour have never been equalled; and though the general animation and energy of his attitudes, and the flowing liberty of his outline, all contribute to arreſt the attention, and inſpire a portion of that enthuſiaſm by which the painter was abſorbed and carried away; yet the ſpectator will at laſt awake from his trance, his eyes will ceaſe to be dazzled, and then he will not fail to lament, that ſuch extraordinary powers were ſo often miſapplied, if not entirely caſt away: he will enquire, why Rubens was content to waſte ſo many requiſites to the perfection of the art? why he paid no greater attention to elegance and correctneſs of form, to grace, to beauty, dignity, and propriety of character? Why every ſubject, of whatever claſs, is equally adorned with the gay colours of ſpring, and every figure in his compoſitions indiſcriminately *fed on roſes*. Nor will he be ſatisfied with the ingenious, but ſurely unfounded apology, that theſe faults harmonize with his ſtyle, and were neceſſary to its complete uniformity, that his taſte in deſign appears to correſpond better with his colouring and compoſition, than if he had adopted a more correct and refined ſtyle of drawing; and that perhaps, in painting, as in perſonal attractions, there is a certain agreement and correſpondence of parts in the whole together, which is often more captivating than more regular beauty.

The redemption of what he wanted, is found in the univerſality of his power as an executive painter. In the ſmalleſt ſketch, the lightneſs and tranſparency of his touch and colour, are no leſs remarkable than the ſweeping rapidity and force of his bruſh in his largeſt works: and in all kinds of ſubjects, he equally keeps up his wonted ſuperiority. His animals, particularly his lions and horſes, are ſo admirable, that it may be ſaid they were never properly, at leaſt poetically, painted, but by him; his portraits rank with the beſt works of thoſe painters who have made that branch of art their ſole ſtudy; and his landſcapes remind us of the luſtre of Claude Lorraine and the grandeur of Titian. In the latter claſs of his works, the picturesque forms of his rocks and trees, the deep tones in his ſhady glades and glooms, the watery ſunſhine, the dewy verdure, the airineſs and facility of his touch, exhibit a charm, and ſhew a variety of invention, which faſcinate the obſerver, and leave him no inclination to dwell on the defects, though they are often neither few nor ſmall.

As a colouriſt, Rubens, in compariſon with Titian, the great maſter of the Venetian ſchool, will riſe or fall, according to the taſte of the amateur. If he is leſs chaſte than the Venetian, he is more brilliant; and if not by the truth of his colours, yet he claims our applauſe by the luſtre and ſplendour of his tints. The latter, in his execution, mingled his hues as they are found in nature, in ſuch a manner as to make it impoſſible to ſay where they begin or terminate; Rubens, on the other hand, laid his colours in their places, one by the ſide of the other, and then very ſlightly mixed them by a touch of a ſoft pencil; not unfrequently leaving his prepared ground viſible through parts of the colours, to produce an harmonizing tone. Of theſe different ſtyles, the only correct mode of judging is by reference to the ſpecific object of art, *the imitation of nature*, and then Titian's will be regarded as the moſt correct, though Rubens may be more alluring.

Rubens, Albert, ſon of Peter Paul, was born at Antwerp in 1614, and ſucceeded his father in his poſt as ſecretary to the council, devoting his leiſure to literary purſuits. He died in 1657, leaving behind him many works, as monuments of his great learning and ſound judgment, of which the following may be mentioned. "Regum et Imperatorum Romanorum Numiſmata," which is a commentary on the medals of the duke of Arſchot: "De Re Veſtiaria Veterum:" "Diſſertatio de Gemma Tiberiana et Auguſtea—de Urbibus Neocoris—de natali Die Cæſaris Auguſti," which were publiſhed by Grævius in the Theſaurus Antiq. Roman.

RUBENTIA, in *Botany*, ſo called by Commerſon, from the vernacular name of the tree in the Mauritius, *Bois Rouge;* ſee Elæodendrum. See alſo Rhamnus *pentaphyllus*, where we ought to have obſerved that the plant of Desfontaines and Boccone is very different from *Elæodendrum Argan*, to which the ſynonyms of Linnæus and Jacquin moſt probably belong, as cited in our vol. 12th.

RUBEOLA, the diminutive of *Rubia;* Tourn. Inſt. 130. t. 50. See Asperula and Crucianella.

RUBETA, or Toad, in *Zoology*, a ſpecies of *Rana;* which ſee.

RUBETRA, in *Ornithology*, a ſpecies of *Motacilla;* which ſee. It is alſo a name by which Geſner and ſome others have called that ſpecies of the œnanthe, commonly known by the names of the *ſtone-chatter*, *ſtone-ſmick*, or *moor-titling*. (See Motacilla *Rubicola*.) Other ſpecies of *Motacilla* are alſo called by the ſame name. See alſo Muscicapa and Pipra.

RUBIA, in *Botany*, derived from *ruber*, red, on account of the fine ſcarlet colour afforded by its root; which is well known to dyers and tanners under the name of Madder.—Linn. Gen. 52. Schreb. 69. Willd. Sp. Pl. v. 1. 603. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 181. Prodr. Fl. Græc. Sibth. v. 1. 97. Ait. Hort. Kew. v. 1. 242. Juſſ. Gen. 197. Tournef. t. 38. Michaux Boreal-Amer. v. 1. 81. Purſh v. 1. 102. Lamarck Illuſtr. t. 60.—Claſs and order, *Tetrandria Monogynia*. Nat. Ord. *Stellatæ*, Linn. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, four-toothed, very ſmall, or none. *Cor.* of one petal, bell-ſhaped, four-toothed, or more frequently five-cleft, without a tube. *Stam.* Filaments four, awl-ſhaped, ſhorter than the corolla; anthers ſimple. *Piſt.* Germen inferior, twin; ſtyle thread-ſhaped, cloven at the top; ſtigmas two, capitate. *Peric.* Two ſmooth berries united into one. *Seeds* ſolitary, roundiſh, umbilicated.

Eſſ. Ch. Corolla of one petal, bell-ſhaped, ſuperior. Berries two, combined, each with a ſingle ſeed.

1. R. *tinctorum*. Dyer's Madder. Linn. Sp. Pl. 158. Sm. Fl. Græc. Sibth. t. 141. Woodv. Med. Bot. t. 68. —Leaves elliptic-lanceolate, annual, about ſix in a whorl, rough at the keel. Stem prickly.—Native of the ſouth of Europe, flowering in June. *Root* perennial, widely ſpreading, much divided and branched at the top, ſucculent, its bark principally affording a ſcarlet dye. *Stems* herbaceous, annual, decumbent, widely ſpreading, branched, leafy, obtuſely quadrangular, prickly, with little hooks at the angles.

gles. *Leaves* ſpreading, acute, an inch and half long, roughiſh above, narrowed at the baſe into a ſhort, broad footſtalk; at the margin and back of the rib rough with ſpines, which for the moſt part point backwards, but in a contrary way towards the tip. *Flowers* yellowiſh-green, in axillary, terminal, trichotomous, leafy or bracteated, rough *panicles*, longer than the leaves. *Berries* dark-purple.

The cultivation of this uſeful plant in Great Britain by no means keeps pace with the demand for it. That grown in Holland is the moſt eſteemed by our dyers and calico-printers. Dr. Sibthorp tells us it is much cultivated in the neighbourhood of Athens.—Madder has the property of tinging, with its bright colour, not only the milk, but even the bones of ſuch animals as feed upon it.

2. R. *chilenſis*. Chili Madder. Willd. n. 2. "Molina Nat. Hiſt. Chili. 118." (Rubiaſtrum, Cruciatæ folio et facie, vulgo Relbun; Feuillée Peruv. 60. t. 45.)—Leaves annual, four in a whorl. Stalks axillary, ſolitary, ſingle-flowered. Stem ſmooth.—Native of Chili, on mountains. *Root* perennial, much divided and ſpreading, affording a dye like the laſt. *Stems* round, ſlender, ſomewhat creeping. *Leaves* ovate, four together, forming a croſs, rough and ſticking to the clothes. *Flowers* axillary, ſolitary, ſtalked, white. *Berries* roundiſh, red.

3. R. *peregrina*. Wild Engliſh Madder. Linn. Sp. Pl. 158. Fl. Brit. n. 1. Engl. Bot. t. 851.—Leaves about four in a whorl, elliptical; ſhining and ſmooth on their upper ſide. Flowers five-cleft. Not uncommon in the ſouth-weſt of England, among buſhes, on a rich loamy ſoil, flowering in July, and ripening its berries about October.—*Root* perennial, red, or orange-coloured. *Stems* branched, diffuſe, ſquare, rough at the angles, perennial. *Leaves* four, rarely ſix together, evergreen, pointed, rough, with teeth at the margin, and nerves on the under ſide. *Flowers* in forked panicles, terminal, yellowiſh, always five-cleft and pentandrous, without a calyx. *Berries* black, one of them generally abortive.

It is remarked in the Flora Britannica, that *Rubia*, n. 708 of Haller, which has been confounded with this ſpecies, is unqueſtionably *R. tinctorum* of Linnæus, having ovato-lanceolate *leaves*, rough on the upper ſide, and *flowers* which are moſtly four-cleft, deſtitute of a calyx.

4. R. *lucida*. Shining-leaved Madder. Linn. Syſt. Nat. ed. 12. v. 2. 732. Willd. n. 4. Sm. Fl. Græc. Sibth. t. 142.—Leaves elliptical, evergreen, ſix in a whorl, ſmooth at the keel. Stem without prickles. Native of Majorca, and the iſlands of Zante and Cyprus. It flowers in July. *Root* perennial, branched, much divided at the crown. *Stems* rather ſhrubby, a little ſpreading, much branched, unarmed, clothed with roughiſh down; jointed, roundiſh, leafleſs and grey in the lower part; leafy and ſquare in the upper. *Leaves* ſpreading, recurved, half an inch long, ſeſſile, pointed, ſmooth on both ſides, thickened at the margin, rough with ſpines pointing forwards. *Flowering* in axillary, numerous, trichotomous panicles, of a yellowiſh-green.

5. R. *fruticoſa*. Prickly-leaved Madder. Willd. n. 5. Jacq. Ic. Rar. t. 25.—Leaves evergreen, elliptical, carinated; prickly at the margin. Stem ſhrubby, rough.—Native of the Canary iſlands, and flowering at Kew in September.—*Stem* woody, round, much branched, of a greyiſh-brown colour; the younger *branches* angular, very rough, green. *Leaves* from three to ſeven together, ſmooth, except at the edges and back of the rib. *Flowers* on axillary, ſhort ſtalks, ſolitary or three together, pale yellow. *Berries* roundiſh, black, with purple pulp.

6. R. *anguſtifolia*. Narrow-leaved Madder. Linn. Mant. 39. Willd. n. 6.—Leaves evergreen, linear, ſmooth on the upper ſide.—Native of Minorca, and introduced at Kew, in 1772, by M. Richard, where it flowers in July and Auguſt.—*Stems* diffuſe, very rough, ſquare. *Leaves* four or ſix in a whorl, linear, acute, their keel and margin fringed with ſmall prickles, and rugged along the rib of the upper ſurface. *Flowers* yellow, flat, five-cleft.

7. R. *cordifolia*. Heart-leaved Madder. Linn. Mant. 197. "Pallas. It. v. 3. 715. t. L. f. 1." (R. cordata; Thunb. Japon. 60.)—Leaves perennial, four in a whorl, heart-ſhaped.—Native of the Cape of Good Hope, Siberia, China, and Japan; flowering at Kew in July.—Whole *herb* diffuſe, or ſlightly climbing. *Stem* ſquare, branched, with recurved prickles at the angles. *Leaves* four, rarely ſix, together, ovate, acute, revolute at the edge, rugged all over and dotted, on quadrangular ſtalks. *Flowers* white, in ſpreading, axillary, terminal panicles. Thunberg informs us that this ſpecies is uſed in Japan for dyeing.

8. R. *Brownei*. Brownean Madder. Michaux Boreal-Amer. v. 1. 81. Purſh 102. (R. peregrina; Walt. Fl. Carol. 86.—R. ſubhirſuta ſcandens vel reclinata, foliis cruciatis floribus ſingularibus ad alas; Brown Jam. 141.—Valantia hypocarpa; Linn. Sp. Pl. 1491.)—Leaves four in a whorl, oval. Flowers on ſtalks, ſolitary.—Found in ſhady woods from Carolina to Florida, and on the cool mountains of Jamaica. *Stem* herbaceous, from one to three feet high, looſe, branched, grooved, rugged. *Leaves* ſeſſile, ſmall, entire, convex, hiſpid with hairs, on ſhort downy ſtalks. *Flowers* axillary, ſmall, yellow, like thoſe of a *Galium*. *Berries* minute, tawny, or purpliſh, ſingle-ſeeded.

RUBIA, in *Gardening*, contains plants of the hardy, herbaceous, perennial kind, of which the ſpecies moſtly cultivated is the dyer's madder (R. tinctorum).

It may be noticed, that madder is ſo eſſential to dyers and calico-printers, that theſe buſineſſes cannot be carried on without it.

Method of Culture.—The young plants of this kind are increaſed by off-ſets or ſuckers, from the roots of the old plants in the ſpring, as April or the following month; which ſhould be ſlipped off ſoon after they appear above ground, by opening the earth round the roots, and taking off the ſide ſuckers with as much root-part and fibres to each as poſſible, preſerving the tops entire; which ſhould be planted directly, in the manner directed below. The ground being well prepared by frequent deep ploughing, or trenching over, and the proper quantity of ſets or ſuckers provided, they ſhould, with a dibble, be planted in rows two feet aſunder, and one diſtant in the row, putting each plant low enough in proportion to the length of its root, leaving moſt of the green top out of the ground, and cloſing the earth well about each ſet, as the work proceeds. Some ſet theſe plants in beds, three rows length-ways, at two feet diſtance, with wide alleys between bed and bed, in order for landing up the crowns of the roots two or three inches deep in winter. They ſhoot up into ſtalks the ſame year in either mode, but the roots require two or three years' growth before they are large enough for uſe; during which period they ſhould be kept clean from weeds all the ſummer by broad-hoeing, in dry weather; and in autumn, when the ſtalks decay, cutting them down, and then ſlightly digging the ground between the rows, raiſing it ſomewhat ridge-ways along the rows of the plants, an inch or two thick over their crowns; or, if they are in beds, they may be landed up from the alleys to the ſame depth; the ſame culture being repeated till the autumn of the third year, when the roots will be fit for taking up for uſe. This is performed by trenching the ground the way of the rows, beginning at one end of it, and

and opening a two-feet-wide trench close along by the first row of plants, digging down to the depth of the roots to get them clean out to the bottom; then opening another trench close to the next row, turning the earth into the first; and so on, trench and trench, till the whole is taken up and removed.

It is found that, in the garden culture, these plants succeed best in a light rich deep soil; the roots are sometimes used fresh for dyeing, being prepared by washing and pounding; but commonly when designed for keeping, or to be sent to a distance, are dried in some covered airy shed; then all the mould being rubbed off, and the roots made sufficiently dry, are sold to those who manufacture them for use, if not performed by the cultivator; this consists in drying them in a kiln or some stove-house, &c. then thrashing them to beat off the outer skin, in order to separate it from the inner part of the root, as being of an inferior quality. The roots being then dried in a kiln about twenty-four hours, are removed to a mill or pounding-house, where they are pounded in a long hollow oaken block, with stampers kept in motion by the mill; and when thus reduced to powder, sifted, and put in casks, as may be more fully seen under the head MADDER, in *Agriculture*.

But these plants are sometimes employed for variety in the borders or other open parts of gardens or pleasure-grounds, when of large extent.

RUBIA, in the *Materia Medica*, &c. See MADDER.

RUBIA, in *Geography*, a town of Austria, in the county of Goritz, on the Vipao; four miles S.E. of Goritz.

RUBIACEÆ, in *Botany*, one of Jussieu's largest and most important natural orders of plants, which has grown out of the Linnæan *Stellatæ*, and is named from *Rubia*, a genus belonging to the latter. Linnæus, in subordinate sections of his *Stellatæ*, has indicated some genera, as akin to what more strictly appeared to him to constitute that order. But his ideas wandered between this tribe and the *Contortæ*, to which last he referred some genuine *Rubiaceæ*; as *Cinchona* and *Gardenia*. Jussieu, taking a more accurate and comprehensive view of the subject, has greatly extended the order, while he has, at the same time, better defined it than any preceding botanist. This order is the 57th of his series, the 2d of his 11th class. We refer the reader to DIPSACEÆ for the characters of that class. *Cotyledons* two. *Flowers* monopetalous, superior. *Anthers* distinct; &c. The order of *Rubiaceæ* is thus defined.

Calyx of one leaf, superior, simple; its limb divided, or occasionally undivided. *Corolla* regular, mostly tubular, with a divided limb. *Stamens* definite, four or five, seldom more, inserted into the tube of the corolla, alternate with its segments, and equal to them in number. *Germen* inferior; style one, very rarely double; stigma generally double. *Fruit* in some cases of two lobes, or grains, each lobe single-seeded, not bursting, but having the appearance of a naked seed; in others a simple capsular or pulpy fruit, often of two cells, in each of which the seeds are either solitary or numerous; in a few instances there is but one cell, in some others many; the fruit, of whatever description, is either crowned with the permanent limb of the calyx, or marked with a rim, or scar, where the latter had been. The *corculum* is oblong, slender, inclosed in a large, horny, lateral *albumen*. *Stem* herbaceous, shrubby, or arboreous. *Leaves* in a few instances whorled, in most opposite, their *footstalks* generally connected at the base, through the medium of a simple pair of *stipulas*, or sometimes a fringed kind of sheath, embracing the stem or branch. Plants of this order are readily known, even without flowers, by their *leaves* or *stipulas*. The shrubby and arborescent kinds are principally natives of tropical climates, where they greatly abound.

Section 1. *Fruit two-lobed, with two seeds. Stamens generally four.* Leaves mostly whorled; stem almost uniformly herbaceous.

Sherardia, Asperula, Galium, Crucianella, Valantia, Rubia, and *Anthospermum*.

Sect. 2. *Fruit two-lobed, with two seeds. Stamens four, rarely five or six.* Leaves mostly opposite, connected by a fringed sheath; stem in general herbaceous.

Houstonia, Knoxia, Spermacoce, Diodia, Galopina, Richardia, and *Phyllis*.

Sect. 3. *Fruit simple, with two cells, and many seeds. Stamens four.* Leaves opposite. Stem either herbaceous or shrubby. *Hedyotis; Oldenlandia* of Plumier and Linnæus, which is not distinct from *Hedyotis*, as we have shewn in its proper place; *Carphalea* of Jussieu, Lamarck Illustr. t. 59; *Coccocypselum* of Browne and Schreber; *Gomozia; Manettia* of Linnæus, for which Jussieu prefers Aublet's name *Nacibea; Tontanea* of Aublet, supposed to be Schreber's *Bellardia; Petesia* of Browne and Linnæus; *Fernelia* of Commerson, Lamarck Illustr. t. 67; and *Catesbæa*.

Sect. 4. *Fruit simple, with two cells, and many seeds. Stamens five.* Leaves opposite; stem often shrubby.

Randia, which is a *Gardenia; Bellonia; Virecta; Macrocnemum; Bertiera* of Aublet and Schreber; *Dentella* of Forster; *Mussænda; Cinchona; Tocoyena* of Aublet, Lamarck Illustr. t. 163; *Posoqueria* of the same authors, which is *Cyrtanthus* of Schreber; *Rondeletia; Genipa* of Plumier and Linnæus, which is a *Gardenia; Gardenia*; and *Portlandia*.

Sect. 5. *Fruit simple, with two cells, and many seeds. Stamens six, or more.* Leaves opposite; stem shrubby or arboreous.

Coutarea of Aublet, which is *Portlandia hexandra* of Linnæus; *Hillia*; and *Duroia*.

Sect. 6. *Fruit simple, with two cells and two seeds. Stamens four.* Leaves opposite; stem for the most part shrubby.

Chomelia of Jacquin; *Pavetta; Ixora; Coussarea* of Aublet; *Malanea* of the same, which is Schreber's *Cunninghamia*; and *Antirrhæa* of Commerson.

Sect. 7. *Fruit simple, with two cells and two seeds. Stamens five.* Leaves opposite; stem shrubby or arboreous.

Chimarrhis of Jacquin; *Chiococca; Psychotria; Coffea; Canthium* of Lamarck, which is a *Gardenia; Ronabea* of Aublet, Lamarck Illustr. t. 166; *Pæderia; Coprosma*; and Aublet's *Simira*.

Sect. 8. *Fruit simple, with many cells, each containing a solitary seed. Stamens four, five, or more.* Leaves opposite; stem often shrubby.

Nonatelia of Aublet, which is scarcely different from *Psychotria; Laugeria; Erithalis; Psathura* of Commerson, Lamarck Illustr. t. 260; *Myonima* of Commerson, ibid. t. 68; *Pyrostria*, ibid. t. 68; *Vangueria*, ibid. t. 159; *Matthiola* of Plum. and Linn.; and *Guettarda*.

Sect. 9. *Fruit simple, with many cells, each containing many seeds. Stamens five, or more.* Leaves generally opposite; stem either shrubby or herbaceous.

Hamellia; Patima of Aublet, Lamarck Illustr. t. 159; and *Sabicea* of Aublet, which is Schreber's *Schwenkfeldia*.

Sect. 10. *Flowers aggregate upon a common receptacle; the fruit sometimes, but rarely, confluent.* Leaves opposite; stem arboreous or shrubby, rarely herbaceous.

Mitchella; Canephora of Jussieu, Lamarck Illustr. t. 151; *Patabea* of Aublet; *Evea* of the same, also *Tapogomea*, both compre-

comprehended by Schreber under *Callicocca; Morinda; Nauclea;* and *Cephalanthus.*

Sect. 10. *Rubiaceous genera, with the nature of whose fruits Jussieu was not, as yet, sufficiently acquainted.*

Serissa of Commerson, Lamarck Illustr. t. 151, which L'Heritier named *Buchozia;* and found to have a berry with two seeds; *Pagamea* of Aublet, Lamarck Illustr. t. 88; *Faramea* of the same, ibid. t. 63; and *Hydrophylax* of Linn. Suppl.

RUBICAN, in the *Manege.* A horse is said to be of a rubican colour, that is a bay, sorrel, or black, with a light grey or white upon the flanks, but so that this grey or white is not predominant there.

RUBICILLA AMERICANA, in *Ornithology,* a name given by Mr. Ray to the guiratirica, a Brasilian bird, of the bull-finch kind, very beautifully variegated with red, black, and grey.

RUBICOLA, a species of *Motacilla;* which see.

RUBICON, in *Geography,* a river of Italy, famous in Roman history, now a diminutive stream, and called by some Fiumesino, and by others *Pisatello* (which see), which enters the Adriatic about eight miles N. of Rimini.—Also, a department of Italy, composed of part of the Romagna. It contains about 105,000 inhabitants, who elect 12 deputies. The capital is Rimini.

RUBICULUS, in *Ichthyology,* a name given by Figulus and some others to that species of fish which we call the *roach.* It is of the cyprinus kind, and is distinguished by Artedi under the name of the red-eyed cyprinus, with the tail and belly-fins red. See CYPRINUS.

RUBIELOS, in *Geography,* a town of Spain, in Aragon; 22 miles S.E. of Teruel.

RUBIERA, a town of Italy, in the department of the Panaro; five miles W. of Modena.

RUBIFYING, formed of *rubens, ruddy,* and *fio, I become,* in *Chemistry,* &c. the act of turning a thing red by force of fire, &c.

Red arsenic is common white arsenic rubified by a mixture of sulphur and copper.

RUBIGALIA, or ROBIGALIA, in *Antiquity,* a feast celebrated by the Romans, in honour of the god Rubigus, or the goddess Rubigo; to engage those deities to preserve the corn from blasting and mildews.

The Rubigalia were instituted by Numa in the eleventh year of his reign; and were held on the seventh of the calends of May, which is our twenty-fifth of April; being about the time when the blight or mildew, called by the Latins *rubigo,* uses to attack the corn.

Varro fixes it to the time when the sun enters the 16th degree of Taurus. Indeed the true time seems rather to have been on the 18th day before the equinox, and the true reason, because then Canicula, or the Little Dog, sets; which is esteemed a malific constellation.

Hence they sacrificed a dog to Rubigo: Ovid says, the entrails of a dog, and those of a sheep; Columella, only a sucking puppy. Festus insinuates, that the victim must also be red.

RUBIGO, or ROBIGO, a disease incident to corn, popularly called *mildew.*

The rubigo is a species of blight. See BLIGHT, and RUST *of corn.*

RUBIN *of Antimony,* in *Chemistry,* a kind of liver of antimony, made with equal parts of nitre and crude antimony detonated together, to which is afterwards added an equal quantity of common salt. It is also called *magnesia opalina.*

RUBIN, or *Roboan,* in *Geography,* a small island near the coast of Arabia, at the entrance of the straits of Babelmandeb, near a projecting cape of the continent, and accessible by fording at low-water. Pilots are obtained here to navigate vessels through the straits, and to different ports in the Red sea.

RUBINELLI, GIOVANNI, in *Biography,* an Italian opera singer of the first class for voice, figure, action, and knowledge, arrived in England, from Florence, in April, 1786. His journey hither from Rome, where he sung during the carnival of this year, was not very propitious, as the weather was uncommonly inclement; and he was not only overturned in his chaise at Macon, in France, but after quitting the ship, in which he sailed from Calais to Dover, the boat that was to have landed him was overset near the shore, and he remained a considerable time up to his chin in water, to the great risk of his health, his voice, and even his life. The first time we meet with his name in the dramatis personæ of an opera is in "Caliroe," set by Sacchini, for Stutgard, in 1770, where he performed the part of second man. He seems to have continued at the court of Wirtemberg, in no higher station, several years, as Graffi and Muzio are named before him in the "Indice de' Spettacoli Theatrale." His name does not appear as first serious man in Italy till 1774, when he sung at Modena, in Paesiello's "Alessandro nell' Indie," and Anfossi's "Demofoonte." After this, he appeared as principal singer in all the great theatres of Italy, till his arrival in London. The first opera in which Rubinelli appeared in England was a pasticcio, called "Virginia," May the 4th. His own part, however, was chiefly composed by Angiolo Tarchi, a young Neapolitan, then advancing into eminence with great rapidity. Rubinelli is in figure tall and majestic, in countenance mild and benign. There is dignity in his appearance on the stage; and the instant the tone of hie voice is heard, there remains no doubt with the audience of his being the first singer. It is a true and full contralto from C, in the middle of the scale, to the octave above. He sometimes, however, goes down to G, and up to F; but neither the extra low notes nor the high are very full. All above C is falset, and so much more feeble and of a different register from the rest, that we were uneasy when he transcended the compass of his natural and real voice. His shake is not sufficiently open; but in other respects he is an admirable singer. His style is grand, and truly dramatic. His execution is neat and distinct. His taste and embellishments are new, select, and masterly. His articulation is so pure and well accented, in his recitatives, that no one who understands the Italian language can ever want to look at the book of the words, while he is singing. His chest is so strong, and his intonation so perfect, that we have very seldom heard him sing out of tune. His voice is more clear and certain in a theatre, where it has room to expand, than in a room. He had a greater variety of embellishments than any singer we had heard, except Pacchierotti, who not only surpasses him in richness of invention and fancy, but in the native pathos, and touching expression of his voice. Yet Rubinelli, from the fulness of his voice, and greater simplicity of style, pleases a more considerable number of his hearers than Pacchierotti, though none perhaps, so exquisitely, as that singer used to please his real admirers. Rubinelli finding himself censured on his first arrival in England for changing and embellishing his airs, sung "Return, O God of Hosts," at Westminster Abbey, in so plain and unadorned a manner, that those who venerate Handel the most, thought him bald and insipid. Indeed, we

we passed several appoggiaturas, which we remember Mrs. Cibber to have introduced, who learned to sing the air from the composer himself; and who, though her voice was a thread, and her knowledge of music very inconsiderable, yet from her intelligence of the words and native feeling, she sung this admirable supplication in a more touching manner, than the finest opera singer we ever heard attempt it; and Monticelli, Guadagni, Guarducci, and Pacchierotti, were of the number.

He remained here only one season; for in 1787 we find him singing at Brescia and Venice; and in 1788 he likewise performed in that city; in 1789, at Rome and at Milan; in 1790, at Genoa. He was succeeded in England by Marchesi.

RUBINUS VERUS, from *ruber*, a true carbuncle.

RUBIO, CAPE, in *Geography*, a cape on the N.W. coast of the island of Iviça. N. lat. 39° 5′. E. long. 1° 21′.

RUBIS, in *Ornithology*, guainumbi or humming-bird. See TROCHILUS *Colubris*.

RUBLACEDA, in *Geography*, a town of Spain, in Old Castile; 18 miles S. of Frias.

RUBLE, in *Commerce*, a money of account in Russia, containing 100 copecks, or kopeeks. The ruble is also divided into 10 grievens, 33⅓ altins, or 50 groschen; and the copeck is likewise divided into 2 denushkas, or 4 polushkas.

The gold coins are the imperial and half imperial, of 10 and 5 rubles; double and single ducats, formerly worth 4½ rubles and 2¾ rubles, but raised in value, in 1764, the double ducat to 5 rubles 60 copecks, and the single to 2 rubles 80 copecks. The silver coins are rubles of 100 copecks; also poltins of 50 copecks; polpoltins of 25 copecks; double and single grieven of 20 and 10 copecks; and pieces of 5 altins or 15 copecks; and peyte-copecks, of 5 copecks each, now out of circulation.

Assay and Value of Rubles.

	Assay.			Weight.		Contents in pure Silver.	Value in Sterling.	
		oz.	dwt.	dwt.	gr.	grains.	s.	d.
Ruble of the reign of Peter the Great	W.	2	7	18	1	315.7	3	8
Ruble of Catherine I. (1725)	W.	2	4½	17	11	309.9	3	7¼
Ruble of Peter II. (1727)	W.	2	12	18	5¾	310.2	3	7¼
Ruble of the empress Ann (1734)	W.	1	11	16	14½	317.2	3	8¼
Ruble of the empress Elizabeth (1750)	W.	1	7	16	12	321.8	3	9
Ruble of Peter III. (1762)	W.	2	2	15	10	277.8	3	2¾
Ruble of Catherine II. (1780)	W.	2	4	15	12	275.9	3	2½
Ruble of the emperor Paul (1799)	W.	0	14	13	12	280.8	3	3¼
Ruble of Alexander (1802)	W.	0	13	13	1½	273	3	2
Ruble of Alexander (1805)	W.	0	16	13	12	278.6	3	3
Poltin, or half ruble, of the empress Ann	W.	1	10	7	21	151.2	1	9
Poltin of the empress Elizabeth	W.	1	8	8	2	156.9	1	10
Poltin of Catherine II.	W.	2	4	7	[illegible]	137.9	1	7¼
Poltin of Paul	W.	0	15	[illegible]	16	139.8	1	7½
Poltin of Alexander (1804)	W.	0	14	[illegible]	13½	136.5	1	7
Polpoltin, or quarter ruble, old	W.	2	6	4	1	71.2	0	10
Polpoltin of Paul	W.	0	[illegible]	3	7	67.3	0	9½
Polpoltin of Alexander (1802)	W.	0	13½	3	9½	70.8	0	10
20-copeck piece (1767)	W.	2	2	3	10¾	62.6	0	8¾
20-copeck piece (1784)	W.	2	2	3	3	56.2	0	8
15-copeck piece (1778)	[illegible]	2	2	2	6	40.5	0	5½
10-copeck piece	W.	2	6	2	1	35.8	0	4¾
10-copeck piece (1798)	W.	0	14½	1	9	28.5	0	4
10-copeck piece (1802)	W.	0	13	1	8½	28.3	0	4
5-copeck piece (1801)	W.	0	13½	0	16½	14.3	0	2

Gold Coins.—The ruble, and also the double and half ruble, bear the same impressions as the ducat, *viz.* the head of the reigning emperor or empress, with the name and titles in Russian characters, thus translated: "Peter by the grace of God emperor, or Elizabeth by the grace of God empress, and sovereign of all the Russias;" but on the reverse of the ruble the value is written, "New coin, 2 rubles or 1 ruble;" and the half piece bears on its reverse the cypher of the empress Elizabeth, with the word "Poltina," which means half a ruble. These coins, as well as the ducats, are now nearly out of circulation.

The imperial has the head of the reigning sovereign, with name and title as above; reverse, a cross formed by five escutcheons, with the four figures of the year of coinage in the four angles; legend, "Imperial Russian coin, value 10 rubles;" and on the half imperial, "Value 5 rubles." But the half imperials of Paul I. have on one side a square, with ornaments, containing the inscription, "Not unto us, not unto us, but unto thy name;" reverse, a cross and four crowns, with a capital I in the centre, and the figure 5 in the four angles of the cross.

Silver Coins.—The ruble has the head of the reigning sovereign, with the name and title as on the gold coins; reverse, a two-headed eagle crowned, with an escutcheon on its breast; legend, "New coin, value 1 ruble," or simply "Coin 1 ruble," and the date. Some rubles of Peter I. and Catherine I. bear on the reverse a cross and four crowns, with four I's, or four double II's in the four angles, and the date within the cross.

The ruble of Paul I. (1799, &c.) bears the same impressions as the half imperial of the same period, except that the legend on the reverse is "Coin, value 1 ruble."

The ruble of Alexander (1802) bears on one ſide the eagle and legend, as above; on the reverſe, "Coin of the Ruſſian empire, ruble," encircled with a branch of laurel, and one of oak, having a ſmall crown at the top.

The poltina, or half ruble, bears the ſame impreſſions as the ruble, according to the period at which it was coined, except that the inſcription contains the word POLTINA, inſtead of RUBLE; and the quarter ruble is marked POLUPOLTINICK.

The 20-copeck piece has the head, name, and title of the reigning ſovereign, as above; reverſe, a two-headed eagle, with the number 20 on its breaſt, and no legend. The 15-copeck piece bears the ſame impreſſions, but it is marked 15.

The 10-copeck piece has the two-headed eagle; reverſe, the value of the piece, 10 COPECKS.

The 5-copeck piece has a Ruſſian P, with a crown over it, and under which is an I; reverſe, 5 COPECKS, and two laurel branches. Kelly's Univerſal Cambiſt.

RUBRIC, RUBRICA, in the *Canon Law*, denotes a title, or article, in certain ancient law-books; thus called, becauſe written, as the titles of the chapters in our ancient Bibles are, in red letters.

RUBRICS alſo denote the rules and directions given in the Liturgy; for the order and manner in which the ſeveral parts of the office are to be performed.

They are called *rubrics* from the Latin *ruber*, *red*; becauſe formerly printed in red ink, to diſtinguiſh them from the reſt of the office, which was in black; as they ſtill are in the Roman miſſals, &c.

The great rubric for the celebration of Eaſter, preſcribed by the Nicene council, is to this purpoſe: Eaſter-day to be the Sunday which falls upon, or next after, the firſt full moon which immediately ſucceeds the vernal equinox. Dr. Wallis has a particular diſcourſe on the ancient rubrics for the feaſt of Eaſter, in the Philoſophical Tranſactions.

RUBRICA. See REDDLE.

RUBUS, in *Botany*, an ancient Latin word, certainly of the ſame origin as *ruber*, which appears to be the Celtic *rub*, red. (See RHUS, ROSA, and RUBIA.) The red hue, more or leſs prevalent, in various parts of the different kinds of Bramble, of which the preſent genus conſiſts, readily accounts for the application of the above name.—Linn. Gen. 254. Schreb. 342. Willd. Sp. Pl. v. 2. 1080. Mart. Mill. Dict. v. 4. Sm. Fl. Brit. 541. Prodr. Fl. Græc. Sibth. v. 1. 349. Ait. Hort. Kew. v. 3. 267. Purſh 346. Juſſ. 338. Tourn. t. 385. Lamarck Illuſtr. t. 441. Gærtn. t. 73.—Claſs and order, *Icoſandria Polygynia*. Nat. Ord. *Senticoſæ*, Linn. *Roſaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, flattiſh, in five oblong, ſpreading, ſimple, permanent ſegments. *Cor.* Petals five, roundiſh or oblong, ſomewhat ſpreading, inſerted into the calyx, and uſually about the length of its ſegments. *Stam.* Filaments numerous, ſhorter than the corolla, inſerted into the calyx; anthers roundiſh, compreſſed. *Piſt.* Germens numerous, altogether ſuperior; ſtyles ſmall, capillary, one ſpringing from the ſide of each germen; ſtigmas ſimple, permanent. *Peric.* Berry compound, conſiſting of ſeveral roundiſh pulpy grains, each of one cell, collected into a convex head, hollow underneath, inſerted upon a conical ſpongy permanent receptacle, and at length deciduous. *Seeds* ſolitary, oblong, compreſſed.

Obſ. The ſeparate juicy grains, which compoſe the general berry, are uſually ſo attached to each other, that they cannot be diſunited without tearing. In *R. ſaxatilis* they are diſtinct. *R. Chamæmorus* is not, as Linnæus firſt thought, dioecious, but monoecious; Dr. Solander having obſerved that the male and female flowers grow from one root, though on ſeparate ſtems. Each flower of this ſpecies has indeed both ſtamens and piſtils, though, in one or other flower, one part is imperfect.

Eſſ. Ch. Calyx in five ſimple ſegments. Petals five. Berry ſuperior, compoſed of ſingle-ſeeded grains, deciduous. Receptacle permanent.

This numerous genus partakes conſiderably of the beauty and elegance prevalent throughout the whole order of *Roſaceæ*, and is beſides valuable, in many inſtances, for its wholeſome and highly grateful fruit. The *ſtem* is moſt generally ſhrubby; ſometimes herbaceous; more frequently trailing than erect; in ſome of the ſhrubby kinds biennial only, not perennial. Both *ſtem*, *ſtalks*, and even the ribs of the *leaflets*, in many of the ſhrubby ſpecies, are prickly. *Leaves* either lobed, digitate, pedate, or pinnate. *Flowers* either ſolitary, racemoſe, or panicled, red or white. *Fruit* black, blueiſh, red, or yellowiſh, often highly fragrant. Moſt of the ſpecies grow in cool climates, or mountainous ſituations. We have ſeveral to add to Willdenow's, which amount to 31 in number.

Section 1. *Stem woody.*

1. R. *roſæfolius*. Roſe-leaved Bramble.—Leaves pinnate, of five, or three, doubly ſerrated leaflets; green, and ſlightly downy, on both ſides. Stem and footſtalks prickly. Flowers ſolitary.—Sm. Plant. Ic. faſc. 3. t. 60. Willd. n. 1. Gathered by Commerſon in the iſle of Mauritius, and communicated by Thouin to the younger Linnæus. We have alſo a fine ſpecimen from ſir Joſeph Banks, without any account of its native country. The *ſtem* is ſhrubby, round, finely downy like the whole of the herbage, but no part is hoary or white. *Prickles* ſomewhat hooked, yellowiſh, rather ſmall, copiouſly ſcattered over the ſtem and leaf-ſtalks. *Leaflets* uſually five, ovato-lanceolate, taper-pointed, deeply, ſharply, and doubly ſerrated; beſprinkled with minute reſinous particles, and of the ſame colour, on both ſides. *Stipulas* in pairs on the baſe of each footſtalk, linear-lanceolate, narrow and acute. *Flowers* ſolitary, ſtalked, either axillary, or oppoſite to the leaves, one of them terminal. Segments of the *calyx* ovate, taper-pointed, longer than the *petals*, denſely downy, eſpecially on the inner ſide. We know nothing of the *fruit*. The minute globular reſinous particles, ſcattered, more or leſs copiouſly, over both ſides of the *leaves*, ſeem peculiar to this ſpecies.

2. R. *fraxinifolius*. Aſh-leaved Indian Bramble. Poiret in Lamarck Dict. v. 6. 242. (R. moluccus parvifolius; Rumph. Amboin. v. 5. 88. t. 47. f. 1.)—Leaves pinnate, of ſeven, or five, doubly ſerrated, parallel-veined leaflets; quite ſmooth on both ſides. Footſtalks prickly. Panicles terminal, ſmooth, widely ſpreading.—Gathered by Commerſon in Java. If we are right in the ſynonym of Rumphius, about which there ſeems little doubt, and which is certainly miſapplied by Linnæus to his *R. parvifolius*, this ſpecies is common in Amboyna, growing in low ſituations near rivers. He ſays the *fruit* is red, but watery and inſipid. The whole plant in our ſpecimen is, except the downy inſide of the *calyx*, quite ſmooth, and of ſo ſtriking an appearance with its large aſh-like *leaves*, marked with numerous, ſtraight, parallel veins, that we cannot but wonder at its having ſo generally eſcaped the notice of Indian botaniſts. The *ſtem* is round, ſlightly, or not at all, prickly; though the *footſtalks*, and now and then the rib of a leaflet, bear ſmall hooked prickles. *Stipulas* almoſt ſetaceous. *Panicles* terminal, many-flowered, repeatedly compound, widely ſpreading; their ſtalks ſlender, unarmed, with ſeveral, ſcattered, oblong, ſmooth *bracteas*, toothed at the end. Segments of the *calyx* broadly ovate, with a long ſlender

ſlender point; partly downy on the outſide, and denſely ſo within. *Petals* not obſerved. *Fruit* of very numerous ſmall grains. *Seeds* curiouſly reticulated or corrugated. Rumphius's figure is about half the ſize of nature.

3. R. *pinnatus*. Wing-leaved Cape Bramble. Willd. n. 2. Ait. n. 10.—" Leaves pinnate, of five or three rugoſe leaflets; ſmooth on both ſides. Stem, footſtalks, and flower-ſtalks prickly. Cluſter terminal."—Native country unknown. *Willd.* Cape of Good Hope, and iſland of St. Helena; from whence it was introduced by ſir Joſeph Banks in 1789. *Aiton.* A ſhrubby green-houſe plant, flowering in June and July. *Branches* villous, green, with hooked prickles. *Leaflets* ovato-lanceolate, green, ſharply and doubly ſerrated; their mid-ribs, like the *footſtalk*, prickly beneath. *Cluſter* ſimple. *Flower-ſtalks* villous, very prickly. *Calyx* villous, longer than the *petals*. *Willd.* We preſume the above authors both mean the ſame plant, though Willdenow is not cited by Aiton, and we have no ſpecimens from either. We ſhould ſuſpect that the above-mentioned ſpecimen of *roſæfolius*, communicated by ſir Joſeph Banks, might be Mr. Aiton's *pinnatus*, were not the latter, as well as Willdenow's, ſaid to have ſmooth leaves.

4. R. *auſtralis*. New Zealand Bramble. Forſt. Prodr. 40. Willd. n. 3.—" Shrubby. Flowers dioecious. Leaves pinnate, of five, or three, leaflets. Stem and footſtalks prickly. Cluſters ſimple, axillary."—Native of New Zealand. *Forſter.*

5. R. *rigidus*. Rigid Cape Bramble.—Leaves pinnate, of five, or three, partial-ſtalked leaflets; ſmooth above; very downy beneath. Stem downy, minutely prickly. Cluſter terminal, twice compound.—Native of the Cape of Good Hope. We know it only by an unnamed ſpecimen, from thence, in the Linnæan herbarium. The *ſtem*, *footſtalks*, *flower-ſtalks*, *calyx*, and under ſide of the *leaves*, are all very denſely clothed with fine, ſhort, velvet-like down. *Leaflets* uſually five, ovate, doubly and unequally ſerrated near an inch and a half long, each on a ſhort, thick, partial ſtalk; the upper ſide green, ſmooth, ſtriated with ſunk ribs and veins, which project on the downy under ſide. *Stipulas* lanceolate, downy. *Flowers* numerous, rather ſmall. *Calyx* with ſhort thick points. The *petals* ſeem to be awl-ſhaped, and very ſmall. We are unacquainted with the *fruit*.

6. R. *laſiocarpus*. Woolly-berried Bramble.—Leaves pinnate, of ſeven, or five, leaflets; ſmooth above; white and very downy beneath. Stem nearly ſmooth, with curved prickles. Cluſter terminal, ſimple. Fruit downy.—Native of Myſore and the neighbouring hills. Sent by the Rev. Dr. Rottler, under the name of *Rubus indicus*. It appears to be no where deſcribed. At firſt ſight the plant reſembles our Raſpberry, but the *leaflets* are generally ſeven, the odd one large, often three-lobed; their upper ſurface ſtrongly ſtriated with veins, which are occaſionally hairy; the under very white and woolly, with yellowiſh, hairy ribs and veins. *Stipulas* awl-ſhaped, hairy. *Prickles* of the ſtem numerous, ſtrong, a little curved. *Cluſter* of few *flowers*, downy and prickly. *Fruit* clothed with denſe, white, woolly down. *Seeds* reticulated. Poſſibly *R. apetalus* of Poiret, Lamarck Dict. v. 6. 242, may be allied to this.

7. R. *idæus*. Raſpberry. Linn. Sp. Pl. 706. Willd. n. 4. Ait. n. 1. Purſh n. 1. Fl. Brit. n. 1. Engl. Bot. t. 2442. Woodv. Med. Bot. t. 138. Fl. Dan. t. 788. Ger. Em. 1272. Math. Valgr. v. 2. 357.—Leaves pinnate, of five, or three, ovate, rather angular leaflets, very downy beneath. Footſtalks channelled. Stem with briſtly prickles. Cluſters terminal, lax, ſomewhat compound. Native of mountainous or ſtony woods and thickets throughout Europe. Mr. Purſh ſays it occurs alſo in hedge-rows, from Canada to Pennſylvania; and Dr. Buchanan gathered what we cannot conſider as a diſtinct ſpecies, in the woods of Nepaul. It flowers every where in April, May, or June, ripening fruit about ſix weeks after. The *ſtems* are erect, ſhrubby, though only biennial, with creeping perennial *roots*. They are pale brown, uſually rough with ſmall briſtles rather than thorns; ſometimes they are quite ſmooth. Lower *leaves* pinnate, with two pair of leaflets and an odd one; upper ternate only; leaflets broad-ovate, partly rhomboid, unequally and ſharply ſerrated and cut, more or leſs pointed; greyiſh-green, and nearly ſmooth, above; white with denſe cottony down beneath, like the *calyx* and *flower-ſtalks*. *Footſtalks* rather downy, with a ſtrong furrow along their upper ſide, prickly, like the *flower-ſtalks*. *Stipulas* ſetaceous. *Cluſters* terminal, for the moſt part ſimple, lax, rather drooping. *Flowers* pendulous. *Calyx* with taper points, variable in length. *Petals* erect, obovate, white, ſmall. *Fruit* crimſon, of numerous pulpy grains, beſet with the permanent ſtyles. Its rich ſweetneſs, and highly perfumed flavour, render this fruit generally agreeable, both recent and preſerved. Raſpberry jam is an acceptable preſent, even in India. There are ſeveral cultivated varieties, differing in ſize and luxuriance, as well as the colour of the berries, which are ſometimes of an amber hue. Mr. Purſh ſays there are a number of wild varieties in America; a circumſtance which we have not much remarked in Europe. There is uſually a ſecond crop of the fruit in gardens. The flavour of the wild kind is thought ſuperior to the cultivated; at leaſt in Wales.

8. R. *ſubarectus*. Red-fruited Bramble. Engl. Bot. t. 2572. Ait. Epit. Hort. Kew. 373. (R. neſſenſis; Hall in Tr. of R. Soc. Edinb. v. 3. 20.)—Leaves pinnate, of ſeven, five, or three ovate leaflets; hairy beneath. Footſtalks channelled. Stems aſcending. Prickles minute, nearly ſtraight. Flowers axillary and terminal, ſomewhat panicled.—This ſpecies, firſt obſerved in Scotland near Loch Neſs, has ſince been found in other parts of that kingdom by Mr. George Anderſon, F.L.S. as well as in Wales and Yorkſhire. It is often intermixed with *corylifolius*, hereafter deſcribed, which it reſembles in habit, eſpecially in the pubeſcence, ſize, and hue of the foliage, though more naturally allied to *R. idæus*. The *ſtems* are biennial, not quite upright, brittle, reddiſh, nearly round, with ſpreading branches. *Prickles* ſcattered, ſmall. *Leaves* light green on both ſides; ſmooth above. *Panicles* racemoſe, rather lax, terminal and axillary. *Petals* larger and more ſpreading than in the laſt. *Calyx* finally reflexed. *Fruit* deep red, agreeable in flavour, later than the Raſpberry, and perhaps for that reaſon, as Mr. Anderſon ſuggeſts, not unworthy of cultivation.

9. R. *biflorus*. Two-flowered Bramble. Buch. MSS.—Leaves pinnate, of five or three acute jagged leaflets; hairy above; white and downy beneath: the odd one three-lobed. Stem and footſtalks prickly. Flower-ſtalks downy, terminal, in pairs, ſingle-flowered.—Native of wet ſituations, about banks of rivers in Upper Nepaul. Gathered by Dr. Buchanan at Chitlong, April 13, 1802. The *ſtems* are partly procumbent, branched, angular, a little zigzag, armed with ſcattered, ſtraight prickles. *Leaves* on long, hairy, prickly ſtalks; their leaflets deeply ſerrated and jagged, uſually five, the terminal one nearly ſeſſile, more or leſs diſtinctly three-lobed, or even pinnatifid, though ſometimes confluent with the two next, ſo as to make with them one deeply three-cleft leaflet; they are all very hairy, though green above; ſnow-white, with greeniſh hairy veins, beneath.

beneath. *Stipulas* linear. *Flowers* in pairs at the end of each branch, drooping. Segments of the *calyx* broad-ovate, very downy, with ſhort naked tips. *Petals* broad and roundiſh, as long as the calyx. Of the *fruit* we are ignorant.

10. R. *ſtrigoſus*. Rough-ſtalked American Bramble. Michaux Boreali-Amer. v. 1. 297. Purſh n. 3. (R. pen-ſylvanicus; Lamarck Dict. v. 6. 246.)—"Leaves pinnate, of five, or three, oval, pointed leaflets; downy and white beneath. Stem erect, very briſtly, without thorns. Flowers axillary, ſolitary; their ſtalks and calyx hiſpid."—Native of the mountains from Canada to Virginia, flowering in June and July; berries very agreeably flavoured. *Purſh*. The *branches*, *ſtalks*, and ribs of the *leaves*, *flower-ſtalks* and *calyx*, are all very hiſpid, but not prickly. *Michaux*.

11. R. *Commerſonii*. Commerſonian Bramble. Poiret in Lamarck Dict. v. 6. 240.—"Leaves pinnate, of ſeven, or five, leaflets, ſmooth on both ſides. Stem prickly. Flowers terminal or axillary, nearly ſolitary. Calyx with long points."—Found by Commerſon in ſhady mountainous parts of the iſland of Java. Poiret ſays it has ſome relationſhip to *R. idæus*, but the *leaflets* are ſmaller, ſmooth on both ſides, and the *flowers* larger. *Prickles* nearly ſtraight, ſcattered. *Leaflets* narrow, cut and ſerrated; the odd one ſometimes lobed. *Footſtalks* cylindrical, prickly. *Petals* white, roundiſh, ſcarcely longer than the calyx. *Fruit* reddiſh, the ſize of raſpberries, but with a much leſs agreeable taſte and ſmell. We have ſeen no ſpecimen.

12. R. *occidentalis*. Virginian Raſpberry. Linn. Sp. Pl. 706. Willd. n. 5. Ait. n. 2. Purſh n. 6. (R. idæus, fructu nigro, virginianus; Dill. Elth. 327. t. 247.)—Leaves ternate, taper-pointed, doubly ſerrated; downy and white beneath. Footſtalks nearly cylindrical; prickly and glaucous, like the ſtem. Prickles hooked. Cluſters terminal, very prickly.—Native of rocky mountainous ſituations, from Canada to Carolina, flowering in May and June. Cultivated in Chelſea garden, before the year 1696, according to Plukenet. The *ſtem* is round, conſpicuous for its peculiarly fine glaucous bloom, even in a dried ſtate. *Leaves* all ternate, the ſide leaflets often furniſhed with a lateral notch, or lobe. *Prickles* on the *flower-ſtalks* remarkably numerous, and hooked. *Petals* ſmall, white, commonly emarginate. *Fruit* black, ſometimes red, ſweetiſh, but not highly flavoured. *Seeds* wrinkled.

13. R. *triphyllus*. Three-leaved Japaneſe Bramble. Thunb. Jap. 215. Willd. n. 6.—Leaves ternate, rounded, cut and coarſely ſerrated; entire at the baſe; downy and white beneath. Branches, footſtalks, and flower-ſtalks hairy and prickly. Flowers ſomewhat racemoſe.—Gathered by Thunberg in Japan. *Stem* round, ſmooth, purpliſh, with ſlender, ſpreading, wavy *branches*, which are hairy and minutely prickly. *Leaflets* rounded, broad and abrupt, nearly ſmooth above, of a thin and pliant ſubſtance. *Flower-ſtalks* very ſhaggy juſt under the *calyx*, which is downy and white, with long taper points. *Petals* erect, obovate, crenate, with long claws. This ſpecies is in reality more akin to our Raſpberry than any other, though perhaps ſufficiently diſtinct. We have no knowledge of the fruit.

14. R. *tomentoſus*. Velvet-leaved Bramble. Willd. n. 7. Sm. Prodr. Fl. Græc. Sibth. v. 1. 349. (R. etneus, trifolius rectus candicans ac piloſus; Cupan. Panphyt. v. 1. t. 149.)—Leaves ternate, or quinate, obovate, unequally ſerrated, all over hoary, very ſoft and downy; paler beneath. Stem and footſtalks with hooked prickles. Panicle downy, many-flowered. Bracteas linear-lanceolate, ſometimes thr e-cleft.—Native of Germany, Switzerland, the neighbourhood of Conſtantinople, and the country about mount Etna. We know no figure of this ſpecies, except in the very rare old work of Cupani, where it is extremely well repreſented, nor does any ſyſtematic author but Willdenow deſcribe it. Botaniſts have moſt unaccountably confounded it with the common *R. fruticoſus*, from which, and every other known ſpecies, it is diſtinguiſhed by the peculiar and uniform ſoft pubeſcence of its *leaves*, equalling that of the Marſh Mallow. The *leaflets* vary in ſhape, but are always contracted towards their baſe. They are uſually three, the lateral ones ſometimes lobed at the lower edge. We have a ſpecimen with five diſtinct leaflets, the lowermoſt pair ſmalleſt, growing out of the partial footſtalks of the next. The *ſtem* is angular, downy, with many uniform, rather ſmall, ſtrongly hooked prickles, ſuch as occur alſo on the footſtalks. *Flowers* large and abundant, with obovate, white, ſpreading *petals*, twice as long as the *calyx*, whoſe ſegments are ovate, finely downy, with ſmall points. The *bracteas* are more pale and membranous than in *fruticoſus*. *Stipulas* linear, very narrow, hairy. This ſpecies is unknown in England, either wild or cultivated.

15. R. *cuneifolius*. Wedge-leaved American Bramble. Purſh n. 5. (R. parvifolius; Walt. Carol. 149.)—"Leaves digitate, of three or five obovate-wedge-ſhaped leaflets; unequally toothed upwards, plaited, entire at the margin, revolute; downy beneath. Stem, footſtalks, and flower-ſtalks downy, with ſcattered recurved prickles. Cluſters terminal, panicled; the partial flower-ſtalks divaricated, and almoſt naked."—In ſandy fields and woods, from New Jerſey to Carolina, flowering in June and July. A ſtraggling briar, of a grey aſpect; the *berries* hard and dry. *Purſh*. Not having ſeen this plant, we have given, as nearly as poſſible, a tranſlation of Mr. Purſh's ſpecific character, though we do not quite underſtand what regards the *leaves*.

16. R. *ellipticus*. Oval-leaved Indian Bramble.—Leaves ternate, elliptical, finely ſerrated; downy and hoary beneath: the lower ones ſimple, ſomewhat three-lobed. Stem and footſtalks hiſpid, downy, and prickly. Panicle denſe, hairy.—Gathered by Dr. Buchanan, in January and April 1802, about the ſtony banks of rivulets in Nepaul. This *ſhrub* is ten or twelve feet high, with long, climbing, angular, zigzag, leafy *branches*, not only clothed with ſoft down, and copious rigid prominent briſtles, but alſo bearing ſcattered, hooked, ſtrong, though not large, prickles. The *footſtalks* are ſimilarly furniſhed. *Leaflets* much reſembling thoſe of a common Provins Roſe in ſhape and ſerratures, but rather larger, and only three to each leaf; ſmooth above; their under ſurface grey or whitiſh with fine down; the veins parallel, ſtraight, ſtrongly marked. *Stipulas* ſetaceous. The lower *leaves*, and ſmall axillary ones, are ſimple, occaſionally three-lobed. *Panicle* terminal, denſe, ſhorter than the *leaves*, compound. *Flowers* not very numerous. *Calyx* downy. *Petals* white, longer than the calyx. *Berries* yellow, pleaſantly flavoured. *Seeds* wrinkled, numerous.

17. R. *hiſpidus*. Briſtly American Bramble. Linn. Sp. Pl. 706. Willd. n. 8. Ait. n. 3. Purſh n. 7.—Leaves ternate, ſtrongly ſerrated, ſmooth on both ſides. Stems trailing, round, hiſpid as well as the footſtalks. Cluſters terminal, ſlender, ſomewhat hiſpid, of few flowers.—Gathered in Canada by Kalm, whoſe ſpecimen is before us. The *ſtems* are very long and trailing, clothed with copious, brown, reflexed briſtles, without prickles, as are alſo the *footſtalks*. *Leaflets* of a ſhining green; the middle one obovate; the others dilated, and often lobed at the outer edge; all acute, unequally ſerrated. *Flowers* few, with linear,

linear, ſometimes three-cleft, *bracteas*. *Berries* of few grains, with large wrinkled *ſeeds*. Perhaps this ought to be arranged among the herbaceous ſpecies, near *ſaxatilis* hereafter deſcribed.

18. R. *trivialis*. Common American Dewberry. Michaux Boreali-Amer. v. 1. 296. Purſh n. 8.—"Leaves ternate, or quinate, oblong-oval, acute, unequally ſerrated, rather downy. Stems trailing. Flower-ſtalks ſolitary, elongated, rough, like the footſtalks, with recurved prickly briſtles. Stipulas awl-ſhaped. Petals obovate, thrice the length of the calyx."—Common in old fields, from New England to Carolina, bloſſoming in May and June. *Flowers* large. *Berries* black, large, very agreeably flavoured, known by the name of Dewberries. *Purſh*.

19. R. *flagellaris*. Long Trailing American Bramble. "Willd. Enum. 549." Purſh n. 9. (R. trivialis; Ait. n. 7. *Purſh*.)—Leaves ternate, unequally ſerrated, ſmooth on both ſides. Stems trailing, round, beſet, like the footſtalks, with recurved prickles. Cluſters terminal, lax, ſlender, downy, of few flowers.—Native of fields and ſandy woods, from Virginia to Carolina, flowering in June and July. *Purſh*. Very nearly akin to *R. hiſpidus*, n. 17, but the *leaves* are ſmaller, and the *ſtem* is rather prickly than briſtly. The hooked prickles on the *footſtalks* are few, and widely ſcattered. *Petals* more orbicular than in the laſt; whether they accord with thoſe of *hiſpidus*, we have not materials to determine; but we are greatly inclined to think the preſent is but a variety of that ſpecies.

20. R. *inermis*. Smooth American Bramble. "Willd. Enum. 548." Purſh n. 10. ("R. hiſpidus; Walt. Carol. 149?")—"Leaves ternate, ovate, acute, unequally ſerrated; downy beneath; the lateral leaflets ſomewhat cut. Stem, footſtalks, and flower-ſtalks unarmed. Stipulas narrow-awl-ſhaped."—Native of Pennſylvania. We have ſeen no ſpecimen of this ſpecies, nor did Mr. Purſh himſelf meet with it in America.

21. R. *parvifolius*. Small-leaved Indian Bramble. Linn. Sp. Pl. 707. Willd. n. 9; excluding the ſynonym of Rumphius, which has no affinity to this ſpecies, but rather belongs to our *fraxinifolius*, n. 2.—Leaves ternate, wrinkled, rounded, cut, and crenate; ſomewhat hairy above; downy and ſnow-white beneath. Branches and footſtalks downy, with ſhort hooked prickles. Stem round. Panicles downy and hairy, of few flowers.—Gathered by Oſbeck in China. A miſerable ſpecimen from him, without flowers, exiſts in the Linnæan herbarium; but we have very complete ones collected by Dr. Buchanan, at Chitlong in Nepaul, April 10, 1802. Their firſt appearance accords very much indeed with our Common Raſpberry, but the *leaflets* are all ternate, rounded, not pointed, crenate rather than ſerrated, as well as more wrinkled; and their upper ſurface, though green, is clothed with extremely ſoft hairs, feeling like velvet. The *flowers*, though few together, are panicled rather than ſimply racemoſe; their very woolly *calyx* is deſtitute of long points; and their *ſtalks* are hairy as well as woolly. We have no account of the *fruit*. The ſhort, but ſtrong and hooked, *prickles* moreover afford an eſſential diſtinction between this ſpecies and *R. idæus*.

22. R. *ſanctus*. Bramble of the Holy Land. Schreb. Dec. 15. t. 8. Willd. n. 10. (R. creticus triphyllus, flore parvo; Tourn. Cor. 43. Pococke's Trav. v. 2. pt. 2. 190.)—Leaves ternate, or ſimple, downy and white beneath. Branches and footſtalks downy, with hooked prickles. Stem angular. Panicles downy, many-flowered. Native of Crete and Paleſtine. This has a general reſemblance to our Britiſh *R. fruticoſus*, but has ſmaller, more rounded, and fewer *leaflets*. The *flowers*, and whole plant, are alſo of ſmaller dimenſions. We do not however profeſs to be well acquainted with the limits of theſe two ſpecies, nor has the preſent one been properly inveſtigated.

23. R. *jamaicenſis*. Jamaica Bramble. Linn. Mant. 75. Willd. n. 11. Swartz Obſ. 205. (R. n. 1; Browne Jam. 242. R. foliis longioribus, ſubtùs molli lanugine obductis et incanis, flore et fructu minoribus; Sloane Jam. v. 2. 109. t. 213. f. 1.)—Leaves ternate, or pedato-quinate, pointed, ſharply ſerrated; white and finely downy beneath. Branches, footſtalks, and flower-ſtalks downy, with hooked prickles. Panicles lax.—Native of Jamaica; frequent in the mountains of St. Mary's, and thoſe beyond mount *Diable*, towards St. Ann's, but ſeldom ſeen in any other part of the iſland. *Browne*. Sloane juſtly remarks, that any arguments in favour of the coldneſs of the air in parts of Jamaica, or Hiſpaniola, where this bramble occurs, prove nothing, becauſe it is a different ſpecies from our European one. Poſſibly however they may be more nearly related than he was aware. The pubeſcence of the back of the *leaves*, though very fine, ſoft, and white, is often approached in thoſe particulars by that of our *fruticoſus*, even on the ſame ſtem, with leaves that are almoſt green underneath. The inſertion of the ſtalks of the fourth and fifth *leaflets*, when preſent, upon thoſe of the next pair, making a pedate leaf, is characteriſtic of the Jamaica Bramble, but even this is occaſionally to be detected in our's. The *flower* and *fruit* are ſaid to be ſmaller than in *fruticoſus*. In the Linnæan ſpecimen the *flowers* are double, quite as large as thoſe of the latter. The ribs of the *leaflets* are prickly in both; nor are the ſerratures at all more deep in one than the other.

24. R. *roſeus*. Red-flowered Peruvian Bramble. Poiret in Lamarck Dict. v. 6. 245.—Leaves ternate, or ſimple, ſmooth. Stipulas oval, obtuſe. Flowers axillary, nearly ſolitary. Calyx ſmooth, ſlightly fringed. Stem, flower-ſtalks, footſtalks, and ribs of the leaves very prickly.—Gathered by Dombey in Peru. The *branches*, according to Poiret, are woody, ſtriated, ſmooth, zigzag, prickly. *Leaves* very large, moſtly ternate, oval or lanceolate, unequal, ſmooth on both ſides; a little paler beneath. The terminal *leaflet* is four or five inches long, and three broad. *Stipulas* large, almoſt half embracing the ſtem. *Flower-ſtalks* long, plentifully furniſhed with ſtrong, reddiſh, recurved prickles. *Calyx* large, with bluntly-pointed ſegments, a little fringed at the margin. *Petals* roſe-coloured, roundiſh, ſhorter than the calyx, furniſhed with claws. We have ſeen no ſpecimen, but the above deſcription leaves no doubt of this being a moſt diſtinct ſpecies.

25. R. *urticæfolius*. Nettle-leaved Peruvian Bramble. Poiret in Lamarck Dict. v. 6. 246.—Leaves ternate, or ſimple, ovate, ſharply ſerrated; ſilky beneath. Stem, flower-ſtalks, footſtalks, and ribs of the leaves denſely hiſpid and ſomewhat prickly. Panicles compound, many-flowered. Calyx ſilky.—Gathered at Lima by Dombey, from whom we have a ſpecimen. This is ſaid to be of very lofty growth. The *branches* are angular, remarkable, like all the *ſtalks*, for a denſe ruſty coating, reſembling coarſe pluſh, among which ſome few ſhort hooked prickles are interſperſed. The *leaflets* are large, denſely, ſharply, and rather unequally ſerrated; in form ovate, or ſomewhat elliptical; their upper ſide green, minutely downy; the under very denſely covered with ſhining ſilky pubeſcence, which is ſaid by Dombey to be of a ſilvery whiteneſs when freſh, though rather tawny in our ſpecimen. *Stipulas* almoſt ſetaceous. *Panicle* large, denſe, many-flowered. *Bracteas* ovate, ſilky externally, as well as the *calyx*. *Petals* minute, white.

white. *Fruit* black, of numerous grains, with reticulated *feeds*.

Mutis ſent Linnæus a ſpecimen from Santa Fé, which agrees in every eſſential particular with that of Dombey, except the *leaflets* being ſmaller, and in ſome inſtances five in number.—The ſpecific name does not appear to us very appropriate; *holoſericeus* would have been better, for we have met with nothing of ſo ſilky an aſpect in the genus beſides.

26. R. *cæſius*. Common Dew-berry. Linn. Sp. Pl. 706. Willd. n. 12. Ait. n. 4. Fl. Brit. n. 2. Engl. Bot. t. 826. Bulliard t. 381. (R. minor, fructu cæruleo; Bauh. Hiſt. v. 2. 59.)—Leaves ternate, hairy beneath; the lateral leaflets lobed externally. Stem prickly, proſtrate, glaucous. Calyx embracing the fruit.—Native of Europe, in groves and buſhy places; not rare in England; about ſhady hedges and the borders of fields, flowering in June and July, bearing fruit throughout Auguſt and September. The ſtems are round, weak and trailing, beſet with ſlender ſlightly curved prickles, and conſpicuous for a vivid glaucous bloom, eaſily rubbed off. Though woody, they are only annual, or at moſt biennial. *Leaflets* three, of a broad, rounded, ovate figure, acute, ſharply and doubly ſerrated, light green; downy and a little paler, but not hoary, beneath; the lateral ones ſeſſile, generally lobed on the outſide. *Footſtalks* prickly and downy. *Stipulas* lanceolate. *Flowers* few together, in ſlender, terminal or axillary, prickly panicles. Segments of the *calyx* ovate, or obovate, long-pointed, downy, ſpreading the *flower*, cloſed about the *fruit*, which laſt character is neglected in Bulliard's, otherwiſe characteriſtic, plate. *Petals* obovate, longer than the calyx, ſpreading, waved and crumpled, white, rarely reddiſh. *Fruit* of few and rather large grains, black with a bright blue tinge, like a plum; its flavour very agreeably acid, though not perfumed, and deſtitute of the mawkiſh flavour of the common Black-berry.

27. R. *corylifolius*. Hazel-leaved Bramble. Fl. Brit. n. 3. Engl. Bot. t. 827. Ait. n. 5. (R. major, fructu nigro; Schmidel Ic. t. 2. R. montanus repens, ſarmentis longiſſimis et rotundis, ſpinis tenuiſſimis exaſperatis, amplo coryli folio, flore albo, fructu nigro craſſiore; Mich. Hort. Florent. 82. Till. Pis. 149?)—Leaves quinate, or ternate, rounded, hairy beneath; the lateral leaflets ſeſſile. Prickles ſtraightiſh. Calyx of the fruit reflexed.—Native of England, Germany, and probably of Italy. We cannot diſcover that Dr. Sibthorp met with this ſpecies in Greece. Dillenius ſeems to hint at it in his edition of Ray's *Synopſis*, 467, as differing from the common bramble, in having "earlier, larger, and white bloſſoms," which is correctly true. Mr. Crowe, ever attentive to the uſeful parts of botany, was led to diſtinguiſh our *corylifolius*, by obſerving that thatchers rejected the *ſtems*, on account of brittleneſs, and ſelected the true *fruticoſus* to bind down their thatch, that ſpecies being truly ſhrubby and perennial; while the *ſtems* of the preſent are, like thoſe of the Raſpberry, biennial, and far more brittle than *fruticoſus*. They are moreover roundiſh, all the prickles nearly ſtraight, not hooked. The *leaflets* are large, pliant, doubly ſerrated, always of a bright green on both ſides; hairy, but never white or cottony, beneath. Some of them ſo exactly reſemble the leaves of a hazel, that we have puzzled good botaniſts to diſtinguiſh one from the other. The *flowers* appear early in July, and are white, forming an oblong cylindrical *panicle*. *Fruit* earlier, of a browner black, of rather fewer grains, and more gratefully acid than in *fruticoſus*, being intermediate, as it were, between the Dew-berry and Common Black-berry. Its reflexed *calyx* diſtinguiſhes it readily from the former. Our *corylifolius* is ſuppoſed to be the *fruticoſus* of Hoffmann's German Flora, and perhaps of many other botaniſts. Willdenow has it not.

28. R. *fruticoſus*. Common Bramble, or Black-berry. Linn. Sp. Pl. 707. Willd. n. 13. Ait. n. 6. Fl. Brit. n. 4. Engl. Bot. t. 715. Mill. Illuſtr. t. 45. (R. major, fructu nigro; Bauh. Hiſt. v. 2. 57. Rubus; Ger. Em. 1272. Camer. Epit. 751.)—Leaves moſtly quinate, downy beneath; leaflets ſtalked. Stem angular, beſet, like the footſtalks and flower-ſtalks, with hooked prickles. Calyx of the fruit reflexed.—Common in hedges and thickets throughout Europe; flowering with us in July and Auguſt, and ripening fruit in September and October. Dr. Sibthorp found this ſpecies extremely abundant in Greece, and conceived it to be, as generally ſuppoſed, the true Βάτος, or Bramble, of Dioſcorides, the ſame name being given to it by the modern Greeks. The *ſtem* is truly ſhrubby and perennial, long and arching, purpliſh, ſtrongly angular, armed with very powerful hooked prickles, ſuch as occur, of a ſmaller ſize, on the ſtalks and ribs of the *leaves*, as well as on the *flower-ſtalks*. The *leaflets*, uſually five, are of a narrower, more oblong, and pointed form than the laſt; dark green above; very white and cottony beneath; though ſpecimens may occaſionally be found which have, on one and the ſame branch, ſuch white-backed leaves, with others that are pale green, or barely hoary. All the *leaflets* have commonly very conſiderable partial footſtalks, the outermoſt more or leſs combined with the next. The *flowers* in long, cylindrical, compound, denſe, and rigid panicles, are of an elegant bluſh or roſe-colour, ſeldom white. *Calyx* downy, moderately pointed, always reflexed both in flower and fruit. *Berry* of very numerous crowded grains, of a violet black when ripe, with a ſweet but mawkiſh taſte, acceptable only to children, whoſe

> "Pretty lips with black-berries,
> Are oft beſmeared and dyed."

There is a ſuppoſed variety of *R. fruticoſus* with jagged *leaves*, green beneath, and double white *flowers*.

29. R. *villoſus*. Hairy American Black-berry. Ait. n. 8. Willd. n. 14. Purſh n. 2.—Leaves quinate, or ternate, ovate-oblong, taper-pointed, ſharply ſerrated, finely hairy on both ſides. Stem and footſtalks hiſpid, and ſomewhat prickly. Cluſters ſimple, lax, hairy, and glandular; ſometimes leafy.—In old fields and commons, from New England to Carolina, frequent, flowering in June and July, and known by the name of Black-berries. *Purſh*. It appears to have been introduced into the gardens of England and France about the ſame time, near 40 years ago. In the latter it was called *R. vulpinus*. The *leaves* are rather large, properly conſiſting of five leaflets, green on both ſides, of which the terminal one has a very long partial ſtalk, and the two hindmoſt very ſhort ones, all the partial ſtalks radiating from one point. In ſome of the upper leaves the lateral leaflets are combined for almoſt their whole length; the next leaf to theſe is ternate; and the uppermoſt of all ſimple, diminiſhing into a leafy *bractea* under each *flower-ſtalk*, but ſtill accompanied by *ſtipulas*. The *flowers* are rather ſmall, and ſeem to be white.

30. R. *canadenſis*. Purple-ſtalked Canada Bramble. Linn. Sp. Pl. 707. Willd. n. 15. Purſh n. 4.—Leaves digitate, of from ten to five, or three, lanceolate, taper-pointed, ſharply ſerrated, partial-ſtalked leaflets, ſmooth on both ſides. Stem without prickles.—In rocky barren woods of Canada and New England, flowering in June and July.

The *ſtem* and old branches are purple. *Purſh.* This is very unlike all the reſt, having ſo many *leaflets*, all ſmooth on both ſides; paler beneath, where they are marked by ſtrong, prominent, parallel veins. *Footſtalks* channelled, purpliſh, nearly or quite ſmooth. *Stipulas* ſetaceous. *Flowers* in ſimple, denſe, terminal, downy *cluſters*, with ovate, pointed, ſmooth *bracteas*. *Calyx* of the fruit reflexed, ſlightly downy. *Berries* of a few large grains, with wrinkled *ſeeds*. Linnæus by miſtake cites the very ſame figure of Miller, which a few lines below, he properly refers to *R. odoratus*. This error Willdenow implicitly copies, without doubt or remark.

31. R. *ſpectabilis*. Elegant American Bramble. Purſh n. 11. t. 16.—Leaves ternate, ovate, acute, doubly ſerrated; downy beneath. Stem ſmooth and unarmed. Stalks ſingle-flowered, ſolitary. Petals ovate.—Gathered by Mr. Menzies on the north-weſt coaſt of America, and by governor Lewis on the banks of the Columbia; flowering in April and May. *Purſh.* An elegant *ſhrub*, four or five feet high. *Stem* ſmooth, deſtitute of prickles; the *branches* ſlender, round, very ſmooth. *Leaves* large, on downy, channelled, occaſionally ſomewhat prickly *ſtalks*, ternate; the lateral leaflets ſeſſile, oblique at the baſe, and lobed at the outer ſide. *Stipulas* awl-ſhaped. *Flowers* as large as in the following ſpecies, of a full and rich crimſon. Segments of the *calyx* downy, oblong, with ſhort points. *Petals* full twice as long as the calyx.

32. R. *odoratus*. Flowering Raſpberry. Linn. Sp. Pl. 707. Willd. n. 16. Ait. n. 9. Purſh n. 12. Curt. Mag. t. 323. Mill. Ic. t. 223. Cornut. Canad. 149. t. 150.—Leaves ſimple, with three or five acute lobes. Stem erect, hiſpid, unarmed. Corymbs terminal, ſpreading, hiſpid and glutinous. Petals nearly orbicular. Calyx with linear leafy points.—This, according to Mr. Purſh, is found in the woods of Canada, and on the Allegany mountains, from New York to Carolina, bloſſoming in June and July. In the gardens of Europe it has been cultivated for above a century, being, though a greenhouſe plant in Sweden, perfectly hardy with us, and generally admired in ſhrubberies for the beauty of its copious, large, crimſon *flowers*, with ſingularly white *ſtamens*; as well as for the cedar-like fragrance of its glutinous, rough, brown *flower-ſtalks* and *calyx*. The *ſtems* are a yard high, or more, biennial like *R. idæus*. *Leaves* ample, ſerrated, roughiſh, of a fine green. The *fruit* is ſcarcely ever formed in England. Miller deſcribes it as reddiſh, inſipid, of numerous ſmall grains. Mr. Purſh ſays "the *berries* are yellow, of a very fine flavour and large ſize, but ſcarcely ever produced in the gardens."

33. R. *alceæfolius*. Hollyhock-leaved Bramble. Poiret in Lamarck Dict. v. 6. 247.—Leaves ſimple, ſomewhat palmate, ſharply ſerrated, rugoſe; downy beneath. Cluſters axillary and terminal, prickly. Bracteas in many capillary ſegments. Calyx very hairy, inflated. Branches angular. Gathered by Commerſon in Java. The *ſtems* are about as tall as *R. idæus*, divided into very hairy, almoſt quadrangular, *branches*, furniſhed with reddiſh prickles. *Leaves* lobed, almoſt palmate, ſharply toothed, very broad; rough and wrinkled, but not hairy, on their upper ſurface; downy beneath, with yellowiſh reticulated veins. *Footſtalks*, as well as the principal ribs of each leaf, prickly. *Cluſters* ſhort, prickly, very hairy. *Bracteas* hairy, divided into numerous capillary ſegments. *Calyx* inflated, almoſt globular, divided half way down into five oval ſegments; white within; clothed externally with denſe, tawny, woolly hairs. *Petals* roundiſh, white, ſoon falling. We know nothing of this ſpecies but from Poiret's deſcription, which is very clear and well marked. We have altered his ſpecific character by that deſcription, for the purpoſe of contraſting its eſſential particulars with the following.

34. R. *rugoſus*. Rugged-leaved Bramble.—Leaves ſimple, heart-ſhaped, roundly lobed, crenate, rugoſe; downy beneath. Cluſters axillary and terminal. Bracteas ovate, cut. Calyx very hairy, branches round, prickly.—Gathered by Dr. Buchanan, July 18, 1802, at Sembu, in Upper Nepaul, where it is called, in the Parbuttie language, *Jogi Ayſhalu*, and by the Nawars *Cumbataſhi*. The *ſtem* is climbing, with round, downy *branches*, armed with ſmall, ſcattered, hooked prickles. *Leaves* as broad as the palm of the hand, heart-ſhaped, acute, with about five or ſeven rounded, ſharply crenate, rather ſhallow lobes; the upper ſide green, teſſellated with numerous wrinkles, rather hairy; the under white and downy, reticulated with innumerable veins. *Footſtalks* round, downy and prickly, as well as the principal ribs. *Stipulas* oblong, ovate, toothed, downy. *Cluſters* ſhort and denſe, chiefly axillary, not ſo long as the footſtalks, of few flowers; the terminal one larger. *Bracteas* broader than the ſtipulas, hairy, ſlightly cut or toothed. *Flowers* large. *Calyx* denſely covered with long ſilky hairs; its ſegments ovate, acute, recurved, downy within. *Petals* white, erect, almoſt as long as the calyx, ovate, obtuſe, finely toothed, furniſhed with claws. *Fruit* red. The round *branches*, leſs divided *leaves*, and more entire *bracteas*, ſeem to render this eſſentially diſtinct from Poiret's *alceæfolius*, to which it is evidently next akin.

35. R. *tiliaceus*. Lime-leaved Bramble.—Leaves heart-ſhaped, rounded, acute, ſharply crenate, very obſcurely lobed; white and downy beneath. Cluſters axillary. Segments of the calyx lanceolate, downy. Stem and footſtalks round, downy, ſlightly prickly. Gathered by Dr. Buchanan at the ſame place as the laſt, June 2, 1802. The *leaves* ſomewhat reſemble thoſe of the American *Tilia alba*. They are ſometimes nearly orbicular, but generally have indications of a ſlight lobe at each ſide; the upper ſurface is green, naked, and tolerably even; the under clothed with very ſoft fine white down. All the ſtalks, like the *calyx*, are more cottony than ſilky. The latter is deeply divided, ſpreading, or in ſome degree recurved. *Petals* ſmall, ſpatulate. *Seeds* wrinkled. The *cluſters* are more lax, and the *flowers* very much ſmaller than in *R. rugoſus*. Small diſperſed prickles may be felt, rather than ſeen, here and there on the downy *branches* and *footſtalks*. The *bracteas* are ſmall, woolly, deeply jagged.

36. R. *moluccanus*. Molucca Bramble. Linn. Sp. Pl. 707. Willd. 17. (R. moluccus latifolius; Rumph. Amboin. v. 5. 88. t. 47. f. 2.)—Leaves ſimple, heart-ſhaped, ſomewhat lobed, crenate; white and downy beneath. Cluſters axillary and terminal, aggregate. Bracteas deeply palmate. Calyx ſilky. Stem and footſtalks round, downy, prickly.—Native of Amboyna and the Molucca iſlands. Very nearly allied to the three preceding ſpecies, but the *leaves* are more elongated and acute than in any of them, with a pair of rounded, more or leſs diſtinct, lateral lobes towards the baſe. The deeply palmate, or digitate ſilky *bracteas* ſeem nearly to agree with thoſe of the *alceæfolius*. The *flowers* are plentiful. *Calyx* ſilky, with deep, lanceolate, taper-pointed ſegments. *Petals* obovate, crenate. *Fruit* red, eatable, but rather inſipid.

37. R. *microphyllus*. Small-leaved Japan Bramble. Linn. Suppl. 263. (R. palmatus; Thunb. Jap. 217. Ki Itzigo; Kæmpf. Amœn. Exot. 787.)—Leaves ſimple, heart-ſhaped, obtuſe, three-lobed, ſmooth. Stem and footſtalks prickly. Flowers ſolitary. Outſide of the calyx naked. Gathered by Thunberg, in hilly places, between Miaco and Quana in Japan,

Japan, flowering in April. The *ſtem* is ſhrubby, erect, two or three feet high. *Branches* round, wavy, ſmooth, purpliſh, beſet with prominent, rather aſcending, ſcattered prickles. *Leaves* ſeveral together from each lateral bud, on ſhortiſh, channelled, rather prickly *ſtalks*, heart-ſhaped, rounded, ſharply crenate, more or leſs three-lobed, ſtrongly veined and ſomewhat plaited, ſmooth on both ſides; paler beneath; their length about an inch. *Flowers* ſolitary from each bud, ſtalked. *Calyx* ſmooth and angular at the outſide; downy within; its ſegments lanceolate, acute. *Petals* twice as long as the calyx, obovate, white, wrinkled, with long claws. *Fruit* yellow, very well flavoured.

38. R. *inciſus*. Cut-leaved Japan Bramble. Thunb. Jap. 217. Willd. n. 19.—Leaves ſimple, heart-ſhaped, obtuſe, cut, ſmooth. Footſtalks with hooked prickles. Stem prickly. Flowers ſolitary. Outſide of the calyx naked.—Native of Japan. We have ſeen no ſpecimen. This ſpecies ſeems, from Thunberg's deſcription, very near the laſt, differing chiefly in the diviſions of the *leaves*.

We here find in Willdenow the *R. japonicus*, Linn. Mant. 245. Suppl. 263. This the Linnæan herbarium ſhews to be no other than *Corchorus japonicus* of Thunberg, a beautiful ſhrub, now becoming common in our gardens, where it is quite hardy. The double yellow *flowers* are much admired. Linnæus, by his ſpecimen, ſuppoſed the *petals* to be white. He knew nothing of the *fruit*, and judging by the habit, was not inexcuſable in referring the plant to *Rubus*. See CORCHORUS, n. 12.

39. R. *corchorifolius*. Corchorus-leaved Bramble. Linn. Suppl. 263. Willd. n. 21. (R. villoſus; Thunb, Jap. 218.)—Leaves ſimple, oblong-heart-ſhaped, pointed, ſerrated, ſomewhat hairy. Stem round, downy, prickly. Flowers ſolitary. Outſide of the calyx hairy. Native of Japan, between Miaco and Jedo, flowering in April. The *ſtem* is ſhrubby and upright, finely downy, with a few diſtant, ſlightly recurved, prickles. *Footſtalks* hairy and prickly. *Leaves* longer, and much more pointed, than in *microphyllus* or *inciſus*, with finer more copious ſerratures; their ribs and veins eſpecially hairy. *Flowers* on the young branches, ſtalked, ſolitary, much like the two laſt ſpecies, but the calyx is both downy and hairy on the outſide. Nothing is ſaid of the *fruit*. The *leaves* are deſcribed by Thunberg as elegantly plaited before they fully expand.

40. R. *elongatus*. Long-cluſtered Bramble. Sm. Plant. Ic. t. 62. Willd. n. 22.—Leaves ſimple, heart-ſhaped, pointed, doubly crenate; white and downy beneath. Panicle elongated, racemoſe. Segments of the calyx rounded, obtuſe. Gathered by Commerſon in Java. The *branches* are round, downy, with minute diſperſed prickles. *Leaves* very ſmooth and even on the upper ſide; their margin furniſhed with a row of broad ſhallow notches, or ſerratures, with ſmall, rather acute, intermediate ones. *Panicle* terminal, long, lax, zigzag, finely downy or ſilky, in every part, as well as the *calyx*. *Bracteas* oblong, jagged at the end, deciduous. *Flower-ſtalks* ſhort and thick, aggregate, cluſtered, or ſomewhat umbellate. Segments of the *calyx* remarkably rounded. *Petals* orbicular, white. *Fruit* red.

41. R. *paniculatus*. Spreading Panicled Bramble.—Leaves ſimple, heart-ſhaped, pointed, ſlightly lobed, ſharply and finely crenate: white and downy beneath. Panicle twice compound, ſpreading. Segments of the calyx ovate, taper-pointed. Gathered by Dr. Buchanan, at Narain hetty, in Nepaul, Nov. 18, 1802. The round, downy *branches*, with ſmall ſcattered prickles, agree with the laſt, as well as with *moluccanus*, *rugoſus*, &c. The woolly *footſtalks* alſo bear very ſmall hooked prickles. The *leaves* are as broad as the hand, more finely and ſharply crenate than thoſe of *R. elongatus*, with ſome irregular, ſhallow, obſolete, acute lobes. *Panicle* very large, lax and ſpreading, twice, or even thrice compound, downy, its ultimate ſtalks partly umbellate, but all much more long and ſlender than in the foregoing. The *calyx* alſo differs eſſentially in its tapering ſegments, downy, not ſilky on both ſides. *Petals* ſmall, obovate. *Fruit* black.

42. R. *pyriſolius*. Pear-leaved Bramble. Sm. Plant. Ic. t. 61. Willd. n. 23.—Leaves ſimple, elliptical, pointed, ſerrated, ſmooth. Panicle corymboſe, downy. Calyx partly jagged. Petals minute.—Found in Java, by Commerſon. The *branches* are ſlender, round, ſlightly zigzag, minutely hairy, armed with ſmall recurved prickles. *Leaves* on ſhortiſh hairy *ſtalks*, coriaceous, three inches long, and one broad, coarſely ſerrated; the ribs and veins only hairy on both ſides. *Panicle* terminal, large, twice compound; its branches corymboſe and downy. *Bracteas* linear, deeply jagged, deciduous. Segments of the *calyx* ovate, taper-pointed, downy on both ſides; the points of two or three of them deeply divided into three or four parts, while the reſt are entire. *Petals* very ſmall, abrupt and jagged, ſcarcely a quarter the length of the calyx. *Fruit* of a few large grains, with wrinkled *ſeeds*.

43. R. *acuminatus*. Pointed-leaved Bramble.—Leaves ſimple, ovate, taper-pointed, ſerrated, ſmooth. Panicle racemoſe, not downy. Petals as long as the calyx.—Found by Dr. Buchanan, in the woods at Sembu in Upper Nepaul, flowering early in July, 1802. This ſpecies is related to the laſt, but very diſtinct. The *ſtem* is climbing, unarmed. The *branches* are minutely prickly, but not hairy. *Leaves* four or five inches in length, ſcarcely coriaceous, ſmooth and ſhining on both ſides, paler beneath, ſimply or doubly ſerrated, remarkable for their long taper points. *Footſtalks* channelled, prickly, as well as the midrib, hardly pubeſcent. *Stipulas* awl-ſhaped, toothed, ſmooth, deciduous. Panicle terminal, elongated, zigzag, compound, accompanied by ſome leaves; its ultimate branches often three-flowered. *Flower-ſtalks* warty, but not downy. *Bracteas* awl-ſhaped, ſimple or divided, ſmooth. *Calyx* warty and downy, with a ſhort ſimple point to each ſegment. *Petals* ovate, acute, the length of the calyx, white. *Fruit* of a very bright red, larger than the calyx.

Sect. 2. *Stem herbaceous*.

44. R. *pedatus*. Pedate Bramble. Sm. Plant. Ic. t. 63. Willd. n. 24. Purſh n. 17.—Leaves pedate, of five bluntiſh, nearly ſmooth, cut and ſerrated leaflets. Flower-ſtalks capillary, ſimple, bracteated in the middle. Calyx ſmoothiſh, partly cut, reflexed.—Gathered on the north-weſt coaſt of America, by Mr. Menzies, to whom we are obliged for ſpecimens. This is an elegant, delicate, herbaceous plant, with creeping *roots*, throwing up, at intervals, ſhort ſimple *ſtems*, with one or two *leaves*, on long, ſlender, channelled *footſtalks*, and one, rarely two, *flower-ſtalks*, nearly the ſame length, but more ſlender, bearing a pair of little roundiſh *bracteas*, about half way up. *Stipulas* in pairs, roundiſh, fringed, larger than the *bracteas*. *Flowers* ſolitary, ſmall. *Calyx* deeply divided; its ſegments oblong, ſome of them three-cleft. *Petals* the ſame length, elliptical, rather abrupt or jagged; whether white or yellow we are doubtful. If the latter, it would greatly confirm Mr. Purſh's ſuſpicion of this plant being a ſpecies of *Dalibarda*, provided that genus ſhould be eſtabliſhed, a point on which we ſhall touch at the concluſion of this article. We know nothing of the *fruit* of our *R. pedatus*.

45. R. *ſaxatilis*. Stone Bramble. Linn. Sp. Pl. 708. Willd. n. 25. Ait. n. 11. Purſh n. 13? Fl. Brit. n. 5.

n. 5. Engl. Bot. t. 2233. Fl. Dan. t. 134. Ger. Em. 1273.—Leaves ternate, acute, ſlightly downy, doubly and unequally notched. Runners creeping, herbaceous. Panicle of few flowers. Stipulas ovate.—Native of ſtony, rather mountainous, dry woods and thickets, in the north of Europe, chiefly confined with us to Scotland, Wales, and the moſt northern and hilly part of England, flowering in June. The whole herb is of a ſlender delicate habit, light green, ſlightly downy, not at all white or hoary. It ſpreads extenſively by means of long trailing ſhoots, either naked or leafy, which do not bloſſom till their extremities have taken root. The flowering *ſtems* are ſolitary, erect, ſimple, a ſpan high, ſlightly angular, leafy, hairy, beſides a few occaſional, very tender, horizontal prickles, often preſent alſo on the *footſtalks*. The *leaflets* are in ſome meaſure rhomboid, ſharply and coarſely crenate; the ſide ones now and then lobed at the lower margin, and very rarely two at each ſide. *Cluſter* terminal, downy, of from three to five ſmall inconſpicuous *flowers*. Segments of the *calyx* lanceolate, downy, acute. *Petals* erect, lanceolate, bluntiſh, cream-coloured or greeniſh. *Berries* of a very few large, crimſon, globular grains, pleaſantly acid. *Seeds* compreſſed, wrinkled.

Mr. Purſh, following Michaux, conſiders as a variety of this a plant found in Canada, and on the mountains from New York to Virginia, which has ſmall black *berries*. The *flowers* are about three, on long partial ſtalks. Its runners accord with our *ſaxatilis*, but we ſhould preſume that an accurate compariſon of theſe two plants might prove them to be diſtinct ſpecies.

46. R. *obovalis*. Moſs American Black-berry. Michaux Boreali-Amer. v. 1. 298. Purſh n. 14.—Leaves ternate, oval, rounded, ſerrated, naked. Stem hiſpid. Cluſters ſomewhat corymboſe, of few flowers. Stipulas ſetaceous. —Found in ſwamps, among bog-moſs, on the mountains from New York to Carolina, flowering from May to July. The *ſtem* is deſcribed as rather ſhrubby, hiſpid with rigid hairs. *Flower-ſtalks* elongated. *Bracteas* ovate. *Berries* with only a few large grains, black and ſweet. The name, and definition of the *leaves*, *foliolis obovalibus*, are incorrect. An oval is of the ſame breadth at each end. We preſume Michaux meant *obovate*.

47. R. *arcticus*. Dwarf Crimſon Bramble. Linn. Sp. Pl. 708. Fl. Lapp. ed. 2. 170. t. 5. f. 2. Willd. n. 26. Ait. n. 13. Purſh n. 15. Fl. Brit. n. 6. Engl. Bot. t. 1585. Curt. Mag. t. 132. Fl. Dan. t. 488.—Leaves ternate, ſmooth, bluntly ſerrated. Stem moſtly ſingle-flowered, without prickles. Petals roundiſh, notched.—Native of Lapland, alſo of Labradore, and about Hudſon's Bay; as well as of the iſle of Mull, and the mountains of Ben-y-glo, in Scotland, flowering in May and June. The *root* is perennial and creeping, but without ſcyons. *Stems* unarmed, erect, leafy, from four to eight inches high, almoſt invariably ſimple and ſingle-flowered, though ſometimes from luxuriance an axillary bloſſom occurs at the ſecond leaf, as drawn in Engl. Bot. *Leaflets* always three, ovate or rhomboid, bluntiſh, with broad roundiſh ſerratures. *Stipulas* ovate, entire. *Flower* terminal, ſtalked, of a beautiful crimſon. *Calyx* downy, often with ſix or ſeven ſegments, with which the *petals* agree in number. The latter are moſtly emarginate, ſometimes much jagged. *Berry* of a few large grains, amber-coloured, with a purpliſh tinge, about as big as a raſpberry, but far ſuperior in flavour, partaking of that fruit and the ſtrawberry, with a luſcious ſweetneſs. Linnæus juſtly extols this fruit, and acknowledges his obligation to it, when fatigued with the labours of his Lapland tour. Syrup, jelly, and wine are made of it in Sweden, which are eſteemed highly. Theſe berries are often ripened in our gardens, provided the plant be allowed to grow with luxuriance. The *ſeeds* are ſcarcely perceptibly wrinkled.

48. R. *piſtillatus*. Cloſe-ſtyled Bramble. Sm. Exot. Bot. v. 2. 53. t. 86. Ait. n. 12. Purſh n. 16. (R. acaulis; Michaux Boreali-Amer. v. 1. 298.)—Leaves ternate, ſmooth, ſharply ſerrated. Stem ſingle-flowered, without prickles. Petals oblong, entire. Styles cluſtered together. —Native of Labradore; and, according to Mr. Purſh, of the bogs of Canada, as well as the north-weſt coaſt of America, flowering in June and July. It was firſt cultivated in England by Mr Dickſon, in the garden of the late Rt. Hon. Charles Greville at Paddington, about the year 1802. This moſt reſembles the *arcticus* in habit, but is of more humble ſtature, though by no means deſtitute of a ſtem. The *leaves* are more acutely ſerrated, and riſe above the *flower*, which is crimſon, large, and handſome, on a terminal, downy, ſimple *ſtalk*. *Calyx* with ſix, or more, lanceolate, narrow ſegments, rather downy. *Petals* as numerous, and twice as long, elliptic-oblong, with taper claws. *Stamens* club-ſhaped and obtuſe, which is likewiſe the caſe in the *arcticus*, but in the preſent there is more of a capillary ſtalk to the *anther*. *Germen* depreſſed. *Styles* few, crowded together, looking like a ſimple one. We know nothing of the *fruit*.

49. R. *geoides*. Avens-leaved Bramble. Sm. Plant. Ic. t. 19. Willd. n. 29.—Leaves ſimple or ternate, obtuſe, ſerrated, ſmooth; the odd leaflet very large. Stems depreſſed, ſingle-flowered. Petals roundiſh.—Gathered by Commerſon at the ſtraits of Magellan. This is a humble depreſſed herb, with very ſhort *ſtems*. *Footſtalks* long, channelled, ſlightly hairy, each bearing two awl-ſhaped *ſtipulas*, a good way above the baſe. *Leaves* moſtly compoſed of one large, heart-ſhaped, rounded, abrupt, unequally ſerrated, ſmooth, terminal leaflet, and a pair of, much ſmaller, ſtalked ones, which laſt are ſometimes wanting. *Flower* terminal, ſolitary, on a thick downy ſtalk. Segments of the *calyx* oblong. *Petals* nearly orbicular. *Fruit* unknown. Commerſon obſerved the *ſtamens* and *piſtils* to be always preſent together in each flower, in which this plant differs from *R. Dalibarda* and *Chamæmorus*, hereafter deſcribed.

50. R. *trifidus*. Three-cleft Japan Bramble. Thunb. Jap. 217. Willd. n. 27.—Leaves ſimple, three-cleft, cut and ſerrated, ſmooth. Stem without prickles, nearly ſimple, erect. Flowers ſtalked, ſolitary. Calyx white and downy.—Found by Thunberg, near Quana in Japan, flowering in April. The *ſtem* is ſaid to be rather zigzag, round, moſtly ſimple, purple, and ſmooth. *Leaves* ſtalked, heart-ſhaped, roundiſh, nearly as broad as the palm of the hand; their lobes cut, and unequally ſerrated. *Flowers* from the ſame bud with the leaves, ſolitary, on a ſimple, rarely divided, *ſtalk*, which is like the *footſtalks*, about a finger's length, and villous. *Fruit* red, eatable, agreeably flavoured. By the above deſcription, taken from Thunberg, it ſhould ſeem that there are more *flowers* than one on each ſtem; but we have ſeen no ſpecimen.

51. R. *ſtellatus*. Starry-flowered Bramble. Sm. Plant. Ic. t. 64. Willd. n. 28. Purſh n. 18.—Leaves ſimple, three-lobed, rugoſe. Stem ſingle-flowered. Segments of the calyx awl-ſhaped. Petals lanceolate.—Gathered by Mr. Menzies, near Foggy Harbour, on the north-weſt coaſt of America. The *roots* are perennial and creeping. *Stems* annual, ſolitary, erect, ſimple, leafy, downy, without prickles, about two inches high. *Leaves* two or three, alternate, on long downy ſtalks, heart-ſhaped, broader than they are long, more

more or lefs deeply three-lobed, rather acute, fharply ferrated, rugofe, veiny, flightly hairy; paler beneath. *Stipulas* roundifh, or ovate, fomewhat notched. *Flower* large, terminal, folitary, much overtopped by the foliage, crimfon, on a fhort downy ftalk. *Calyx* hairy, with from five to ten long, taper fegments; its bafe angular and ribbed. *Petals* as many, lanceolate or obovate, with taper claws. *Berry* compofed of feveral grains. The *calyx* fometimes remains through the winter, elevated on the elongated dried *ftem*, as in the plate above cited.

52. R. *Chamæmorus*. Mountain Bramble, or Cloudberry. Linn. Sp. Pl. 708. Fl. Lapp. ed. 2. 173. t. 5. f. 1. Willd. n. 30. Ait. n. 14. Purfh n. 19. Fl. Brit. n. 7. Engl. Bot. t. 716. Lightf. Scot. 266. t. 13. f. 2. Fl. Dan. t. 1. (Chamæmorus; Ger. Em. 1273. Vaccinia nubis; ibid. 1420, very bad.)—Leaves fimple, lobed, rugofe. Stem fingle-flowered. Segments of the calyx ovate. Petals roundifh.—Native of alpine turfy bogs in the north of Europe, frequent in Lapland, Denmark, Siberia, &c., as well as on the higheft mountains of Scotland, Wales, and the north of England, flowering in June. It occurs alfo in Canada and New England. The *roots* are long and creeping, throwing up here and there folitary *ftems*, about a fpan high, fome bearing folitary male *flowers*, others female ones. *Leaves* fhaped like thofe of a mallow, or currant, heart-fhaped at the bafe, ftrongly veined, plaited, fmooth, unequally ferrated, one or two on each ftem. *Footftalks* flightly hairy. *Stipulas* ovate, obtufe. *Flower* on a long downy *ftalk*, rifing above the leaves, white, elegant. *Calyx* tawny, downy, with five broad ovate fegments. *Petals* about twice as long as the calyx. *Berry* of many large grains, amber-coloured, with a pleafant acid flavour refembling that of tamarinds, though rather mucilaginous. Lightfoot fays, thefe berries are brought to table in the highlands. Linnæus fpeaks of them as much efteemed by the Laplanders, who preferve them through the winter, buried under the fnow.

53. R. *coriaceus*. Coriaceous Peruvian Bramble. Poiret in Lamarck Dict. v. 6. 237.—Leaves fimple, ovate-oblong, undivided, fmooth, ferrated. Stem and footftalks fomewhat prickly. Flowers axillary, folitary. Segments of the calyx lanceolate. Petals roundifh.—Found by Dombey in Peru. Defcribed by Poiret, from Juffieu's herbarium. The *ftems* are erect, nearly fimple, herbaceous, reddifh, compreffed, very fmooth, except a few fmall fcattered prickles on their upper part. *Leaves* alternate, diftinct, thick, and coriaceous, rather obtufe; fhining on the upper fide; their *footftalks* furnifhed with fome fmall prickles. *Stipulas* oval, toothed. *Flowers* axillary, towards the top of the ftem, on fimple, thickifh *ftalks*, armed with very fine prickles. *Calyx* large, broad at the bafe, with five fmooth, lanceolate, pointed, greenifh fegments. *Petals* rounded, fhorter than the calyx, crenate at the extremity, appearing yellow when dry.

54. R. *Dalibarda*. Violet-leaved Dwarf Bramble. Linn. Sp. Pl. 708. Willd. n. 31. Sm. Plant. Ic. t. 20. Lamarck Illuftr. t. 441. f. 3. (Dalibarda repens; Linn. Sp. Pl. ed. 1. 491. Poiret in Lamarck Dict. v. 6. 250. Purfh v. 1. 350. D. violæoides; Michaux Boreali-Amer. v. 1. 299. t. 27. Ait. v. 3. 271.)—Leaves fimple, heart-fhaped, undivided, crenate, hairy. Stems creeping. Stalks fingle-flowered. Petals ovate. Gathered by Kalm in Canada. Mr. Purfh fays it is found in the fhady woods and bogs of that country, and on the high mountains of New England and Pennfylvania, flowering in May and June. The *herbage* much refembles that of fome fpecies of violet. The *root* is perennial and creeping, fending forth feveral depreffed, creeping, round, leafy, downy *ftems*. *Leaves* rounded, about an inch in diameter, finely hairy on both fides, on long, flender, hairy *footftalks*. *Stipulas* oblong, with feveral terminal awl-fhaped fegments. *Flower-ftalks* nearly radical, about as long as the footftalks, but more flender, fimple, hairy, each bearing a fmall white *flower*, not unlike a fingle *hepatica*, but about half the fize. Segments of the *calyx* lanceolate, acute, downy, fometimes partly notched, nearly equal to the *petals*. *Stamens* capillary. *Styles* five, above half as long as the ftamens. They are erroneoufly defcribed "very fhort" in the Plant. Ic. *Fruit* of five, or not fo many, pale, dry, ovate, obtufe grains, minutely downy, and flightly wrinkled.

The want of pulp in the *fruit* firft induced Linnæus to feparate this plant, as a genus, from *Rubus*; but he afterwards altered his opinion. His original determination has been followed by Michaux, Purfh, and Aiton. The queftion is difficult, but there are many different degrees of pulpinefs in the feveral fruits of acknowledged *Rubi*, and Mr. Purfh himfelf defcribes his *cuneifolius*, fee n. 15, with "hard and dry *berries*," though no perfon furely would think of placing that fpecies any where elfe. Till, therefore, we can judge for ourfelves, by tracing the growth of the *fruit* in queftion, and comparing it with others, we had rather follow Linnæus. Michaux fays *Dalibarda* differs from *Rubus*, nearly in the fame manner as *Potentilla* from *Fragaria*; but this is incorrect. Thefe latter are diftinguifhed by the deciduous fleffy receptacle of *Fragaria*; the others merely by more or lefs pulp in the berry; for *Dalibarda* has not naked feeds, or "*femina exfucca*," but poffibly *bacca exfucca*, a very different matter. We fhall recur to the fubject again under the following fpecies.

55. R? *fragarioides*. Strawberry-leaved Bramble. (Dalibarda fragarioides; Michaux Boreali-Amer. v. 1. 300. t. 28. Curt. Mag. t. 1567. Purfh v. 1. 350. Ait. v. 3. 271. Poiret in Lamarck Dict. v. 6. 250.)—Leaves ternate; leaflets all feffile, wedge-fhaped, notched and ferrated, fringed. Stalks radical, many-flowered. Calyx tubular at the bafe.—Native of fhady beech woods in Canada, and of the Allegany mountains, flowering in May and June. We have feen no fpecimen, but by the above plate, the *root* appears to be fimple, oblong, woody and perennial. *Leaves* all radical, on longifh flender ftalks; the middle *leaflet* feffile like the reft, and very little larger. *Flower-ftalks* longer than the leaves, fomewhat panicled, bearing about five *flowers*, the fize of the laft. *Calyx* remarkably elongated, and inverfely conical, at the bafe, with ovate, finally reflexed, fegments. *Petals* ovate, faid to be yellow. *Stamens* numerous; their filaments permanent, erect. Of the particular ftructure of the *fruit* we find no account. This fpecies, with its yellow *flowers*, and tubular *calyx*, to fay nothing of the *herbage*, is fo unlike the other *Dalibarda*, that it weakens, inftead of confirming, that fuppofed genus. We prefume not to fay, without actual examination, what it moft refembles. Pallas, it feems, made this plant a *Dryas*. We place it here merely for further enquiry. Dr. Sims in Curtis's Magazine remarks that the *calyx* fometimes betrays an inclination to have intermediate fegments, a very curious, though puzzling, circumftance.

56. R. *radicans*. Creeping Peruvian Bramble. Cavan. Ic. v. 5. 7. t. 413. Poiret in Lamarck Dict. v. 6. 249.—Leaves ternate; leaflets all ftalked, heart-fhaped, villous, ferrated. Stem creeping, prickly. Stalks radical, fingle-flowered. Calyx notched. Gathered by Lewis Née, in the woods of Chili, growing at the roots, or on the rotten trunks, of trees, bearing flowers and fruit in February. The *ftem* is quite proftrate, armed with fhort prickles, fpreading

ing to a great extent, and fixing itſelf here and there, as it runs, by fibrous *roots*. *Leaves* ſeveral from each part where the roots are produced, forming a tuft, accompanied by a ſolitary, long-ſtalked, pale red *flower*, riſing above the leaves, and ſucceeded by an ovate greeniſh *berry*, compoſed of numerous grains, all together the ſize of a currant, and ſaid to be very agreeably flavoured. The *calyx* is reflexed when in fruit, its ſegments oblong, acute, with many deep notches. *Petals* roundiſh, obtuſe.

Rubus, in *Gardening*, contains plants of the under-ſhrubby and herbaceous perennial kind, of which the ſpecies cultivated are, the raſpberry (R. idæus); the Virginian raſpberry (R. occidentalis); the flowering raſpberry (R. odoratus); the common bramble (R. fruticoſus); the briſtly bramble (R. hiſpidus); the dewberry bramble (R. cæſius); the dwarf crimſon bramble (R. arcticus); and the mountain bramble, or cloud-berry (R. chamæmorus).

In the firſt ſpecies the varieties are, the red-fruited, the white-fruited, the twice-bearing, of which the firſt crop ripens in July, and the ſecond in October, thoſe of the latter ſeaſon having ſeldom much flavour; the ſmooth raſpberry, and the large Antwerp. But the ſorts moſtly cultivated, according to Mr. Forſyth, are, the early white, the double-bearing white, the large common white, the large red, the red Antwerp, the large white Antwerp, the ſmooth cane double-bearing, and the Woodward's new raſpberry.

In the fourth ſort there are ſeveral varieties; but that which is chiefly introduced as a garden ſhrub, is the double-flowered bramble.

Method of Culture.—In the firſt ſort and varieties of theſe plants it may be effected by ſuckers and layers. The plants ſhould always have a portion of ground to themſelves, being planted at the diſtance of about ſix feet from row to row, and four in the rows, with the exception of the early white ſort, which may be ſet out cloſer. And according to Mr. Forſyth, the ground ſhould firſt be well trenched over and dunged; then, making choice of the ſtrongeſt and fineſt plants that come out from the ſides of the ſtools, where they have been ſtanding for ſome years, or encouraging the ſtrongeſt plants that come out betwixt the rows after digging, which ſhould be done annually, they may be planted out as above. In digging the ground, it frequently happens that the roots are cut with the ſpade, which occaſions a great number of ſmall plants to come up; of theſe the ſtrongeſt and fineſt ſhould be ſelected, hoeing up all the ſuperfluous ones. But he prefers laying down ſome of the ſtrongeſt outſide ſhoots in the month of March; as, by the following autumn, they will make fine roots, and may be planted out in a quarter, or piece of ground, where they are intended to remain. Theſe will not be ſo liable, he thinks, to throw out ſuckers as thoſe which are produced from ſuckers. The freſh pieces of ground ſhould always be planted in moiſt weather, as the roots are very delicate, and liable to hurt, when expoſed to a dry air. If, however, they are planted in dry weather, he adviſes that care be taken to moiſten the roots with water, and cover them well with wet litter, or leaves, during the time in which they are planting out. In performing the work, a trench ſhould be opened with a ſpade, along the line where the ſuckers or layers are to be planted, cutting off all the ſmall fibry roots with a knife, leaving only the ſtronger roots; putting them into the trench, and covering them with ſome earth; then watering them well, and throwing the remainder of the earth over them, letting them remain till you have finiſhed planting the piece; then, where you firſt began to plant, beginning to tread the ground with the foot as hard as poſſible along each of the trenches, and in the ſame direction as planted; then with a ſpade levelling all the ground ſmooth, and running it over with a rake, taking off any ſtones and rubbiſh that may be left on the ſurface, ſo as to render it perfectly even. The plants ſhould be watered two or three times a week, when the ſeaſon is dry, till they have taken root; and it will be neceſſary to ſtake the Antwerp, and other ſtrong growing ſorts, with ſtout ſtakes, running a couple of ſmall rails at top to tie the branches to, which will prevent their being broken by the wind, or beaten down by the rain. The early white, and ſmaller ſorts, may be plaited together at top, tying them round with the ſmall yellow willow, which will keep them together. Some of the early raſpberries may be planted between the trees on a weſt aſpect, to produce early fruit before thoſe in the quarters come in. The Antwerps thrive exceedingly well againſt north walls or palings, and produce late crops. Such as are planted againſt walls or palings ſhould be tacked to them, to keep them in their places.

And it is adviſed that where any of the ſmall red and white ſorts are found, they ſhould be deſtroyed, planting the large red, the ſmooth cane double-bearing, the large red and white Antwerps, the large common white, the double-bearing white, and Woodward's new raſpberry in their ſtead. In reſpect to the cutting or pruning of theſe plants, ſome, Mr. Forſyth remarks, prefer pruning them in autumn, a practice of which he by no means approves. As they bear the fruit on the wood of the preceding year, they are, he thinks, very liable to be killed by the froſt in ſevere winters; but, by deferring the pruning till the month of February, there will be a great choice of fine wood for bearing the following ſummer, being careful to root out or cut down all the wood that bore fruit the preceding year, which generally dies, ſelecting only from five to ſeven of the moſt vigorous and ſtrong ſhoots from the laſt year's wood to bear fruit the enſuing ſeaſon. Theſe ſhoots may be pruned to the length of three or four feet, according to their ſtrength, when they are of the ſmooth cane double-bearing ſort (which generally bears a ſecond crop in autumn, and will, in fine ſeaſons, continue bearing from June to November); but, if the large Antwerp, the ſhoots ſhould be left five or ſix feet long in theſe prunings.

But in regard to the early white, which never grows ſo ſtrong as the above ſorts, it ſhould be ſhortened to two feet and a half, or three feet. Theſe ſhould be planted in rows about three feet diſtant from each other, and two feet from plant to plant in the rows; always remembering to keep them clear of ſuckers, and to cut out the dead or laſt year's wood, as above; making choice of the ſtrongeſt ſhoots for bearing wood. Great care ſhould, however, be taken not to cut off the little ſpurs on the ſides, which bear the fruit in this kind. Plants of this ſort continue in bearing five or ſix years; by which time a freſh plantation ſhould be in readineſs to ſucceed them. The young plants often bear ſome fruit the firſt year, and come into full bearing in the ſecond after planting. If they be ſuffered to remain more than five or ſix years on the ſame ground, they degenerate, and bear ſmall fruit. And much care ſhould be taken not to leave above eight or ten of the ſtrongeſt ſhoots, rubbing off or pulling up all the ſuperfluous ones; and keeping the ground well hoed and cleared of weeds between the rows, as well as in other places.

Alſo in the other ſorts the increaſe may be effected by ſuckers, layers, cuttings, and dividing the roots, and in the two laſt, or herbaceous kinds, by ſeed. The ſuckers ſhould be taken up in autumn, winter, or ſpring, with roots; and the ſtrongeſt be planted at once into the ſhrubbery, and the others in nurſery-rows for a year or two, or till wanted for

planting. The layers ſhould be made from the ſhoots, which may be done almoſt any time, as they readily emit roots at every joint, and become fit to plant out in the autumn following. And the cuttings ſhould be taken off from ſome of the younger ſhoots, and divided into lengths a foot long, and planted in a ſhady border, either in the ſpring or ſummer ſeaſon. The roots in any of the raſpberry and herbaceous ſorts, when increaſed into large bunches, may be divided or ſlipped into ſeveral diſtinct ſets, and planted out ſeparately.

The laſt two ſorts may likewiſe be raiſed from ſeeds, which ſhould be taken from the ripened fruit, and ſown in a moiſt ſituation where the plants are to remain, keeping the young plants clean afterwards.

Both the firſt ſpecies, and all the varieties, are highly uſeful for their fruit; for the table, preſerving, and other culinary purpoſes.

And moſt of the other ſorts afford variety in the borders, clumps, and other parts of pleaſure-grounds, among other hardy plants.

RUBUS, in *Ichthyology*, a name given by Joannes Cuba, Albertus, and ſome other writers, to the ſpecies of *ray*, uſually called the *ſkate*, or *flaire*. See RAIA (BATIS and RUBUS).

RUBY, *Spinelle*, Fr., in *Mineralogy*, a precious ſtone, much valued by jewellers; but under this name a variety of minerals have not unfrequently been ſold, which differ eſſentially in their characters. Mineralogiſts have alſo diſagreed much in the claſſification of ſubſtances to which they have given the name of ruby. The oriental ruby is, in fact, a red variety of the ſapphire, and is deſcribed under the article GEMS. It poſſeſſes greater hardneſs than the common ruby, and differs from it in its cryſtallization. The primitive form of the cryſtals of the common ruby is the regular octahedron, from which the ſecondary forms vary but little. Two cryſtals are ſometimes united, and form a macle. The colour is red, varying from ſcarlet to violet and yellowiſh-red, and ſometimes a dark red. It is infuſible by the blowpipe, nor does it loſe its colour by the heat. The fracture is flatly conchoidal; it has a ſplendent vitreous luſtre. The ruby poſſeſſes a conſiderable degree of hardneſs, though its principal conſtituent ingredient is alumine. According to Vauquelin, it contains

Alumine - - -	84.47
Magneſia - - -	8.78
Chromic acid - - -	6.18

To the chromic acid the common ruby owes its colouring matter. A variety of ruby has received from Haüy the name of Pleonaſte; it differs from the above in containing iron in place of chromic acid, and the colours vary from a purple to blue and green. Another gem nearly reſembling the ruby, the ſpinelle zinſifere of Haüy, called alſo automalite, has been claſſed as a ſub-ſpecies of ruby, but it differs from it greatly in its conſtituent parts.

Automalite, like the common ruby, has the octahedral cryſtallization, with laminæ parallel to the faces of the cryſtal; its colour is a dark blueiſh-green, nearly opaque. The conſtituent parts, according to Vauquelin, are,

Alumine - - -	42
Silex - - - -	4
Oxyd of zinc - - -	28
Oxyd of iron - - -	5
Sulphur - - -	17

The ruby, in its moſt perfect ſtate, is a gem of very great beauty and value. It is often found perfectly pure, and free from all ſpots or blemiſhes; but it is much more frequently debaſed by them, and greatly brought down in its value, eſpecially in the larger ſpecimens. It is of very great hardneſs, equal to that of the ſapphire, and ſecond only to the diamond. It is various in ſize, but is leſs ſubject to variations in its ſhape than moſt of the other gems. It is moſt frequently found very ſmall; its common ſize being that of the heads of the larger ſort of pins; and when of this ſize it is very cheap; but it is alſo found of four, ſix, or ten carats; and ſometimes, though but very rarely, up to twenty, thirty, or forty; nay, we have accounts of ſome of more than a hundred. It is never found of an angular or cryſtalliform ſhape, but always of a pebble-like figure, often roundiſh, ſometimes oblong, and much larger at one end than the other, and in ſome ſorts reſembling a pear, and is uſually more or leſs flattened on one ſide.

It is commonly ſo naturally bright and pure on the ſurface as to need no poliſhing: it is worn in rings, and in the crowns of princes, in its rough or native ſtate. Its colour is red in very different degrees, from the deepeſt garnet colour to that of the paleſt red diamond, but it ever has with the red more or leſs of a purpliſh tinge. This is very plainly diſtinguiſhed in the deeper coloured ſpecimens, but in the pale ones is gradually leſs and leſs to be diſtinguiſhed in proportion to their degree of colour. Theſe are the diſtinguiſhing characters of the ruby, and by theſe it is eaſily known from the garnet, carbuncle, and other red gems.

Our jewellers are very nice, though not perfectly determinate in their diſtinctions; knowing this gem, in its different degrees of colour, under three names; the firſt is ſimply the *ruby*: this is the name they give to it in its moſt perfect and ſtrongeſt coloured ſtate.

The ſecond is the *ſpinel* ruby. Under this name they know thoſe rubies which are of a ſomewhat leſs deep and much leſs vivid colour than what they call the true ruby, or ſimply the ruby.

The third is the *balaſs* ruby, a name derived from Balakeia, the name of a country where the paler rubies are principally found. Under this name they expreſs a pale, yet a very bright ruby, with a ſmaller admixture of the purple tinge than in the deeper coloured one, and ſomething reſembling the colour of the damaſk roſe. This is of a conſiderable value, but leſs than the deeper, or, as they call it, the true ruby.

Beſides theſe, they know alſo two other ſtones under the general name rubies, calling them the *rock ruby*, and the *rubacelle*. But theſe are not truly of the ruby kind; the firſt being a very beautiful ſpecies of garnet, and having a tinge of blue with its red; and the other a hyacinth, having a manifeſt caſt of yellow. See GEMS.

There are but two places in the Eaſt where the ruby is found; the kingdom of Pegu, and the iſle of Ceylon. The mine in Pegu, where it is found in greateſt plenty, is in the mountain Capelan, twelve days' journey from Siren, the reſidence of the king of that country. The fineſt rubies brought hence do not exceed three or four carats; the king reſerving all the larger to himſelf.

In Ceylon the rubies are found in a river which deſcends from the mountains towards the middle of the iſland: ſome few are alſo found in the ground. The rubies of Ceylon are uſually brighter and more beautiful than thoſe of Pegu, but they are rare; the king of Ceylon prohibiting his people to gather them, or traffic with them. There are, as ſome ſay, rubies alſo found in Europe, particularly in Bohemia and Hungary, eſpecially the former, in which is a mine of flints of divers ſizes; which, upon breaking, are ſometimes found to contain rubies, pretended to be as fine and hard as any of the Eaſtern ones.

The

The Greeks call the ruby πυρωτος, *q. d.* resisting the fire. The ancients, out of their credulity and superstition, attributed many virtues to the ruby; as that it expels poisons, cures the plague, abates luxury and incontinence, banishes sorrow, &c.

It is said the inhabitants of Pegu have the art of heightening the redness and brilliancy of rubies, by laying them in the fire, and giving them a proper degree of heat; but this seems a very erroneous account.

The ruby is formed in a stony substance, or bed, of a rose-colour, called *mother of ruby;* it has not all its colour and lustre at once, but comes to it by degrees. At first it is whitish; and, as it approaches to maturity, becomes red. Hence we have white rubies, others half-white, half-red, and others blue and red, called *sapphire* rubies. When a ruby exceeds twenty carats, it may be called a *carbuncle;* the name of an imaginary stone, of which the ancients and moderns have given us so many descriptions.

They have several modes of counterfeiting rubies; and some have carried the imitation to that length, that the most able lapidaries, till they come to try the hardness, are sometimes deceived.

Frutiere assures us very positively, that there have been rubies in France of two hundred and forty carats. Tavernier tells us he saw one in the Indies of fifty carats, which he had a mind to have bought. He adds, that the king of France has finer and larger rubies than any in the possession of the great Mogul.

The largest ruby that is known to be in the world was brought from China to prince Gargarin, governor of Siberia. It came afterwards into the hands of prince Mentchikof, and is at present one of the ornaments of the imperial crown of Russia.

Ruby, *Sapphire.* See Sapphire and Gems.

Ruby, *Counterfeit.* See Gems, *Ruby* Glass, and *Ruby* Paste.

Ruby, in *Chemistry,* is a name given to several preparations of natural bodies, because of their red colour: as,

Ruby *of Arsenic,* &c. See Realgar.

Ruby, in *Heraldry,* denotes the red colour with which the arms of noblemen are blazoned; being the same which, in the arms of others, not noble, is called *gules.*

Ruby-*Throat,* Latham, in *Ornithology.* See Motacilla *Calliope.*

RUCCELLA, La, in *Geography,* a town of Sicily, in the valley of Demona; 7 miles S.W. of Cefalu.

RUCELLAI, Bernardo, in *Biography,* was born of a noble family at Florence in 1449. At the age of seventeen he married Nannina, daughter of Piero, and sister of the illustrious Lorenzo de Medici, which gave him great influence, and raised him to the highest posts in the republic. In 1480 he was appointed to the office of gonfalonier of justice; and four years afterwards he went as ambassador to the state of Genoa. In 1494 he was deputed, in the same quality, to Ferdinand, king of Naples, and afterwards to Charles VII. king of France. With his public employments he joined that cultivation of polite literature, which was frequent among the Florentines in the age of the Medici. He was intimately acquainted with Marsiglio Ficino, of whose academy he was at first one of the chief ornaments, and afterwards the firmest support. After the death of Lorenzo he was the munificent patron and protector of the Platonic academy, for the use of which he erected a sumptuous edifice, with fine gardens and groves, furnished with monuments of antiquity, serving as well for ornament as instruction. In the revolutions which followed the subversion of the Medici interest, Rucellai incurred the charges of ambition and inconstancy, by favouring sometimes one party and sometimes another: but, according to Mr. Roscoe, his crime, in the eyes of the Florentine historians of the succeeding century, was "an ardent love of liberty, which he preferred to the claims of kindred, and the expectations of personal aggrandizement." On the accession of Leo X. he declined the office which his countrymen would have conferred upon him of going as public orator to congratulate the pontiff, foreseeing, probably, in his elevation, the ruin of the liberties of Florence. He died in 1514, and was buried in the church of St. Maria Novella, the front of which, begun by his father, was finished by him with great magnificence. The following are the works of this patron of literature: "De Urbe Roma," which is a commentary on the description of Rome by Publio Vittore, in which he collected from all the ancient writers whatever would serve to convey a just idea of the grandeur of that capital; "De Magistratibus Romanis;" "De Bello Italico;" and "De Bello Pisano:" these have been compared with the history of Sallust. Bernardo was a poet in his own tongue; and a piece of his, entitled "Trionfo della Calumnia," was printed among the "Canti Carnascialeschi," at Florence in 1759. Roscoe's Lorenzi de Medici.

Rucellai, Giovanni, son of the preceding, a distinguished Italian poet, was born in 1475. Improving the advantages which he naturally enjoyed under his father's roof, he became a distinguished scholar, and in 1505 the republic of Florence nominated him ambassador to the Venetian state. He took a very active part in the tumult raised by the younger citizens in the year 1512, to promote the return of the Medici to Florence. Upon the elevation of pope Leo X., who was his relation, Giovanni, in hopes of preferment, repaired to Rome, and entered into the ecclesiastical order: and in 1515 he attended Leo on his visit to Florence, on which occasion the pontiff was entertained in the Rucellai gardens with the representation of the tragedy of "Rosmonda," written by Giovanni. Leo shewed the greatest attachment to his relation, and sent him, at a very critical period, as nuncio to the court of Francis I., where he was at the death of Leo X. On that event he returned to Florence, and was sent to Rome to congratulate the new pope Adrian VI. on his accession. In this, as well as in the pontificate of Leo X., and also in the succeeding one of Clement VII., to whom he was related, he had the most sanguine hope of promotion to a cardinalate. He died in 1526, without attaining to the object of his ambition. As an author, Giovanni is known by "Le Api," The Bees, which is a didactic poem in unrhymed verse, and bears a high rank among Italian compositions in that class. His tragedy Rosmonda, already noticed, and his Orestes, are imitations, the former of the Hecuba of Euripides, the latter of the Iphigenia in Tauris. Roscoe's Leo X.

RUCHENWALDE, in *Geography,* a town of Brandenburg, on the Ucker Mark; 2 miles N.E. of Storkow.

RUCHT, a river of France, which runs into the Roer, near Hermbach.

RUCK, in *Rural Economy,* a provincial term, signifying a rude heap or bundle of any thing.

RUCKENSTEIN, in *Geography,* a town of the duchy of Carniola; 6 miles W. of Gurkfeld.

RUCKERSDORF, a town of Bavaria, in the territory of Nuremberg; 8 miles W. of Lauf.

RUCKERSWALDE, a town of Silesia, in the principality of Neisse; 5 miles E.S.E. of Neisse.

RUCK-

RUCKINGEN, a town of Germany, in the county of Ifenburg, on the Kinzig; 5 miles N.E. of Hanau.

RUCTATION, Ructus, in *Medicine*, belching, an involuntary difcharge of flatus from the ftomach, fometimes accompanied with a portion of the folid or liquid contents of that organ.

This is ufually one of the fymptoms of indigeftion, whether arifing from a morbid condition of the ftomach, or from a temporary overloading of it with too much food, or with food of an acrid, heavy, or indigeftible quality, or fuch as is difpofed to pafs into fermentation. There is a natural tendency in the food, efpecially the vegetable portion of it, to the procefs of fermentation, and the confequent evolution of air; but by the influence of the gaftric juice, when it is fufficient to accomplifh the digeftive procefs, this tendency is counteracted, and no air is evolved. Whence the beft remedy for eructation is the improvement of the digeftive power, and the avoiding of fermentative food. See Indigestion.

RUD, in *Ichthyology*. See Cyprinus *Caraffius*, and Cyprinus *Erythrophthalmus*.

Rud, in *Rural Economy*, a term provincially fignifying a fort of red ochre.

RUDAW, in *Geography*, a town of Pruffia, in the province of Natangen; 12 miles S.W. of Lick.—Alfo, a town of Pruffia, in the province of Samland, formerly fortified with a caftle, now in ruins. Some monuments of Pagan idolatry ftill remain in the vicinity of Rudaw; and alfo a ftone pillar in a field near Tranzou, erected in commemoration of a victory obtained by the knights of the Teutonic order in 1370, over Kinftud, great duke of Lithuania; 12 miles N.N.W. of Königfberg.

RUDBECK, John, in *Biography*, a learned Swedifh bifhop, was born about the year 1581. After having obtained the elementary parts of education, he was entered at the univerfity of Upfal, where he made fuch progrefs in the higher branches of learning, that before he had completed his twenty-third year he was appointed profeffor of mathematics, which, in 1610, he exchanged for his profefforfhip of Hebrew. On the coronation of Guftavus Adolphus, he took his degree in theology, and in 1619 he was nominated to the bifhopric of Vefteras. In confequence of fome ftrong expreffions which he made ufe of in a public oration, a violent difpute took place between him and profeffor Meffenius, which was carried fo far, that the king was obliged to interfere, and to allay the angry paffions of the difputants, his majefty appointed Meffenius affeffor in one of the courts of juftice; and in 1613 he made Rudbeck one of his own chaplains. It was owing, in a great meafure, to the zeal and exertions of this prelate, that the Swedifh bible, known among the learned as the Bible of Guftavus Adolphus, was publifhed in 1618. He is alfo known and highly efteemed in his own country for the confiderable donations which he made to the gymnafium of Vefteras, and for his aid in the improvement of other ufeful inftitutions; he died in 1646. He was author of feveral theological works, of which the titles are given in the General Biography. Among thefe was one, entitled "Privilegia quædam Doctorum, Magiftrorum, Pracalaureorum, Studioforum, et Scholarum omnium, &c." This work, which excited great attention, had nearly proved the author's ruin, and was, very foon after the publication, prohibited by a decree of the fenate. Upon this occafion, one of the members of the fenate afferted, that a more dangerous book had fcarcely ever appeared, and that it was neceffary the publifher fhould make oath that he had not retained a fingle copy. It prevented the promotion of the prelate, who would otherwife probably have been raifed to the rank of archbifhop.

Rudbeck, Olof, or Olaus, a man of very extenfive learning and accomplifhments, who if not, ftrictly fpeaking, the father of natural fcience in Sweden, muft be reckoned among its earlieft and moft diftinguifhed patrons and cultivators, was the fon of John Rudbeck, bifhop of Vefteras; an honeft and uncourtly bifhop, who fpoke truth, and was never promoted. The fon had a great and vigorous mind, fomewhat over-luxuriant in fpeculation and hypothefis, but fagacious in difcovery, and indefatigable in application. He was born in 1630, and educated at Upfal. Anatomy was his earlieft ftudy, and he profecuted it with fuch fuccefs, that at the age of nineteen or twenty he made the important difcovery of the lymphatic veffels in the liver, and, foon afterwards, of thofe of other parts of the body. His inaugural differtation, in 1652, treated of the circulation of the blood. Bartholine contended with Rudbeck for the originality of the difcovery of the lymphatic fyftem, and they appear to have made it independent of each other; though Haller gives the priority, in point of time, to Rudbeck. See Bartholine, Thomas.

The univerfity of Upfal was, at this time, advancing rapidly towards that celebrity which it has now fo long maintained. Enriched with the patrimonial eftates of the great Guftavus Vafa, its funds have ever been ample, and the good fenfe of its directors has generally led them to a right application of thefe refources. Rudbeck, however, having made Botany a part of his purfuits, contributed, out of his own means, to the advancement of that fcience. He founded a garden, which he afterwards gave to the univerfity. He vifited Holland in 1653, but returning home next year, devoted himfelf to the ftudy, and, we prefume, to the practice of medicine, as well as to the inftruction of his pupils in anatomy. In 1658 he was appointed profeffor of medicine, and was fixed at Upfal for the remainder of his life. It appears that he married before the age of thirty, his fon, the fubject of our next article, having been born in 1660, but we have no particular account of Rudbeck's domeftic hiftory. Befides the attention which he gave to the above-mentioned purfuits, he very early addicted himfelf to the ftudy of languages, hiftory, antiquities, architecture, and mufic, as well as the practical art of drawing. He fo far took the lead in matters of tafte, that the public feftivals and decorations, at the coronation of the young king Charles XI., in 1660, were put entirely under his direction.

The firft botanical publication of Rudbeck feems to have been his Catalogue of the Upfal Garden, printed in 1658, the year after the eftablifhment of that collection. To this little volume a preface in Latin and Swedifh is prefixed, treating of practical horticulture, and recommending botany for its agreeablenefs and utility. The lift is, of courfe, not very ample, but contains feveral exotic fpecies and varieties; and when the author complains of a fharp froft on the 24th of July, we cannot but allow the protection of ftoves and greenhoufes to have been of the moft imperious neceffity, fo that he could fcarcely, in one year, have fufficiently provided them. An Appendix to this catalogue was printed in 1666, the garden having been, by that time, confiderably enriched. The fame year, 1666, not, as Linnæus has it, 1664, another fimilar work appeared, *Deliciæ Vallis Jacobææ;* a catalogue, alphabetical like the former, of a garden at Jacob's Dahl, near Stockholm, belonging to count Magnus Gabriel de la Gardie, chancellor of the kingdom of Sweden, as well as of the univerfity of Upfal. This, though anonymous, is attributed by Linnæus to

to Rudbeck. It is a little book of extreme rarity, insomuch that Haller speaks of it by report only. A Latin poem is prefixed to the work, describing the beauty of this villa, its orangery, aviary, plantations, and fountains.

We know not at what period of his life Rudbeck first conceived the vast project of his *Campi Elysii*, in which all the plants in the world, as far as they had been discovered, were to be represented by wooden cuts, in twelve folio volumes, disposed according to Bauhin's *Pinax*. For this stupendous work he is said to have prepared ten or eleven thousand figures. The first and second volumes were already printed, when a dreadful fire reduced almost the whole town of Upsal to ashes, in the year 1702. Three copies only of the first volume escaped the fire, two of which remain in Sweden, and the third is preserved in the Sherardian library at Oxford. A few leaves of this last copy, having been deficient, are supplied in manuscript. A number of the blocks of this very volume, which consists of grasses and their allies, came into England with the Linnæan collection; and having been compared with the Oxford copy, an impression of them was given to the public in 1789, under the title of *Reliquiæ Rudbeckianæ*, the appropriate letter-press of each figure, and the Linnæan names, being subjoined. An historical preface is prefixed to this edition, as well as a dedication to Dr. John Gustavus Acrel, Professor of Medicine at Upsal, who was entrusted with the sale of the Linnæan museum and library. (See LINNÆUS.) The object of the dedication is to bear testimony to the honourable conduct of this gentleman, who, because he would not act unjustly, was accused of having received a bribe of 100 pounds, so moderate is the standard of bribery in Sweden, to betray the interest of the proprietors. Perhaps this report arose from his rejecting, for them, the offer of the same sum, from another quarter, to forfeit their engagement to the person with whom they had treated, and to whom he indignantly communicated the proposal.

The second volume of the *Campi Elysii* came from the press a little before the former; so that several copies, having got abroad, escaped the destruction of the rest. Even this, however, is a very rare book, the price of which can hardly be estimated. A copy was bought by professor Jacquin in Germany, many years ago, for about 30 guineas. This volume is in the Linnæan, Banksian, and Sherardian libraries. Containing liliaceous plants, and the Orchis tribe, it is much more splendid than the first. The figures are copied from all quarters, though several are original, and amount to about 600 in all, many of them executed with great correctness and elegance, more especially after the fine engravings of the Hortus Malabaricus. There are, of course, several repetitions of the same species, and abundance of garden varieties of Tulips, &c. The *Orchideæ* are numerous, but inferior, as to the correctness of their flowers, to some other plants, a defect arising from their singularity or minuteness. The preface attributes the anticipated publication of this volume to the greater popularity and attraction of its contents; and speaks of many of the intended figures of the whole work, as to be executed from drawings made by the author himself, after original specimens, either preserved in Burser's fine Swiss herbarium, or obtained from other quarters. The author speaks of his son and nephew, each of the same name with himself, as his coadjutors, and the destined continuators of this laborious undertaking. The destruction of his materials is extremely to be regretted; for such a repository of the botanical knowledge of the time, would have been highly valuable to succeeding writers; particularly as illustrating the plants of Bauhin, so many of which are to be determined from Burser's herbarium only. The volume in question stands alone, like the single unrivalled column of the temple of peace at Rome, a perpetual cause of regret, and a monument of irrevocable destruction.

Another great work of our author, on which, most of all perhaps, his literary celebrity depends, is entitled *Atlantica*, and ought to consist of four volumes in folio; but of these the fourth, at least, if we mistake not, is to be met with in manuscript only. The others are extremely rare, probably from the accident of the fire above-mentioned. One alone, composed of wooden cuts, is in our possession. The aim of this singular, but profoundly learned, performance, was to prove that Sweden had been the terrestrial paradise of our first parents, the *Atlantis* of Plato, and the source of all learning, ancient mythology, arts, and sciences. By a passage in Linnæus's Lapland Tour, v. 1. 19, it should seem that Rudbeck had fixed the scene of the Trojan war at a village in Gestrickland, which bears the name of Troye. The reader will no longer wonder at this, when, in one of our author's illustrative maps, he finds Helicon stationed in Lapland; the Fortunate Islands at the Orkneys; and Acheron at the Maelstrom, off the coast of Norway. The church of old Upsal, certainly a hyperborean temple of the simplest form, and the most remote antiquity, is supposed to have been a fane of Apollo. It is square, with two round-arched door-ways at each side, but no windows. Rudbeck compares it with the temple of Janus at Rome, and shews how the present cathedral of Upsal originated from the plan of a similar edifice. In these points his remarks are well worthy of attention. Those who cannot help smiling at the wildness of some of his hypotheses, must respect his learning and ingenuity, and his work is said to have excited much attention when it first appeared. At present it ranks chiefly among the baubles of mere collectors, for the sake of its rarity.

This great man did not long survive the wreck of all his hopes and labours, in the fire at Upsal. He died in 1702, aged 72, having, nine years before, resigned the Professorships of Botany and Anatomy to his son. In the frontispiece of his *Atlantica* he is represented, with rather an agreeable and sensible countenance, of a plump and sleek habit of body, with long straight hair, and the habiliments of our professors and divines in the time of the Commonwealth. He is demonstrating his peculiar opinions to a circle of ancient philosophers and poets, and Plato is lending the delighted Hesiod a pair of spectacles. Rudbeck is said to have been a man of a mild and amiable character, much esteemed for his personal qualities, as well as for his boundless erudition. We can scarcely call him the founder of Botanical Science in Sweden, because he was preceded by Chesnecopherus, under whose presidency at Upsal, in 1621, a physical dissertation on plants was published and defended by Starbeck, a native of Smoland, which evinces the deep attention this branch of philosophy had even then excited, in that famous school. The curious reader may trace, in this dissertation, many ideas, supposed to have a more modern origin. Rudbeck's Works. Haller's Bibl. Bot. and Anat. Aikin's Gen. Biog. S.

RUDBECK, OLOF, junior, son of the preceding, was born at Upsal in 1660. Having been directed by his father to his own favourite studies of medicine, botany, and antiquities, he proved worthy of such a parent, friend, and preceptor. He excelled likewise in the art of delineating natural objects, and found great advantage from this talent in his subsequent pursuits. Having travelled to Holland, he took his degree of doctor of physic, at Utrecht, in 1690, publishing on that occasion an able dissertation, *de Fundamentali*

RUCKINGEN, a town of Germany, in the county of Isenburg, on the Kinzig; 5 miles N.E. of Hanau.

RUCTATION, Ructus, in *Medicine*, belching, an involuntary discharge of flatus from the stomach, sometimes accompanied with a portion of the solid or liquid contents of that organ.

This is usually one of the symptoms of indigestion, whether arising from a morbid condition of the stomach, or from a temporary overloading of it with too much food, or with food of an acrid, heavy, or indigestible quality, or such as is disposed to pass into fermentation. There is a natural tendency in the food, especially the vegetable portion of it, to the process of fermentation, and the consequent evolution of air; but by the influence of the gastric juice, when it is sufficient to accomplish the digestive process, this tendency is counteracted, and no air is evolved. Whence the best remedy for eructation is the improvement of the digestive power, and the avoiding of fermentative food. See Indigestion.

RUD, in *Ichthyology*. See Cyprinus *Carassius*, and Cyprinus *Erythrophthalmus*.

Rud, in *Rural Economy*, a term provincially signifying a sort of red ochre.

RUDAW, in *Geography*, a town of Prussia, in the province of Natangen; 12 miles S.W. of Lick.—Also, a town of Prussia, in the province of Samland, formerly fortified with a castle, now in ruins. Some monuments of Pagan idolatry still remain in the vicinity of Rudaw; and also a stone pillar in a field near Tranzou, erected in commemoration of a victory obtained by the knights of the Teutonic order in 1370, over Kinstud, great duke of Lithuania; 12 miles N.N.W. of Königsberg.

RUDBECK, John, in *Biography*, a learned Swedish bishop, was born about the year 1581. After having obtained the elementary parts of education, he was entered at the university of Upsal, where he made such progress in the higher branches of learning, that before he had completed his twenty-third year he was appointed professor of mathematics, which, in 1610, he exchanged for his professorship of Hebrew. On the coronation of Gustavus Adolphus, he took his degree in theology, and in 1619 he was nominated to the bishopric of Vesteras. In consequence of some strong expressions which he made use of in a public oration, a violent dispute took place between him and professor Messenius, which was carried so far, that the king was obliged to interfere, and to allay the angry passions of the disputants, his majesty appointed Messenius assessor in one of the courts of justice; and in 1613 he made Rudbeck one of his own chaplains. It was owing, in a great measure, to the zeal and exertions of this prelate, that the Swedish bible, known among the learned as the Bible of Gustavus Adolphus, was published in 1618. He is also known and highly esteemed in his own country for the considerable donations which he made to the gymnasium of Vesteras, and for his aid in the improvement of other useful institutions; he died in 1646. He was author of several theological works, of which the titles are given in the General Biography. Among these was one, entitled "Privilegia quædam Doctorum, Magistrorum, Pracalaureorum, Studiosorum, et Scholarum omnium, &c." This work, which excited great attention, had nearly proved the author's ruin, and was, very soon after the publication, prohibited by a decree of the senate. Upon this occasion, one of the members of the senate asserted, that a more dangerous book had scarcely ever appeared, and that it was necessary the publisher should make oath that he had not retained a single copy. It prevented the promotion of the prelate, who would otherwise probably have been raised to the rank of archbishop.

Rudbeck, Olof, or Olaus, a man of very extensive learning and accomplishments, who if not, strictly speaking, the father of natural science in Sweden, must be reckoned among its earliest and most distinguished patrons and cultivators, was the son of John Rudbeck, bishop of Vesteras; an honest and uncourtly bishop, who spoke truth, and was never promoted. The son had a great and vigorous mind, somewhat over-luxuriant in speculation and hypothesis, but sagacious in discovery, and indefatigable in application. He was born in 1630, and educated at Upsal. Anatomy was his earliest study, and he prosecuted it with such success, that at the age of nineteen or twenty he made the important discovery of the lymphatic vessels in the liver, and, soon afterwards, of those of other parts of the body. His inaugural dissertation, in 1652, treated of the circulation of the blood. Bartholine contended with Rudbeck for the originality of the discovery of the lymphatic system, and they appear to have made it independent of each other; though Haller gives the priority, in point of time, to Rudbeck. See Bartholine, Thomas.

The university of Upsal was, at this time, advancing rapidly towards that celebrity which it has now so long maintained. Enriched with the patrimonial estates of the great Gustavus Vasa, its funds have ever been ample, and the good sense of its directors has generally led them to a right application of these resources. Rudbeck, however, having made Botany a part of his pursuits, contributed, out of his own means, to the advancement of that science. He founded a garden, which he afterwards gave to the university. He visited Holland in 1653, but returning home next year, devoted himself to the study, and, we presume, to the practice of medicine, as well as to the instruction of his pupils in anatomy. In 1658 he was appointed professor of medicine, and was fixed at Upsal for the remainder of his life. It appears that he married before the age of thirty, his son, the subject of our next article, having been born in 1660, but we have no particular account of Rudbeck's domestic history. Besides the attention which he gave to the above-mentioned pursuits, he very early addicted himself to the study of languages, history, antiquities, architecture, and music, as well as the practical art of drawing. He so far took the lead in matters of taste, that the public festivals and decorations, at the coronation of the young king Charles XI., in 1660, were put entirely under his direction.

The first botanical publication of Rudbeck seems to have been his Catalogue of the Upsal Garden, printed in 1658, the year after the establishment of that collection. To this little volume a preface in Latin and Swedish is prefixed, treating of practical horticulture, and recommending botany for its agreeableness and utility. The list is, of course, not very ample, but contains several exotic species and varieties; and when the author complains of a sharp frost on the 24th of July, we cannot but allow the protection of stoves and greenhouses to have been of the most imperious necessity, so that he could scarcely, in one year, have sufficiently provided them. An Appendix to this catalogue was printed in 1666, the garden having been, by that time, considerably enriched. The same year, 1666, not, as Linnæus has it, 1664, another similar work appeared, *Deliciæ Vallis Jacobæa;* a catalogue, alphabetical like the former, of a garden at Jacob's Dahl, near Stockholm, belonging to count Magnus Gabriel de la Gardie, chancellor of the kingdom of Sweden, as well as of the university of Upsal. This, though anonymous, is attributed by Linnæus to

to Rudbeck. It is a little book of extreme rarity, insomuch that Haller speaks of it by report only. A Latin poem is prefixed to the work, describing the beauty of this villa, its orangery, aviary, plantations, and fountains.

We know not at what period of his life Rudbeck first conceived the vast project of his *Campi Elysii*, in which all the plants in the world, as far as they had been discovered, were to be represented by wooden cuts, in twelve folio volumes, disposed according to Bauhin's *Pinax*. For this stupendous work he is said to have prepared ten or eleven thousand figures. The first and second volumes were already printed, when a dreadful fire reduced almost the whole town of Upsal to ashes, in the year 1702. Three copies only of the first volume escaped the fire, two of which remain in Sweden, and the third is preserved in the Sherardian library at Oxford. A few leaves of this last copy, having been deficient, are supplied in manuscript. A number of the blocks of this very volume, which consists of grasses and their allies, came into England with the Linnæan collection; and having been compared with the Oxford copy, an impression of them was given to the public in 1789, under the title of *Reliquiæ Rudbeckianæ*, the appropriate letter-press of each figure, and the Linnæan names, being subjoined. An historical preface is prefixed to this edition, as well as a dedication to Dr. John Gustavus Acrel, Professor of Medicine at Upsal, who was entrusted with the sale of the Linnæan museum and library. (See LINNÆUS.) The object of the dedication is to bear testimony to the honourable conduct of this gentleman, who, because he would not act unjustly, was accused of having received a bribe of 100 pounds, so moderate is the standard of bribery in Sweden, to betray the interest of the proprietors. Perhaps this report arose from his rejecting, for them, the offer of the same sum, from another quarter, to forfeit their engagement to the person with whom they had treated, and to whom he indignantly communicated the proposal.

The second volume of the *Campi Elysii* came from the press a little before the former; so that several copies, having got abroad, escaped the destruction of the rest. Even this, however, is a very rare book, the price of which can hardly be estimated. A copy was bought by professor Jacquin in Germany, many years ago, for about 30 guineas. This volume is in the Linnæan, Banksian, and Sherardian libraries. Containing liliaceous plants, and the Orchis tribe, it is much more splendid than the first. The figures are copied from all quarters, though several are original, and amount to about 600 in all, many of them executed with great correctness and elegance, more especially after the fine engravings of the Hortus Malabaricus. There are, of course, several repetitions of the same species, and abundance of garden varieties of Tulips, &c. The *Orchideæ* are numerous, but inferior, as to the correctness of their flowers, to some other plants, a defect arising from their singularity or minuteness. The preface attributes the anticipated publication of this volume to the greater popularity and attraction of its contents; and speaks of many of the intended figures of the whole work, as to be executed from drawings made by the author himself, after original specimens, either preserved in Burser's fine Swiss herbarium, or obtained from other quarters. The author speaks of his son and nephew, each of the same name with himself, as his coadjutors, and the destined continuators of this laborious undertaking. The destruction of his materials is extremely to be regretted; for such a repository of the botanical knowledge of the time, would have been highly valuable to succeeding writers; particularly as illustrating the plants of Bauhin, so many of which are to be determined from Burser's herbarium only. The volume in question stands alone, like the single unrivalled column of the temple of peace at Rome, a perpetual cause of regret, and a monument of irrevocable destruction.

Another great work of our author, on which, most of all perhaps, his literary celebrity depends, is entitled *Atlantica*, and ought to consist of four volumes in folio; but of these the fourth, at least, if we mistake not, is to be met with in manuscript only. The others are extremely rare, probably from the accident of the fire above-mentioned. One alone, composed of wooden cuts, is in our possession. The aim of this singular, but profoundly learned, performance, was to prove that Sweden had been the terrestrial paradise of our first parents, the *Atlantis* of Plato, and the source of all learning, ancient mythology, arts, and sciences. By a passage in Linnæus's Lapland Tour, v. 1. 19, it should seem that Rudbeck had fixed the scene of the Trojan war at a village in Gestrickland, which bears the name of Troye. The reader will no longer wonder at this, when, in one of our author's illustrative maps, he finds Helicon stationed in Lapland; the Fortunate Islands at the Orkneys; and Acheron at the Maelstrom, off the coast of Norway. The church of old Upsal, certainly a hyperborean temple of the simplest form, and the most remote antiquity, is supposed to have been a fane of Apollo. It is square, with two round-arched door-ways at each side, but no windows. Rudbeck compares it with the temple of Janus at Rome, and shews how the present cathedral of Upsal originated from the plan of a similar edifice. In these points his remarks are well worthy of attention. Those who cannot help smiling at the wildness of some of his hypotheses, must respect his learning and ingenuity, and his work is said to have excited much attention when it first appeared. At present it ranks chiefly among the baubles of mere collectors, for the sake of its rarity.

This great man did not long survive the wreck of all his hopes and labours, in the fire at Upsal. He died in 1702, aged 72, having, nine years before, resigned the Professorships of Botany and Anatomy to his son. In the frontispiece of his *Atlantica* he is represented, with rather an agreeable and sensible countenance, of a plump and sleek habit of body, with long straight hair, and the habiliments of our professors and divines in the time of the Commonwealth. He is demonstrating his peculiar opinions to a circle of ancient philosophers and poets, and Plato is lending the delighted Hesiod a pair of spectacles. Rudbeck is said to have been a man of a mild and amiable character, much esteemed for his personal qualities, as well as for his boundless erudition. We can scarcely call him the founder of Botanical Science in Sweden, because he was preceded by Chesnecopherus, under whose presidency at Upsal, in 1621, a physical dissertation on plants was published and defended by Starbeck, a native of Smoland, which evinces the deep attention this branch of philosophy had even then excited, in that famous school. The curious reader may trace, in this dissertation, many ideas, supposed to have a more modern origin. Rudbeck's Works. Haller's Bibl. Bot. and Anat. Aikin's Gen. Biog. S.

RUDBECK, OLOF, junior, son of the preceding, was born at Upsal in 1660. Having been directed by his father to his own favourite studies of medicine, botany, and antiquities, he proved worthy of such a parent, friend, and preceptor. He excelled likewise in the art of delineating natural objects, and found great advantage from this talent in his subsequent pursuits. Having travelled to Holland, he took his degree of doctor of physic, at Utrecht, in 1690, publishing on that occasion an able dissertation, *de Fundamentali*

mentali Plantarum Notitiâ ritè acquirendâ. In this he afferts the neceffity of arranging and diftinguifhing the genera of plants by their fructification alone, and prefers fuch leading principles as are derived from the fruit, rather than from the corolla. He rejects habit, colour, fenfible qualities, time of flowering, &c. on which fo much ftrefs has been laid by fuperficial obfervers; while, on the other hand, he declines being implicitly led by the more abftrufe principles of certain more philofophical botanifts. Some unfortunate errors of the prefs occur in pages 12, 13, &c. the terms *gymno-* and *angio-fpermæ* being often tranfpofed. Rudbeck extends his remarks to nomenclature, and very much to the purpofe. He had previoufly, at Upfal, in 1686, defended a thefis, *de Propagatione Plantarum*, which is lefs original, though highly creditable as a fchool exercife. The Upfal garden was founded immediately on his return, and enriched with feeds obtained from the collections in Holland.

On the 21ft of May 1695, profeffor Rudbeck, junior, fet out from Upfal on a tour to Lapland, accompanied by two young men, the fons of Count Gyllenborg. After his return he prepared a very ample account of his journey, having made a number of drawings for the purpofe. The firft part, publifhed in 1701, in Latin and Swedifh, is dedicated to king Charles XII. in a Latin, as well as Swedifh, poem, and ornamented with a magnificent wood cut of the *Pedicularis Sceptrum-Carolinum*. But this volume, a thin quarto, goes no further than the province of Upland. The reft of the materials, except a collection of drawings of plants, which ftill exift, and perhaps rather belong to the *Campi Elyfii*, feem to have perifhed in the fire of Upfal. Such indeed was the fate of moft of the copies of the work juft mentioned, entitled *Laponia illuftrata*, which is therefore an extremely fcarce book.

In 1720 Rudbeck, in conjunction with Benzelius, afterwards archbifhop of Upfal, founded the Swedifh Academy of Sciences, as it was then called, though fubfequently, when other fimilar eftablifhments arofe at Stockholm, Lund, &c. the original one was entitled the Royal Academy of Upfal. This inftitution ftill flourifhes, and has produced feveral volumes of Tranfactions in Latin. In the firft, printed in 1720, is a catalogue of plants, obferved by Rudbeck in Lapland, with cuts of *Lobelia Dortmanna*, and *Linnæa borealis*.

Several curious differtations came forth, from time to time, from this learned man, which evince his deep erudition, though he betrays, like his father, fomewhat of a paradoxical turn. He was particularly fkilled in oriental literature, and was hence led to undertake the explanation of fome of the moft obfcure fubjects of natural hiftory in the facred fcriptures. He contends that *Borith*, mentioned by fome of the prophets, is neither an herb, nor any kind of foap, but a purple dye. He alfo undertook to demonftrate that the *Dudaim* were Rafpberries. (See DUDAIM.) The perufal of thefe erudite fpeculations, inftead of affording inftruction on the fubject difcuffed, rather leads us to the conviction, that a man who has fo many tools at command, can turn and mould any fubject as he pleafes. The two differtations in queftion appeared in 1733, in quarto. The author had previoufly given to the world three others, the inaugural effays of fome of his pupils. Thefe were on *Hedera*, in 1707, in 4to.; on *Mandragora*, in 1702; and on the *Rubus arcticus* of Linnæus, in 1716, both in 8vo., with good cuts. His moft elaborate and eccentric performance of all, perhaps, is a differtation on the bird *Selav*, which our tranflation of the bible renders a quail. Some have thought it a locuft, but Rudbeck will have it a flying-fifh; and as Johnfon maliciouffy fays of Milton, he is never at a lofs for a reafon. Abundance of profound remarks are interfperfed in this treatife. Amongft other things, the affinity of the Hebrew, Chinefe, and Gothic languages is difcuffed. The younger Rudbeck died in 1740, highly refpected. He left in manufcript a fort of univerfal lexicon, which has never been printed. Rudbeck, jun.'s Works. Haller Bibl. Bot. Aikin's Gen. Biog. Dryand. Bibl. Banks. S.

RUDBECKIA, in *Botany*, was dedicated by Linnæus to the memory of his great countrymen, Olof Rudbeck, father and fon, his predeceffors in the botanical chair at Upfal. (See RUDBECK.) A genus allied to *Helianthus* was well chofen for this purpofe, a Sun-flower having been the emblem, or, fome fay, a part of the coat of arms, of the perfons commemorated.—Linn. Gen. 440. Schreb. 574. Willd. Sp. Pl. v. 3. 2246. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 130. Purfh v. 2. 573. Juff. 189. Lamarck Illuftr. t. 705. Gærtn. t. 172.—Clafs and order, *Syngenefia Polygamia-fruftranea*. Nat. Ord. *Compofitæ oppofitifoliæ*, Linn. *Corymbiferæ*, Juff.

Gen. Ch. *Common Calyx* a double row of flat, broadifh, fhort fcales, fix in each row. *Cor.* compound, radiated. Florets of the conical difk numerous, perfect, tubular-funnel-fhaped, five-cleft in the border; thofe of the radius about twelve, female, ligulate, very long, lanceolate, flat, pendulous, with two or three terminal teeth. *Stam.* in the perfect florets five, capillary, very fhort; anthers united into a cylindrical tube. *Pift.* in the perfect florets, germen fquare; ftyle thread-fhaped, the length of the partial corolla; ftigma deeply divided, revolute: in the female florets, germen minute; ftyle and ftigma wanting. *Peric.* none, except the unchanged calyx. *Seeds* in the perfect florets only, folitary, oblong, each crowned with a membranous four-toothed border. *Recept.* chaffy, conical, longer than the common calyx. Scales the length of the feeds, erect, of a concave or channel-like form, deciduous.

Eff. Ch. Receptacle chaffy, conical. Seed crowned with a four-toothed border. Calyx of a double row of fcales.

1. R. *laciniata*. Broad Jagged Rudbeckia. Linn. Sp. Pl. 1279. Willd. n. 1. Ait. n. 1. Purfh n. 12. (Aconitum helianthemum canadenfe; Cornut. Canad. 178. t. 179.) —Lower leaves pinnate; leaflets ovate, unequal at the bafe, toothed, fomewhat three-lobed: upper ones undivided or three-cleft, ovate-oblong. Crown of the feeds four-toothed. —Native of North America. On the edges of fwamps and ditches, from Canada to Virginia, flowering from Auguft to October. *Purfh.* A hardy perennial in our gardens, where it has been known for nearly two centuries, flowering in autumn. The *ftems* are from five to eight or ten feet high, erect, branched, furrowed, fmooth. *Leaves* alternate, deep green, minutely rough, like a file, to the touch, pointed, variouffy divided. *Flowers* large, terminal, on long folitary *ftalks*, erect; their radius of a full yellow; difk ovate, brown.

2. R. *columnaris*. High-crowned Rudbeckia. Purfh n. 11. Curt. Mag. t. 1601.—Stem fimple, ftraight, with a few flowers, on long ftalks, at the top. Leaves pinnatifid, cut, with linear fegments. Calyx fimple, five-leaved. Difk cylindrical, elongated.—Found on the banks of the Miffouri, by Mr. Frafer, who has brought it to England. The fingular appearance of the *receptacle*, which is quite cylindrical, flat at the top, diftinguifhes this from all other known fpecies. The *rays* are from five to eight, lax, elliptical, jagged at the end. *Leaves* narrow, roughifh.

3. R. *digitata*. Narrow Jagged Rudbeckia. Mill. Dict. n. 6. Ait. n. 2. Purfh n. 13. (Chryfanthemum americanum

canum majus, foliis magis dissectis; Morif. v. 3. 22. sect. 6. t. 6. f. 54.)—Lower leaves pinnate; leaflets pinnatifid: upper ones deeply three-cleft, lanceolate, partly cut. Crown of the seeds crenate. Stem smooth.—Found on the mountains of Virginia and Carolina, flowering from August to October. *Pursh.* This resembles the first species, but has smaller *flowers*, and much narrower, rather smoother, *leaves*. The crown of each *seed*, besides having four teeth, is finely jagged, or crenate.

4. R. *pinnata*. Fragrant Pinnated Rudbeckia. Venten. Hort. Cels. t. 71. Sm. Exot. Bot. v. 1. 73. t. 38. Ait. n. 3. Pursh n. 14. Michaux Boreali-Amer. v. 2. 144. (R. digitata; Willd. n. 2.)—Leaves pinnate, somewhat subdivided. Crown of the seed entire at the edge. Stem rough.—Native of the western parts of Carolina and Georgia, where it flowers from July to October. *Pursh.* With us it is a hardy perennial, having been introduced, from the garden at Madrid, by seeds sent to the late lady Amelia Hume. Every part of the *herbage* is minutely rough. *Flowers* large and handsome, with the scent of anise; their rays deep yellow; numerous, broad, downy, pointing downwards; disk ovate, dark purple, almost black. Ventenat mistook this for the *digitata* of Miller and Aiton.

5. R. *triloba*. Three-lobed Rudbeckia. Linn. Sp. Pl. 1280. Willd. n. 3. Ait. n. 4. Pursh n. 9. (Chrysanthemum cannabinum virginianum hirsutum, disco nigro, petalis aureis radiato; Pluk. Almag. 100. Phyt. t. 22. f. 2.)—Leaves spatulate; the lower ones three-lobed; the upper undivided. Stem hairy, much branched. Calyx leafy. Scales of the receptacle with prominent points.—An inhabitant of the mountains of Virginia and Carolina, flowering in August and September. *Pursh.* *Stem* four or five feet high, much branched and spreading, leafy, striated, rough with pale, rigid, deflexed hairs, which are more erect on the branches. *Leaves* more or less shaggy with similar hairs. *Flowers* not much above an inch in diameter, pale yellow according to Mr. Pursh, but partly orange, or tawny, in our dried specimens. Outer scales of the *calyx* leafy, as long as the radiant florets. *Disk* convex, hardly conical, remarkable for the projecting needle-like points of the scales, between the florets. This has long been cultivated in France as well as England, where it is biennial, though sometimes perennial in Carolina.

6. R. *subtomentosa*. Downy Rudbeckia. Pursh n. 10. (R. triloba β; Michaux Boreali-Amer. v. 2. 144.)—"Downy, with short pubescence. Branches erect, many-flowered. Leaves oblong-lanceolate, acute, somewhat serrated; the lower ones three-lobed. Scales of the calyx close-pressed, shorter than the rays."—Native of mountain meadows, in Virginia and the country of the Illinois, flowering in August and September. Perennial, not near so tall as the preceding, from which it is very distinct. *Pursh.*

7. R. *Radula*. File Rudbeckia. Pursh n. 8.—"Stem hispid below; smooth, and nearly naked, above. Stalks very long, single-flowered. Leaves ovate, tapering, tubercurated, hispid. Calyx imbricated; with ovate, pointed, fringed scales.—Gathered by Bartram in Georgia. Mr. Pursh described it from the Banksian herbarium. The *root* is marked as biennial. We have examined no specimen.

8. R. *hirta*. Great Hairy Rudbeckia. Linn. Sp. Pl. 1280. Willd. n. 4. Ait. n. 5. Pursh n. 7. (R. foliis lanceolato-ovatis, alternis, indivisis, petalis radii bifidis; Mill. Ic. t. 224. f. 1. Obeliscotheca integrifolia, radio aureo, umbone atro-rubente; Dill. Elth. 295. t. 218.)—Rough with bristly hairs. Stem slightly branched, single-flowered. Flower-stalk elongated, naked. Leaves undivided, ovate, somewhat spatulate, triply ribbed, serrated. Calyx leafy. Scales of the receptacle lanceolate, hairy.—Found on the mountains from Virginia to Florida, flowering from July to September. *Pursh.* *Root* biennial. *Herb* about two feet high, rough and hairy. *Flower* rather large, with a dark brown disk, and long yellow rays.

9. R. *fulgida*. Small Hairy Rudbeckia. Ait. n. 6. Willd. n. 5. Pursh n. 6.—Stem hispid. Branches straight, single-flowered. Leaves oblong-lanceolate, triply ribbed, toothed, rough; contracted, and somewhat heart-shaped, at the base. Calyx leafy. Scales of the receptacle lanceolate, fringed.—In mountain meadows and woods, from Pensylvania to Carolina, flowering from July to October. *Pursh.* Said in Hort. Kew. to have been introduced into England, by the late Messrs. Kennedy and Lee, in 1760. This differs from the last in having a perennial *root*; branched *stem*; and smaller *flowers*, whose rays are of a deep orange-colour, and the disk dark purple. The scales of the *calyx* are shorter, broader, and more ovate.

10. R. *densifolia*. Crowded-leaved Rudbeckia.—Stem rough. Branches single-flowered. Leaves opposite, stalked, elliptic-lanceolate, rough, somewhat toothed. Calyx close-pressed, not half the length of the rays.—Gathered by Commerson, on rocks at Monte Video. The *stem* seems rather shrubby, branched, round, clothed with numerous leaves, and very rough with minute depressed prickles, such as cover every part of the herbage. *Leaves* about an inch and half long, more or less acute, sometimes distantly toothed; the upper ones partly scattered. *Flowers* large, on long, rough, nearly leafless *stalks*. Scales of the *calyx* ovate, rough and fringed. *Rays* numerous, broad, yellow, ascending, almost thrice as long as the *calyx*. *Disk* brown, or purplish.

11. R. *decumbens*. Decumbent Rudbeckia.—Stem decumbent, creeping. Leaves opposite, stalked, linear-spatulate, nearly smooth. Flower-stalks erect, solitary, angular, very long and slender, slightly hairy.—Found by Commerson on the rocks of Monte Video. The *stems* are woody, creeping by means of numerous radicles, ascending at the extremity only, but producing, as they go, a dense assemblage of short leafy shoots or branches. *Leaves* very various in size and breadth, obtuse, triply ribbed, rather fleshy, very slightly and occasionally hairy, nearly entire. *Flower-stalks* terminal, solitary, simple, single-flowered, erect and straight, naked, near a span long, being ten times the length of the leaves, of equal thickness throughout. *Flowers* about an inch in diameter, yellow in the *disk* as well as *radius*. Scales of the *calyx* ovate, acute, close-pressed, fringed with bristles, and about half the length of the rays. We have no means of investigating the *receptacle*, or *seed-crown*, but we presume, from the habit of every part, the genus can scarcely be doubtful.

12. R. *bellidioides*. Daisy-like Rudbeckia.—Stem decumbent. Leaves opposite, stalked, ovate, rough-edged. Flower-stalks erect, solitary, very long; swelling and very downy at the top.—This likewise was gathered by Commerson, at Monte Video. *Roots* creeping, with thick fleshy fibres. *Stems* trailing, with short leafy branches, forming a sort of tuft, much as in the foregoing, but the leafy part does not appear to take root. *Leaves* tolerably uniform, from one and half to two inches long, and half an inch wide, obtuse, triply ribbed, entire; very rough on the ribs and margin; tapering down at the base into a broad fringed *footstalk*. *Flower-stalks* four or five inches long, situated as in the last species, but stouter, especially towards the flower, where they are densely covered with short, rigid, close-pressed hairs. *Flowers* entirely yellow, the size of the last,

laſt. Scales of the *calyx* cloſe-preſſed, ovate, half the length of the *radius*, ſmooth, except a ſlight marginal fringe; ſtrongly ribbed, or furrowed, at the baſe. The younger Linnæus, as well as Commerſon, thought this a *Rudbeckia*, nor have we ſufficient doubts on the ſubject to ſpoil a flower by diſſection.

13. R. *ariſtata*. Awn-ſcaled Rudbeckia. Purſh n. 5.—"Stem hiſpid. Branches elongated, corymboſe, ſingle-flowered. Leaves lanceolate-oblong, ſerrated, hiſpid. Diſk of the flower nearly hemiſpherical. Scales of the ſeed-crown awl-ſhaped, awned."—Native of South Carolina; deſcribed by Mr. Purſh from the Bankſian herbarium. The *flowers* are ſmall, deep yellow. If there be no error in the above definition, and the *ſeed* be really crowned with ſeparate awl-ſhaped ſcales, this ſpecies does not well anſwer to the character, or idea, of a *Rudbeckia*. The analogy of other ſpecies would lead us to ſuppoſe the ſcales of the *receptacle* were meant, had not the words "*paleis pappi*" been ſo preciſe.

14. R. *ſpatulata*. Spatulate-leaved Rudbeckia. Michaux Boreali-Amer. v. 2. 144. Willd. n. 6. Purſh n. 4.*—"Slender, finely downy. Stems ſingle-flowered. Leaves obovato-ſpatulate, entire. Calyx ſpreading, imbricated. Radiant florets three-toothed."—Gathered by Michaux on the mountains of Carolina; by Bartram in Florida. It is biennial, flowering in July and Auguſt. *Purſh*.

15. R. *diſcolor*. Two-coloured Rudbeckia. Purſh n. 4.—"Branches corymboſe, ſingle-flowered. Flower-ſtalks naked, elongated. Leaves lanceolate, nearly entire, rough with rigid hairs. Calyx-ſcales ovate, acute. Petals lanceolate, entire, of two colours, as long as the calyx."—Gathered in Florida, by Bartram. Perennial. *Flowers* ſmall; their rays yellow above, deep orange or purple underneath. *Purſh*. We have not examined a ſpecimen of either of the two laſt, both which Mr. Purſh deſcribed from ſir Joſeph Banks's herbarium.

16. R. *lævigata*. Smooth Rudbeckia. Purſh n. 3.—"Quite ſmooth all over. Stem poliſhed, panicled. Branches corymboſe. Stalks elongated, ſingle-flowered. Leaves ovato-lanceolate, pointed at each end, triply ribbed, poliſhed, nearly entire. Scales of the calyx lanceolate, the length of the rays."—Found by Mr. Lyon, in Georgia. Perennial. The *leaves* have occaſionally one or two teeth. *Rays* pale yellow, ſhort. In Mr. Lambert's herbarium. *Purſh*.

16. R. *amplexifolia*. Stem-claſping Rudbeckia. Jacq. Coll. v. 5. 155. Ic. Rar. t. 592. Willd. n. 7. Ait. n. 7. Purſh n. 2. (R. perfoliata; Cavan. Ic. v. 3. 27. t. 252.)—Leaves elliptic-oblong, heart-ſhaped at the baſe, naked, rough-edged; the lower ones ſerrated. Stem ſmooth, ſtriated. Diſk nearly cylindrical.—Native of Lower Louiſiana, on the banks of the Miſſiſippi, flowering in July and Auguſt. We had a ſpecimen, in 1793, from the garden of Mr. Saliſbury, who received ſeeds the preceding year, ſaid to have been collected by Michaux, in New Orleans. The *root* is annual. *Stem* erect, branched, round, leafy, about two feet high. *Leaves* of a pale glaucous green, acute, alternate, reticulated with veins, very ſmooth, except at the edge, which is beſet with minute cloſe prickles. *Flowers* ſolitary, at the ſummit of each branch, erect, with broad, dependent, deep yellow *rays*, each terminating in two or three blunt teeth; and an elongated, obtuſe, dark green or blackiſh *diſk*.

17. R. *purpurea*. Purple Rudbeckia. Linn. Sp. Pl. 1280. Willd. n. 8. Ait. n. 8. Purſh n. 1. Curt. Mag. t. 2. Chryſanthemum americanum, doronici folio, &c.; Pluk. Phyt. t. 21. f. 1. Cateſb. Carol. v. 2. t. 59.)—Leaves rough, ovate, tapering at the baſe, undivided, toothed; the upper ones lanceolate, entire. Rays very long, pendulous, cloven.—On the mountains from Virginia to Florida, flowering from Auguſt to October. *Purſh*. This elegant and hardy perennial plant has been more than a century in our gardens. It thrives beſt in a rich moiſt ſoil, and is propagated by parting the roots. The *ſtems* are three or four feet high, erect, round, ſtriated, ſmooth, moſtly purpliſh. *Leaves* triply ribbed, near a ſpan long, rough and harſh to the touch; the lower ones on long ſtalks. *Flowers* terminal, ſolitary, very large, and of a beautiful, as well as ſingular, aſpect; the *diſk* obtuſely conical, brown, beſet with the long, prominent, rigid, ſpinous ſcales of the *receptacle*; *radius* of numerous, linear-lanceolate, pink or light crimſon *florets*, each three inches long, pendulous, acute and cloven at the extremity. Mr. Curtis obſerves that the *ſeeds* are rarely perfected here, nor do the *roots* increaſe very faſt. Linnæus has ſtrangely erred, in referring to this ſpecies, Miller's yellow-flowered figure, which belongs to *R. hirta*; ſee n. 8.

R. *anguſtifolia*, Linn. Sp. Pl. 1281. Willd. n. 9, proves the very ſame plant with *Helianthus anguſtifolius* of the ſame authors.

R. *oppoſitifolia*, Linn. Sp. Pl. 1280, is, according to Mr. Purſh, the ſame as *Helianthus lævis*, Linn. Sp. Pl. 1278, and *Silphium ſolidaginoides*, ibid. 1302. Perſoon has eſtabliſhed it as a new genus, by the name of *Heliopſis lævis*, and he is followed by Purſh, p. 563. The *leaves* do not anſwer to the ſpecific name, being rough with briſtly warts.

R. *alata*, Jacq. Ic. Rar. t. 593, is *Helenium quadridentatum*, Willd. Sp. Pl. v. 3. 2121. Purſh 560. See HELENIUM.

RUDBECKIA, in *Gardening*, contains plants of the herbaceous, biennial, and perennial kinds, of which the ſpecies cultivated are, the broad jagged-leaved rudbeckia (R. laciniata); the narrow jagged-leaved rudbeckia (R. digitata); the hairy rudbeckia (R. hirta); the purple rudbeckia (R. purpurea); the narrow ſimple-leaved rudbeckia (R. anguſtifolia); and the three-lobed rudbeckia (R. triloba).

Method of Culture.—All the ſorts of theſe plants may be increaſed by off-ſets, parting the roots and ſeeds. The off-ſets in the perennial ſorts ſhould be taken off, and planted out in the early autumn: when the ſtems decay, the roots may alſo be divided, and planted out at the ſame time, or in the early ſpring months. And as theſe plants are often liable to go off ſoon, ſome ſhould be frequently raiſed to keep up the ſtock; and others have a tendency to become biennial, and decay without increaſing the root: they ſhould have the flower-ſtems cut down in the early ſummer, to encourage the growth of the root off-ſets, for ſlipping in the following autumn.

However, all the ſorts may be raiſed from ſeed, and the biennial ſorts muſt always be raiſed annually in that way; likewiſe ſuch of the perennial kind as are biennially inclined, ſowing the ſeeds in April, in a border of light earth, raking them in; and when the plants are two or three inches high, pricking them out in nurſery-rows till autumn, then planting them out where they are to remain. They ſhould have a light dry ſoil, and rather warm ſituation. They all afford much ornament and variety in the borders and clumps, among other flowering plants.

RUDDER, in *Navigation*, a piece of timber turning on hinges in the ſtern of a ſhip; and which oppoſing ſometimes one ſide to the water, and ſometimes another, turns or directs the veſſel this way or that.

The rudder becomes gradually broader, in proportion to its

its diſtance from the top, or to its depth under water. The back, or inner part of it, which joins to the ſtern-poſt, is diminiſhed into the form of a wedge through its whole length, ſo as that the rudder may be the more eaſily turned from one ſide to the other, where it makes an obtuſe angle with the keel. The hinges, which are bolted round the ſtern-poſt to the after-extremity of the ſhip, are called *googings*, and are furniſhed with a large hole on the after-part of the ſtern-poſt. The other parts of the hinges, which are bolted to the back of the rudder, are called *pintles*, being ſtrong cylindrical pins, which enter into the googings, and reſt upon them. The length and thickneſs of the rudder are nearly equal to thoſe of the ſtern-poſt. The rudder is turned upon its hinges, by means of a long bar of timber, called the *tiller*, which enters nearly in an horizontal direction into the ſhip, paſſing under the upper or middle deck tranſom; and its operation is directed by the tiller-rope, which in large veſſels is wound about a wheel. (See TILLER.) The power of the rudder is reducible to that of the lever, and the oblique action of the water upon it is to be determined by the reſolution of forces.

In order to explain the action of the rudder on the ſhip, it ſhould be conſidered that if, inſtead of leaving the rudder exactly in a right line with the keel, ſo as to be a kind of prolongation of it, it be turned to one ſide or the other, as B D (*Plate* IV. *Navigation*, *fig.* 4.), it receives an immediate impulſe from the water, which glides along the ſhip's bottom, in running aft from A to B; and this fluid impels it towards the oppoſite ſide, while it continues in that ſituation, ſo that the ſtern, to which the rudder is confined, receives the ſame movement; and the ſhip receiving an impulſe ſideways, her ſtern turns accordingly from B to *b*, on any point whatever C, while her head paſſes from A to *a*. It muſt be obſerved, that the water ſtrikes the rudder obliquely, and only with that part of its motion which acts according to the ſine of incidence, in impelling it in the direction N P, with a force which depends not only on the rapidity of ſailing, but alſo on the greatneſs of the ſine of incidence; a force which is conſequently in the compound ratio of the ſquare of the greater or leſs velocity of the ſhip's motion, and of the ſquare of the larger or ſmaller ſine of incidence, which depends upon various circumſtances. So that, if the veſſel runs three or four times more ſwiftly, the abſolute ſhock of the water upon the rudder will be nine or ſixteen times ſtronger under the ſame angle of incidence, and will be augmented in a greater proportion, if the ſine of incidence be increaſed. This impulſion, or, what is the ſame, the power of the helm, is always very feeble, when it is compared with the whole weight of the veſſel; but it acts with a very long arm of a lever, which occaſions it to work very advantageouſly in turning the ſhip; for the helm is fixed at a very great diſtance from the centre of gravity G, as well as from the point C, upon which the ſhip is ſuppoſed to turn, with reſpect to the point of percuſſion B: and if the direction P N of the impreſſion of the water upon the rudder be prolonged, it is evident that it will paſs perpendicularly at the point R, widely diſtant from the centre of gravity G; therefore the abſolute effort of the water is very powerful. It is not therefore ſurpriſing, that this machine impreſſes the ſhip with a conſiderable circular movement, by forcing the ſtern from B to *b*, and the head from A to *a*, and even much farther, when the velocity of the ſhip is preſerved; becauſe the effect of the helm always keeps pace with the rapidity of the ſhip's way.

Amongſt all the obliquities which may be given to the rudder, there is one ſituation which is more favourable than any of the others, to make it produce with more rapidity the effect of turning the ſhip, in order to change her courſe. To be convinced of this, we have only to conſider that, if the obtuſe angle A B D (*fig.* 4.) were to be leſſened, the impulſe of the water on the rudder would augment, at the ſame time that it would more oppoſe the ſailing of the ſhip, ſince the angle of incidence would be more open, and would preſent a greater ſurface to the ſhock of the water, by oppoſing its paſſage more perpendicularly: but then the direction N P of the effort of the helm upon the ſhip would paſs at a ſmaller diſtance from the centre of gravity G towards R, and would leſs approach the perpendicular N L; according to which, it is abſolutely neceſſary that the power ſhould act with greater effect to turn the ſhip. Therefore, it is evident, that, if the obtuſe angle A B D were too much leſſened, the greater ſhock of the water could not counterbalance the loſs occaſioned by the diſtance between the direction N P and N L, or by the great obliquity which would be given to the ſame direction N P of the abſolute effort of the helm with the keel A B. If, on the other hand, the angle A B D were made more obtuſe, the direction N P of the effort of the rudder would become more advantageous to turn the ſhip, ſince it would approach more the perpendicular N L, and ſince the prolongation of N P would augment G R, by paſſing at a greater diſtance from the centre of gravity G. But the rudder would then be ſtruck too obliquely; for the angle of incidence would be more acute; ſo that it would only preſent a ſmall part of its breadth to the ſhock of the water, and would of courſe receive but a faint impulſion. All this proves that the greateſt diſtance G R from the centre of gravity G will not counterbalance the too great obliquity of the ſhock of the water. Whence it muſt be concluded, that when the water ſtrikes the rudder too obliquely, or too perpendicularly, a great deal of the impulſion, or of the effect it ſhould produce, is loſt. Therefore, between theſe two extremes, there is a middle poſition, which muſt be the moſt favourable.

The diagonal N P of the rectangle I L (*fig.* 4.) repreſents the abſolute direction of the effort of the water upon the rudder: N I expreſſes the portion of this effort which oppoſes the ſhip's head-way, or which forces her a-ſtern in the direction of the keel. It is eaſy to perceive that this portion N I of the whole power of the helm contributes little to turn the veſſel; for, if I N were prolonged, it would be ſeen that its direction paſſes at a very ſmall diſtance G V from the centre of gravity G, and that the arm of the lever B N = G V, to which the force is as it were affixed, is at moſt equal only to one half of the breadth of the rudder. But it is not ſo with reſpect to the relative force N L, which acts perpendicularly to the keel. If the firſt force, N I, is almoſt uſeleſs, and even hurtful, by retarding the velocity; the ſecond, N L, is capable of a very great effect, ſince it is applied at a great diſtance from the centre of gravity G of the ſhip, and acts on the arm of a lever G E, which is very long. Thus it appears, that, between the two effects N L and N I, which reſult from the abſolute effort N P, there is one which is always oppoſing the ſhip's head-way, contributing but little, therefore, to the motion of her turning; whilſt the other alone produces that movement of evolution, without retarding her velocity.

As to the moſt advantageous angle made by the helm, with the line prolonged from the keel, geometricians have fixed it at 54° 44′ (See DYNAMICS, MECHANICS, and WINDMILL.) But it has been ſaid, that, in determining

this angle, they have presumed that the ship is as narrow at her floating line, or at the line described by the surface of the water round her bottom, as at the keel; whereas all vessels increase in breadth from the keel upward to the extreme breadth, where the floating line, or the highest water-line, is terminated; and, therefore, the angle above stated is too large. For the rudder is impressed by the water, at the height of the floating line, more directly than at the keel, because the fluid exactly follows the horizontal outlines of the bottom; so that a particular position of the helm might be supposed necessary for each different incidence which it encounters from the keel upwards. But as a middle position may be taken between all these points, it will be sufficient to consider the angle formed by the sides of the ship, and her axis, or the middle line of her length, at the surface of the water, in order to determine afterwards the mean point, and the mean angle of incidence. The angle 54° 44′, it is said, is too open, and very unfavourable to the ship's head-way, because the water acts upon the rudder there with too great a fine of incidence, as being equal to that of the angle which it makes with the line prolonged from the keel below; but above, the shock of the water is almost perpendicular to the rudder, because of the breadth of the bottom, or that of the ship's sides. If then the rudder is only opposed to the fluid, by making an angle of 45°, or 45° 1′, with the line prolonged from the keel, the impression, by becoming weaker, will be less opposed to the ship's head-way, and the direction N P (*fig.* 4.) of the absolute effort of the water upon the rudder, approaching nearer to the lateral perpendicular N L, will be placed more advantageously, since the prolongation of the absolute effort passes at a greater distance G R from the centre of gravity of the ship. To which it is added, that experience daily testifies, that a ship steers well, when the rudder makes the angle D B E no more than 35°. If this angle be made 45°, and the absolute effort N P be discomposed, we shall have N I equal to the other side N L of the same square; so that the part of the whole power which opposes the head-way of the ship would be only equal to that which produces the movement of rotation; instead of which, if D B E were 54° 44′, N I would become much greater than N L, in proportion to the sines of the angles which are opposed to them in the triangles P I N or P L N, and the ship would lose much more of her velocity than in the first situation of the rudder, which is thought to be best adapted to vessels in general, subject, however, to occasional alteration, as they shall make an angle more or less open with their sides a-stern. Hence it has been concluded, as a general position, that the most advantageous angle will always be found between 35° and 45°. From Bouguer's treatise (ubi infra), it appears, that, in most ships, the angle of the rudder with the prolonged line of the keel should be 46° 40′. L. Euler recommends an obliquity somewhat less than 54° 44′, for the greatest action of the rudder; and establishes this rule, that an obliquity of about 48° will, in general, produce the best effort.

Those who duly consider the action of the *helm* and *tiller* (for an account of which, see those articles) will easily conceive, that the greater the ship's velocity is, the more powerful is the action of the rudder, since it acts against the water with a force which increases as the square of the velocity of the fluid, whether the ship has head-way, or stern-way; observing always, that in these two circumstances the effects are contrary; for, if the ship goes a-stern, the rudder will be struck from I to N (*fig.* 4.); and, instead of being pushed from N to P, it will be so from N to R; so that the stern being moved in the same direction, the head will take a contrary one, and move towards the same side as the tiller B F.

It should be observed, in the use of the rudder, that there is one part of its effort which impedes the ship's sailing, when it is struck by the water which runs rapidly along the ship's bottom. If it makes an angle of 45° with the keel prolonged, it receives only half the impulsion it would, if acted upon perpendicularly; because the absolute impulse diminishes from two causes. The surface which opposes the shock of the water is reduced to a less extent than it was at first, and the angle of incidence diminishes likewise; so that by this, the impulse has diminished one half. Considering next the impulsion N P, which remains (*fig.* 4.), it will appear that there is only one part N I which is opposed to the sailing, and which is less than N P, in the proportion as the sine total is to the sine of 45°, the measure of the angle of incidence V N B equal to N P I; for the angle V N L is right, as well as the angle P N B; so that, if you take away the common angle L N B, the two angles P N L and V N B will remain equal between themselves; but, as the angle I P N is equal to its alternate angle P N L, it follows that I P N is always equal to V N B, whether the angle made by the rudder be more or less open with the keel prolonged. So that, if the surface of the rudder which receives the shock be 80 feet square superficies, it will first be reduced, by its being exposed to the course of the fluid, to an effort of 40 feet surface, then to 28 or 29; because, in the first place, there is only one part of the velocity of the water which contributes to the shock, and that is proportional to the relation of the square of the sine total to that of the sine of incidence; and, secondly, because out of the absolute impulse N P, which results from this last oblique shock, there is only a part N I which opposes the velocity of the ship proportional to the absolute force N P, in the same relation as there is between the sine total and the sine of incidence; that is to say, that when the rudder makes, in the largest ships, an angle of 45°, it impedes the ship's rapidity of sailing, in the direction of the keel, with an effort N I, equivalent to the impulsion which a surface of 28 or 29 feet square might receive, if it were exposed perpendicularly to the shock of the water. So that, if the ship sails 12 knots an hour, or 19 feet a second, the effort of the rudder N I, which opposes the ship's way, will be 12,499 or 12,945 pounds; salt water weighing $\frac{1}{35}$th more than fresh.

It follows, from all that has been said of the rudder, that it ought to be employed as little as possible; that is to say, the ship and her sails ought to be so disposed, that the smallest motion of this machine may bring her to her course, if she deviates from it, or make her perform any evolution which may be thought proper.

The ingenious writer of the article *Seamanship* in the Enc. Brit. suggests, that the theory of M. Bouguer and some other French mathematicians is founded on principles that are erroneous. They assume, as we have above supposed, that the impulse of a fluid is in the proportion of the square of the sine of the angle of incidence; and also that its action on any small portion, such as a square foot of the sails or hull, is the same as if that portion were detached from the rest, and were exposed, single and alone, to the wind or water in the same angle. Both these principles, it is affirmed, are erroneous; and the error is very considerable in cases which most frequently occur in practice, that is, in the small angles of inclination. The error of this theory, especially in cases of great obliquity, may be seen in the following

following table: in which the first column exhibits the angle of incidence; the second, the impulsions really observed; the third, the impulses, if they had followed the duplicate ratio of the sines; and the fourth, the impulses according to the simple ratio of the sines.

Angle of Incidence.	Impulsions observed.	Impulses in dupl. Ratio of Sines.	Impulses in simple Ratio of Sines.
90	1000	1000	1000
84	989	989	995
78	958	957	978
72	908	905	951
66	845	835	914
60	771	750	866
54	693	655	809
48	615	552	743
42	543	448	669
36	[illegible]	346	587
30	440	250	500
24	424	165	407
18	414	96	309
12	[illegible]	43	208
6	[illegible]	11	105

The error in the second principle of the theory is still greater, and the action on one part of the sail or hull is so greatly modified by its action on another adjoining part, that a stay-sail is often seen hanging like a loose rag, although there is nothing between it and the wind; and this merely because a great sail in its neighbourhood sends off a lateral stream of wind, which completely hinders the wind from getting at it. Till the theory of the action of fluids be established, therefore, we cannot tell what are the forces which are acting on every point of the sail and hull: therefore we cannot tell either the mean intensity or direction of the whole force which acts on any particular sail, nor the intensity and mean direction of the resistance to the hull; circumstances absolutely necessary for enabling us to say what will be their energy in producing a rotation round any particular axis. In like manner, we cannot, by such a computation, find the spontaneous axis of conversion (see ROTATION), or the velocity of such conversion. In short, we cannot pronounce with tolerable confidence *à priori* what will be the motions in any case, or what dispositions of the sails will produce the movement we wish to perform. The experienced seaman learns by habit the general effects of every disposition of the sails; and though his knowledge is far from being accurate, it seldom leads him into any very blundering operation. Perhaps he seldom makes the best adjustment possible, but seldomer still does he deviate very far from it; and in the most general and important problems, such as working to windward, the result of much experience and many corrections has settled a trim of the sails, which is certainly not far from truth, but (it must be acknowledged) deviates widely and uniformly from the theories of the mathematician's closet. The honest tar, therefore, must be indulged in his joke on the useless labours of the mathematician, who can neither hand, reef, nor steer.

Bouguer Traité de la Manœuvre des Vaisseaux. Falconer's Marine Dict. art. *Helm*; and Euler's Complete Theory of the Construction and Properties of Vessels, translated by Mr. Watson, 1776, book ii. chap. vii. viii. ix.

A narrow rudder is best for a ship's sailing, provided she can feel it, that is, be guided and turned by it; for a broad rudder will hold much water when the helm is put over to any side; but if a ship have a fat quarter, so that the water cannot come quick and strong to her rudder, she will require a broad rudder.

The aftmost part of the rudder is called the *rake* of the rudder.

Large canal boats have *clasp-rudders*, about half their length being moveable on hinges, so as to fold and shorten them before the entering of a lock.

RUDDER-*Coats*, are coverings made of well-tarred canvas, to prevent the water from running in at the rudder-hole.

RUDDER-*Irons*, in a *Ship*, are the cheeks of that iron of which the pintle is part, which is fastened and nailed down about the rake of the rudder.

RUDDER-*Pendants*. See PENDANTS.

RUDDER-*Rope*. See ROPE.

RUDDER-*Tackle*. See TACKLE.

RUDDIMAN, THOMAS, in *Biography*, was born in the parish of Boyndie, Banffshire, in the year 1674, where he received the first rudiments of his education, and in 1690 he was sent to King's college, Aberdeen, where he obtained a bursary. He took the degree of M. A. in 1694, and in the following year he was elected master of the public school of Laurence-Kirk. In 1700 he removed to Edinburgh, and two years afterwards he was appointed librarian to the faculty of advocates. In 1709 he published Johnson's metrical paraphrase of Solomon's Song, and soon after he added a very accurate glossary to the folio edition of Gawin Douglas's translation of the Eneid. His situation at the advocates' library was so favourable to his literary pursuits, that he declined an invitation from the magistrates of Dundee, to the office of rector of the grammar-school in that town. In 1714 he published his "Rudiments of the Latin Tongue," which became a very popular book in Scotland, and was used in many schools in South Britain. In 1725 he edited "Buchanani Opera omnia," in two vols. folio, to which he added notes critical and explanatory. About the same time he commenced the business of printer, in conjunction with his brother Walter. In 1720 he published the first part of his "Grammaticæ Latinæ Institutiones," which was very soon followed by his "Grammatical Exercises." Of the various works which issued from the press of the Ruddimans, the most important were the "Greek Testament," and an edition of the works of Livy: the last is reckoned an extremely correct edition. He also edited Anderson's "Diplomata et Numismata Scotiæ," to which he prefixed a learned preface. He exhibited great critical acumen in his vindication of "Buchanan's Version of the Psalms," against the objections of Mr. Mann, and by "Critical Observations on Burrman's Commentary on Lucan's Pharsalia." Some treatises on disputed points of Scottish history involved him in controversies, in which he met with much abuse, but he did not lose his own temper, though he was a warm advocate for the national independence of Scotland, and much attached to the house of Stuart. At an advanced age his eye-sight began to fail him, and he resigned the office of librarian to the faculty of advocates in 1752. He died in January 1757, at the age of 83. Chalmer's Life of Ruddiman.

RUDDOCK, in *Ornithology*, an English name for the *rubecula*, more commonly known by the name of the *red-breast*, or *robin-red-breast*.

RUDELSHOFEN, in *Geography*, a town of Germany, in the margraviate of Anspach; four miles E. of Uffenheim.

RUDELSTADT, a town of Silesia, in the principality of Schweidnitz; 16 miles W. of Schweidnitz. N. lat. 50° 42′. E. long. 15° 59′.

RUDEN,

RUDEN, a ſmall iſland in the Baltic, near the coaſt of Pomerania, amidſt ſhoals and ſand-banks, which render it probable that it was formerly much larger; and this conjecture is confirmed by another circumſtance, *viz.* that in the year 1264 it had two church-villages, called "Ruden" and "Carven." On this iſland is a caſtle; and between it and the little iſland of Die is a ſand eight miles long and two broad. N. lat. 53° 40′. E. long. 13° 48′.

Ruden, or *Tydal*, a mountain which ſeparates the province of Jamptland in Sweden, from the province of Drontheim in Norway.

RUDENHAUSEN, a town of Germany, in the county of Caſtel; 28 miles W.S.W. of Bamberg.

RUDENTURE, in *Architecture*, the figure of a rope, or ſtaff, ſometimes plain, ſometimes carved; with which a third part of the fluting of columns is frequently filled up.

It is thus called from the Latins *rudens*, *cable*, whence ſome call it a cabling; and the columns, whoſe flutings are thus filled, they call *rudented*, or *cable columns*.

There are alſo rudentures in relievo, laid on the naked of pilaſters, not fluted; an inſtance of which we have in the church of St. Sapienza at Rome.

RUDERATION, Ruderatio, in *Building*, a term uſed by Vitruvius for the laying a pavement with pebbles, or little ſtones.

To perform the ruderation, it is neceſſary the ground be firſt well beaten, to make it firm, and to prevent its cracking. Then a ſtratum of little ſtones is laid, to be afterwards bound together with mortar, made of lime and ſand, called by Vitruvius *ſtatumen*.

If the ſand be new, its proportion to the lime may be as three to one; but if dug out of old pavements, or walls, as five to two.

Ruderation, Daviler obſerves, is uſed by Vitruvius, lib. vii. cap. 1. for the coarſeſt and moſt artleſs kind of maſonry; where a wall is, as it were, cobbled up.

RUDGELEY, in *Geography*, a market-town in the pariſh of Rudgeley, eaſt diviſion of the hundred of Cuttleſtone, county of Stafford, England, is ſituated on the ſouth bank of the river Trent, at the diſtance of 9½ miles E.S.E. from the town of Stafford, and 131½ miles N.W. by N. from London. It has been long celebrated on account of its great annual fairs for horſes, particularly thoſe of the coach breed. The market day is Tueſday, weekly; and the fairs are held on the 6th of June and 20th of October. The church, which ſtands on the north ſide of the town, is not remarkable as a building, but it contains ſeveral handſome monuments to the memory of the Chetwynd and Weſton families. The living is a vicarage in the patronage of the dean and chapter of Lichfield.

The ancient owners of Rudgeley were of the ſame name with the town, and ſeem to have continued in poſſeſſion till the reign of Henry VI. In the time of Edward III. ſome of the family were ſheriffs of the county; and one was a knight of the ſhire during the ſame period. Erdeſwick ſtates that this manor ſubſequently belonged to the biſhops of Lichfield, and was alienated by biſhop Sampſon to the crown in 1547.

On the oppoſite bank of the Trent from Rudgeley, are ſeveral villages named Ridwane, and diſtinguiſhed from each other by the adjunct Hamſtall, Pipe, and Maveſyn or Malveyſin. Of theſe, the laſt is the moſt important; and its church is intereſting to the antiquary, on account of the numerous ancient monuments it contains in memory of the Maveſyns, lords of the manor, ſeveral of whom were military characters of conſiderable eminence. Hugo Maveſyn, the founder of the church, is repreſented by a ſtone figure in chain armour, armed and equipped for battle, lying under a pointed arch in the north wall of the church. Adjoining, under another ſimilar arch, is the recumbent figure of ſir Henry Maveſyn, a knight croiſader. Like his predeceſſor, he appears completely armed, and dreſſed in chain mail; but differs from him in having his legs croſſed, and his ſhield charged with croſs bars. The other tombs are altar-ſhaped, and are ſituated in the middle of the church. That of ſir Robert Maveſyn recalls to memory a melancholy ſtory, thus related by Mr. Pennant: "In the beginning of the reign of the uſurping Henry, when the kingdom was divided againſt itſelf, two neighbouring knights, ſir Robert Maveſton, and ſir William Handſacre, of Handſacre, took arms in ſupport of different parties: the firſt to aſſert the cauſe of Bolingbroke; the laſt that of the depoſed Richard. They aſſembled their vaſſals, and began their march to join the armies, then about to commence battle near Shrewſbury. The two neighbours, with their reſpective followers, unfortunately met not far from the ſeats. Actuated by violent party rage a ſkirmiſh enſued: ſir William was ſlain on the ſpot. What a picture is this of the miſery of civil diſſention? What a tale the following of the ſudden viciſſitude of hatred to love, between contending families? Margaret, one of the daughters, and coheireſs, of ſir Robert Maveſton, gave her hand to ſir William, ſon of the knight ſlain by her father, and with her perſon and fortune compenſated the injury done by her houſe to that of Handſacre."

About two miles to the north-weſt of Rudgeley, cloſe to the river Trent, ſtand the church and village of Colwich. The firſt is very ancient, and is prebendal to the cathedral of Lichfield. Here are ſeveral tombs in memory of the Anſons, anceſtors of the preſent lord Anſon; alſo of the Wolſelys, proprietors of Wolſely park, which is ſituated on the ſouthern bank of the Trent, and diſplays much fine and pictureſque ſcenery. Cannock chace, which extends to the ſouthward, and contains an area of nearly forty miles ſquare, was formerly a foreſt, but has been long ſtripped of its foliage, and is now a heathy waſte, only remarkable for the extenſive proſpects it affords, and for its richneſs in coal-mines. On its eaſtern boundary is Beaudeſert park, the princely ſeat of the earl of Uxbridge, which is placed on the declivity of a lofty ſloping eminence, ſheltered on all ſides by "beautiful riſing grounds, emboſomed with trees, and commanding in front, over the tops of far ſubjacent woods, a moſt extenſive and diverſified view; ſo that it well vindicates the propriety of its name." The houſe was erected in the reign of queen Elizabeth, by Thomas, ſecond lord Paget. It is a handſome ſtructure of ſtone, built in the form of a half H, and has been of late years greatly improved by its noble owner. On the ſummit of the hill on which it is ſituated, may be ſeen the remains of an ancient Britiſh poſt, called Caſtle-hill. It is formed by two deep ditches, and an immenſe rampart, and has one entrance on the eaſt and another on the weſt. Near the baſe of the hill on its eaſt ſide, ſtands the village of Fairwell, the church of which was formerly attached to a priory of Benedictine nuns. Originally it was the property of canons regular, or hermits, but at the requeſt of ſeveral of the brethren it was beſtowed on the nunnery in 1140, by Roger de Clinton, biſhop of Lichfield, who further endowed it with conſiderable poſſeſſions. King Henry II. was likewiſe a great benefactor to this ſociety. Pennant's Journey from Cheſter to London, 4to. Lond. 1782. The Hiſtory and Antiquities of Staffordſhire, &c. by the Rev. Stebbing Shaw, B. D. F. S. A. vol. i. fol. Lond. 1798.

RUDHAN, a town of Perſia, in the province of Kerman; 60 miles N.W. of Sirgian.

RUDI-

RUDIARIUS, in *Antiquity*, a veteran gladiator, who had got a difcharge from the fervice.

He was thus called, becaufe, as a mark of difmiffion, a rod was put into his hands, called *rudis;* which fee.

The *rudiarii* were alfo called *fpectatores.*

RUDIMENTS, RUDIMENTA, the firft principles, or grounds, of any art or fcience, called alfo the elements thereof.

RUDIS, a knotty, rugged ftick, which the prætor, among the Romans, gave the gladiators, as a mark of their freedom and difmiffion.

The rudis feems to have been beftowed both on flaves and freedmen; with this difference, that it procured for the former no more than a difcharge from any farther performance in public, upon which they commonly turned *lanifta*, fpending their time in training up young fencers; but the latter, who had hired themfelves out for thefe fhows, were reftored to a full enjoyment of their liberty. Kennet, Rom. Ant. p. 280.

Hence the Latin phrafe, *rude donare*, to make a gladiator free, to difcharge him from fighting any more. They were hence called *rudiarii*, and had a cuftom of hanging up their arms in the temple of Hercules, the patron of their profeffion, and were never called out again without their confent.

RUDISHEIM, in *Geography*, a town of Germany, in the Rhingau, celebrated for its wine; 19 miles W. of Mentz.

RUDKIOPING, a fea-port town of Denmark, on the W. coaft of the ifland of Langeland, and the only town in the ifland; the inhabitants carry on a confiderable trade in corn and provifions. N. lat. 54° 37′. E. long. 10° 45′.

RUDMAS DAY, in our *Old Writers*, the feaft of the Holy Crofs. There are two of thofe feafts, one on the third of May, being the Invention of the Crofs; and the other the fourteenth of September, called *Holy Rood-day*, and is the Exaltation of the Crofs.

The word is compounded of the Saxon *rode, i. e. crux*, and *mafs-day, i. e. feaft-day.*

RUDNA, in *Geography*, a town of Hungary; 12 miles N.N.W. of Kemnitz.

RUDNIK, a town of Servia; 40 miles N.N.E. of Jenibafar.

RUDNIKI, a town of Lithuania, in the palatinate of Wilna; 15 miles S.S.W. of Wilna.

RUDNIKZA, a town of European Turkey, in Servia; 46 miles S. of Belgrade.

RUDOLFSOWITZ, a town of Silefia, in the lordfhip of Plefz, on the Biela; three miles S.E. of Plefz.

RUDOLFSTEIN, a town of Germany, in the principality of Culmbach; five miles N.W. of Hof.

RUDOLFWERTH, NEUSTADTEIN, or *Novomeflo*, a town of Auftria, in the duchy of Carniola, fituated on the Gurk, and founded in the year 1365, by the Auftrian archduke Rodolph IV. privileged, and called after his own name. It has a provoftfhip or collegiate church, erected in the year 1509, four other churches, and two convents. By incurfions of the Turks in the fifteenth and fixteenth centuries, fucceffive fires, and the plague, this town has been very much reduced from its former flourifhing condition; 44 miles S.S.W. of Pettau. N. lat. 45° 52′. E. long. 15° 41′.

RUDOLPHIA, in *Botany*, a genus eftablifhed by Willdenow, in the Tranfactions of the Society *Naturæ Scrutatorum* at Berlin, v. 3. 151, is named in honour of Charles Afmund Rudolph, a German phyfician, the author of fome botanical obfervations. Such at leaft is the account of De Theis, taken probably from the above publication, which we have not feen. The genus may alfo ferve as a memorial of John Henry Rudolph, author of an inaugural differtation on fuch plants of the *Flora Jenenfis*, as belong to the *Polyandria Monogynia* of Linnæus; fee *Dryandr. Bibl. Banks.* v. 3. 161.—Willd. Sp. Pl. v. 3. 918. Poiret in Lamarck Dict. v. 6. 331.—Clafs and order, *Diadelphia Decandria.* Nat. Ord. *Papilionaceæ*, Linn. *Leguminofæ*, Juff.

Eff. Ch. Calyx two-lipped. Standard of the corolla very long, lanceolate. Stamens all connected. Legume flat, with many feeds.

1. R. *volubilis.* Twining Rudolphia. Willd. n. 1.—"Leaves ovate, pointed; heart-fhaped at the bafe, and fomewhat peltate."—Native of very lofty mountains, in the Weft Indian ifland of Porto Rico. The *ftem* is fhrubby, without prickles, twining up the trunks of trees; its bark black and warty; the young branches downy. *Leaves* fimple, alternate, ftalked, rigid, entire; fhining on the upper fide; downy when young. *Footftalks* with two joints, channelled between them, on the upper fide. *Cluffers* fcattered, thrice the length of the leaves. *Flower-ftalks* three together. *Flowers* fcarlet. *Willdenow.*

2. R. *peltata.* Peltate Rudolphia. Willd. n. 2. (Erythrina planifiliqua; Linn. Sp. Pl. 993. Corallodendron folio fingulari oblongo, filiquâ planâ; Plum. Ic. 92. t. 102. f. 1.)—Leaves oblong-lanceolate, fomewhat heart-fhaped, peltate.—Native of Hifpaniola. Willdenow afferts this to be diftinct from the foregoing. The common *flower-ftalk*, as reprefented by Plumier, is a foot and half long, racemofe at the extremity.

M. Poiret reduces to this genus the *Butea* of Koenig, and we heartily wifh we could follow him, in order to get rid of a name fo abfurd and reprehenfible in its original application; fee PLASO and BUTEA. We fear however that neither the character of the legumes, nor the habits of the plants, will fupport fuch a meafure.

RUDOLPHINE TABLES. See CATALOGUE *of the Stars.*

RUDOLSTADT, or RUDELSTADT, in *Geography*, a town of Germany, in the county of Schwartzburg Rudolftadt, from which a branch of the houfe of Schwartzburg derives its title, fituated on the Saal; 24 miles S.E. of Erfurt. N. lat. 51° 40′. E. long. 11° 19′.

RUDRA, in *Mythology*, a name of the Hindoo deity Siva. In fome of their theogonical books, Siva, in the form of Rudra, is made to fpring from a wrinkle in the forehead of Brahma, with five heads and ten arms, as he is reprefented in the plates of the Hindoo Pantheon. When five-headed, he is named Pancha-muki. (See that article.) Rudra is faid to have thus fprung into a new form, to enable Brahma to people the world with fuitable inhabitants; his earlier efforts having been productive of a refractory race. (See MUNI.) The name of Rudra is generally applicable to Siva, in his character of Fate and Deftiny, and of Time. Under the article MAHAKALA he is called Kal-Agni-Rudra, interpreted Time, Fire, Fate, and defignative of his deftructive energies. (See KAL-AGNI-RUDRA.) In the Inftitutes of Menu, (fee MENU,) the "eleven Rudras" are mentioned, but it has not been explained what that number efpecially adverts to. Rudra is underftood to be the deity of pregnant women, as is his confort, known as fuch in her character of Rudri, or Rudrani. (See RUDRANI.) He is alfo called the god of tears and lamentation: being, as time or fate, the lord of punifhment, and thereby caufing thefe refults. Sometimes he is called Maha Rudra, or the great Rudra. This occurs in an extract in the article KAMA.

RUDRANI, or RUDRI, is a name and form of the goddefs

goddeſs Parvati, conſidered then as the ſakti or energy of her lord Siva, in his form of Rudra. (See thoſe ſeveral articles; alſo RAUDRI.) In this character ſhe is ſometimes called the patroneſs of pregnant women. (See IDITA, ILITA, and ILITHYA.) She is invoked under the appellation of "Rudrani the beloved of Siva," in the article LAKSHMI of this work.

RUDSTAKES, in *Agriculture*, a provincial term applied to the ſtakes to which cattle are tied in the ſtall.

RUDTSDORF, in *Geography*, a town of Bohemia, in the circle of Chrudim; nine miles E. of Leutmiſchl.

RUE, PIERRE DE LA, in *Biography*, an eccleſiaſtical compoſer in the firſt ſtage of correct counterpoint. He was contemporary with Joſquin, and one of the compoſers for the papal chapel during the pontificate of Sixtus IV. who reigned from 1471 to 1484. De la Rue, or as he is called by writers in Latin, Petrus Platenſis, was one of the moſt voluminous compoſers of this early period. What country gave him birth, is now difficult to aſcertain; Walther calls him a Netherlander; Glareanus, a Frenchman; others ſuppoſe him to have been a Spaniard. It is, however, certain that he was in high favour with prince Albert, and princeſs Iſabella, of the Low Countries; that a work under his name was publiſhed at Antwerp, with this title: "El Parnaſſo Eſpanol de Madrigales y Villancicos à quatro, cinco y ſeis voces;" beſides maſſes and motets to Latin words; and that he was a very learned contrapuntiſt.

Many of his compoſitions for the church are ſtill extant in the muſeum collection of maſſes and motets, ſome of which were publiſhed as early as the year 1503, immediately after the invention of muſical types.

RUE, CHARLES DE LA, a learned French Benedictine monk, was born at Corbie, in Picardy, in the year 1684. He took the vows at the age of 19, in the abbey of Meaux, having already given evidence that he poſſeſſed a ſtudious diſpoſition, by the progreſs which he had made in the languages, and in the belles lettres. In 1712 the learned Montfaucon admitted him into his friendſhip, became the guide of his ſtudies, and freely communicated to him the ſtores of knowledge which he poſſeſſed. So well did the pupil avail himſelf of theſe advantages, that he ſoon became a very uſeful aſſiſtant to his maſter in his learned labours. In 1713, Montfaucon had publiſhed the remains of Origen's "Hexapla," and de la Rue was fixed on to give a complete edition of that learned father's works, with the exception of the Hexapla. In 1733 he publiſhed the two firſt volumes, with proper prolegomena, and many uſeful as well as very learned notes. The other volumes were publiſhed by his nephew Vincent, whom he had aſſociated with himſelf in his work, after the death of Charles, which happened in 1739. The manner in which the third and fourth volumes of this great work were executed, ſhews that the nephew was fully adequate to the taſk confided to him. This edition is entitled "Origenis Opera omnia, quæ Græcè vel Latinè extant, et ejus nomine circumferentur, ex variis Editionibus et Codicibus Collecta, recenſita, Latinè verſa at Annotationibus illuſtrata." Vincent de la Rue died in the year 1762. Moreri.

RUE, in *Botany*. See RUTA.

RUE, in the *Materia Medica*, the ruta graveolens, or common rue, has a ſtrong, ungrateful odour, and a bitter, hot, penetrating taſte; the leaves are ſo acrid as to irritate and inflame the ſkin, if they be much handled; and in its natural and uncultivated ſtate, it is ſaid to poſſeſs theſe qualities more powerfully. Its virtues are extracted both by water and rectified ſpirit, but more powerfully by the latter. On inſpiſſating the ſpirituous tincture, very little of its flavour riſes with the menſtruum; moſt of the active parts of the rue being concentrated in the extract. In diſtillation with water, an eſſential oil ſeparates, which is of a yellowiſh or browniſh colour, a moderately acrid taſte, and penetrating ſmell; the decoction, inſpiſſated, yields a moderately warm, pungent, and bitteriſh extract. The ſeeds and capſules contain more oil than the leaves. From the experiments of Beaumé it appears, that the recent plant contains but a very ſmall portion of eſſential oil: thus, from 21 lbs. of the leaves he ſcarcely obtained a drachm, while 10 lbs. of the ſeeds yielded two ounces.

Rue was much uſed by the ancients, who aſcribed to it many excellent qualities. Hippocrates commends it as a reſolvent and diuretic, and attributes to it the power of reſiſting contagion, and the action of other kinds of poiſons; ſo that it was employed with this intention by Mithridates (ſee Plin. N. Hiſt. l. 28. c. 8.): this quality, though allowed by Boerhaave, is now generally diſcredited. (Cullen's Mat. Med. vol. ii. p. 365.) According to Bergius, it is "alexiteria, pellens, emmenagoga, ſudorifera, rubefaciens." It is, however, acknowledged to be a powerful aſtringent, and, like other medicines of the fetid kind, to poſſeſs attenuating, deobſtruent, and antiſpaſmodic powers, and to be peculiarly adapted to phlegmatic habits, or weak and hyſterical conſtitutions, ſuffering from retarded or obſtructed ſecretions. A ſtrong infuſion of it, exhibited per anum, has been found of great ſervice in relieving the convulſions of infants, ariſing from flatulence and other inteſtinal irritations. It is employed by ſome as a tea, and alſo externally in diſcutient and antiſeptic fomentations. Among the common people, the leaves are ſometimes taken with treacle, on an empty ſtomach, as anthelmintic. A conſerve, made by beating the freſh leaves with thrice their weight of fine ſugar, is the moſt commodious form for uſing the herb in ſubſtance. The doſe of the powdered leaves may be from grs. xv to ʒjj, given twice or thrice a day.

The officinal preparations are *oleum rutæ*, and *extractum rutæ graveolentis*. The "oleum herbæ floreſcentis rutæ" of the Dublin pharmacopeia, or oil of rue, is procured in the quantity of 59 grains of oil from 21 pounds of rue, which oil has the ſtrong ungrateful odour and taſte of the plant. When recently drawn the colour is yellow, but by age it deepens to a brown, and depoſits a browniſh reſinous ſediment. It congeals at 40° Fahrenheit. This oil is ſtimulant, and antiſpaſmodic: it is ſometimes given in hyſteria, and the convulſive affections of infants attendant on dentition, and is ſometimes uſed as a rubefacient in palſy. The doſe is from ♏ ij to ♏ v, triturated with ſugar or mucilage. The "extractum foliorum rutæ graveolentis," Edin. "extractum foliorum rutæ," Dub., or extract of rue, is prepared by the former diſpenſatory in the ſame manner as the extract, and by the latter, like other ſimple extracts: and by whichever proceſs it is prepared, it is inodorous, but has a bitter acrid taſte. The medicinal properties are different from thoſe of the plant, the ſtimulant and narcotic powers of which depend on the volatile oil it contains, which is diſſipated during the inſpiſſation of the extract. The doſe is from grs. x to ʒj, in pills. Lewis. Woodville. Thompſon.

RUE, *Dog's*. See SCROPHULARIA.

RUE, *Goat's*. See GALEGA.

RUE, *Meadow*. See THALICTRUM.

The leaves of meadow-rue, mixed with other greens, are ſomewhat laxative, according to Dodonæus; but a decoction of the root is more ſo, and may be well ſubſtituted for rhubarb.

RUE,

Rue, *Wall*, or *White maidenhair*, *ruta muraria*, a ſpecies of *aſplenium*; which ſee.

This plant is found growing out of the joints of old walls in various parts of England, where it is gathered for medicinal uſe; but as it cannot be cultivated in gardens ſo as to grow to advantage, it is needleſs to ſay more of it.

This is one of the five capillary herbs mentioned in the Diſpenſatory, and has the ſame virtues with the reſt of the maiden-hairs; it is ſometimes uſed in pectoral decoctions and diuretic apozems.

Rue, *Wild Aſſyrian*. See Peganum.

Its virtues agree with the garden rue, but it is more acrimonious.

Rue, in *Geography*, a town of France, in the department of the Somme, and chief place of a canton, in the diſtrict of Abbeville; 12 miles N.W. of Abbeville. The place contains 1346, and the canton 9736 inhabitants, on a territory of 332½ kiliometres, in 16 communes. The chief trade of this town is in fiſh, ſheep, wool, horſes, and cattle.

Rue, a river of Wales, in the county of Montgomery, which runs into the Severn, three miles S. of Welſhpool.—Alſo, a river of France, which runs into the Dordogne, near Bort.

Rue *Ruw*, a town of Switzerland, in the canton of Friburg, capital of a bailiwick; 10 miles W. of Gruyeres.

RUEBLAND, a town of the duchy of Carinthia; ſix miles S.S.E. of Spital.

RUECCO, a river which riſes in Carniola, and runs into the ſea a little to the N.E. of Trieſte, paſſing during its ſhort courſe through immenſe rocks.

RUEDA, a town of Spain, in the province of Leon; 11 miles E.S.E. of Leon.—Alſo, a town of Spain, in the province of Leon; 16 miles S.W. of Valladolid.

RUEDOCK. See Ruadock.

RUELLE, a French term, formerly introduced into our language, is a diminutive of *rue*, *ſtreet*, and ſignifies, literally, *little ſtreet*.

Its uſe, among us, was for an alcove, or other genteel apartment, where the ladies receive viſits either in bed or up. The poets go reading their works from ruelle to ruelle, to beſpeak the approbation and intereſt of the ladies. The term, however, is now diſuſed.

RUELLIA, in *Botany*, a genus of Plumier's, named in honour of a French phyſician and botaniſt, Dr. John Ruelle, who publiſhed, in 1536, a treatiſe "De Naturâ Stirpium," chiefly a tranſlation of Dioſcorides, which is celebrated by Plumier for the excellence of its latinity. Ruelle, though phyſician to Francis I., quitted the profeſſion of phyſic, and entered into the church. He died a canon of Paris, in 1537. —Plum. Gen. 12. t. 2. Linn. Gen. 324. Schreb. 423. Willd. Sp. Pl. v. 3. 362. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 4. 56. Purſh 420. Brown. Prodr. 477. Dill. Elth. t. 248 and 249. Juſſ. 103. Lamarck Dict. v. 6. 337. Illuſtr. t. 550. Gærtn. t. 54.—Claſs and order, *Didynamia Angioſpermia*. Nat. Ord. *Perſonatæ*, Linn. *Acanthi*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, permanent, divided, more or leſs deeply, into five linear, acute, ſtraight, equal, permanent ſegments. *Cor.* of one petal, ſomewhat irregular; the upper part of the tube dilated and inclining; limb five-cleft, ſpreading, obtuſe; the two upper ſegments moſt reflexed. *Stam.* Filaments four, ſhorter than the corolla, ſituated in the dilated part of the tube, approaching each other, and connected, in pairs; anthers ſcarcely projecting beyond the tube, each with two parallel, ſimple cells. *Piſt.* Germen ſuperior, roundiſh; ſtyle thread-ſhaped, the length of the ſtamens; ſtigma in two acute ſegments, the lowermoſt involute. *Peric.* Capſule nearly cylindrical, pointed at each end, almoſt ſeſſile, of two cells, and two valves, ſeparating by the elaſticity of their taper baſe. Partition contrary to the valves, and combined with them. *Seeds* ſeveral, roundiſh, compreſſed, each ſubtended by an awl-ſhaped, aſcending prop.

Eſſ. Ch. Calyx in five deep, equal ſegments. Corolla ſomewhat bell-ſhaped, ſlightly irregular. Stamens approximated in pairs. Anthers of two parallel cells. Capſule of two elaſtic valves, and two cells; partition from the centre of each valve. Seeds ſeveral, with awl-ſhaped props.

This genus has generally been ſuppoſed, by botaniſts of the Linnæan ſchool, to differ from *Juſticia*, merely in having four ſtamens inſtead of two. The elaſtic bivalve capſule, with props to the ſeeds, was conſidered as common to both, and very juſtly; though a few ſpecies have been admitted, in which theſe characters are altogether wanting, as *R. balſamea* and *uliginoſa*.

Mr. Brown has inveſtigated *Ruellia* with no leſs care than Juſticia, ſee that article; for indeed a ſtudent of tropical plants could not fail ſoon to diſcover, that he was able to proceed but a very little way, without underſtanding theſe genera, and the family to which they belong. The able botaniſt juſt mentioned ſeparates from *Ruellia* all ſpecies that have only two ſeeds in each cell, ſuch as *R. intruſa* of Vahl, and the Linnæan *Juſticia gangetica*; and even theſe, he thinks, require ſubdiviſion. Others are to be removed on account of their ſeparate partition, unconnected with the valves of the capſule, like *R. Blechum*, &c. *R. depreſſa* belongs, it ſeems, to a different natural order.

The number of ſpecies, which in Willdenow is 46, becomes thus greatly reduced. In the new edition of Hort. Kew. eleven are, under Mr. Brown's inſpection, enumerated, two of them not among Willdenow's. Four more are deſcribed in his own Prodromus, from New Holland. To all theſe *reptans* of Forſter, and probably *ſecunda* of Vahl, are to be aſſociated, nor is it ſuppoſed that ſeveral more ſpecies may not be found. We ſhall exhibit theſe acknowledged ones (only omitting *ringens*; ſee Hygrophila,) as a ſpecimen of the genus, ſeveral of them being much recommended by their beauty. Unfortunately they moſtly require the heat of a ſtove, a few only will ſucceed with the protection of a green-houſe, in this country. They are generally perennial herbs; ſometimes ſhrubby.

1. R. *ovata*. Ovate-leaved Ruellia. Cavan. Ic. v. 3. 28. t. 254. Willd. n. 4. Ait. n. 1.—Leaves ſeſſile, elliptic-oblong, acute at each end, entire, villous. Flowers axillary, ternate, nearly ſeſſile. Stem decumbent.—Native of Mexico, from whence it was tranſmitted to the botanic garden at Madrid. The late marchioneſs of Bute ſent it to Kew in 1800. This is a perennial, herbaceous, ſtove-plant, flowering in July and Auguſt. The *root* is fibrous. *Stems* ſcarcely a ſpan long, obſcurely quadrangular, leafy, hairy; proſtrate at the baſe; aſcending at the extremity. *Leaves* oppoſite, near two inches long, ſoft, downy and fringed. *Flowers* about the top of the ſtem, large, longer than the upper leaves, deep blue with a white tube. *Stigma*, according to Cavanilles, ſpatulate, undivided.

2. R. *ſtrepens*. Whorled Ruellia. Linn. Sp. Pl. 885. Mant. 422. Willd. n. 5. Ait. n. 2. Purſh n. 1. (R. ſtrepens, capitulis comoſis; Dill. Elth. 330. t. 249.)—Leaves ſtalked, ovate, acute, entire. Stalks three-flowered, very ſhort. Stem erect.—Native of North America. On dry hills, in ſhady woods, from Virginia to Carolina, flowering in June and July. *Purſh*. *Stem* ſquare, with a few ſhort branches. *Leaves* two inches long, roughiſh with ſhort ſcattered hairs. *Flowers* large, pale blue, making two or three

three apparent whorls, from the upper leaves. *Bracteas* lanceolate, fringed, rising above the *calyx*, whose segments are awl-shaped, very narrow, and hairy, rather longer than the ripe *capsule*.

3. R. *patula*. Spreading Ruellia. Jacq. Misc. 2. 358. t. 119. Willd. n. 6. Ait. n. 3.—Leaves stalked, ovate, entire, very obtuse, downy. Flowers ternate, nearly sessile. Stem much branched, spreading. Capsule above twice the length of the calyx.—Native of the East Indies; imported by sir J. Banks, in 1777. This is a shrubby species, flowering copiously in the stove, in July and August. The *leaves* are shorter and broader than in the foregoing, rounded, and somewhat heart-shaped. *Flowers* light blue. *Calyx* small. The whole plant is finely downy.

4. R. *lactea*. White Mexican Ruellia. Cavan. Ic. v. 3. 28. t. 255. Willd. n. 9. Ait. n. 4.—Leaves stalked, ovate, fringed, slightly toothed. Stalks about three-flowered, very short. Stem woolly, erect. Capsule shorter than the calyx.—Native of Mexico. It has been dispersed from the garden of Madrid, to different parts of Europe, and proves a tolerably hardy green-house plant, flowering in summer. The *stem* is herbaceous, erect, a foot high, square, covered with long, dense, woolly hairs. *Leaves* three or four inches long, and two broad. *Flowers* of a pale blueish-white, the central one without *bracteas*. Segments of the *calyx* hairy, very long and slender.

5. R. *clandestina*. Covert-flowering Ruellia. Linn. Sp. Pl. 885. Willd. n. 10. Ait. n. 5. (R. capsulis teretibus; Dill. Elth. 328. t. 248.)—Leaves stalked, oblong, obtuse, somewhat toothed; tapering at the base. Stalks three-flowered, rather shorter than the leaves. Capsule nearly cylindrical, longer than the calyx.—Native of Barbadoes and Santa Cruz. A perennial stove plant, flowering in July and August, but seldom cultivated. The *root* consists of many long, thick, fleshy fibres. *Stem* a span high, clothed with numerous, large, undulating *leaves*. *Flowers* large, blue, on slender elongated stalks. *Calyx* linear and very narrow, scarcely above half the length of the *capsule*, which is obscurely quadrangular when ripe, containing a great number of flat, downy *seeds*, bordered with a white membrane. The *corolla* of the earliest flowers is said to be small and imperfect.

6. R. *paniculata*. Panicled Ruellia. Linn. Sp. Pl. 885. Willd. n. 18. Ait. n. 6. (Speculum veneris majus, impatiens; Sloane Jam. v. 1. 158. t. 100. f. 2.)—Leaves ovate, pointed, rough, entire. Stalks many-flowered, forked, divaricated, longer than the leaves. Upper segment of the calyx rather the broadest. Native of the West Indies. Sloane speaks of it as common about Kingston in Jamaica, growing among bushes. Miller and Linnæus cultivated this plant, and it may be met with sometimes in stoves, flowering in summer. The habit is somewhat shrubby, and the herbage hoary. *Leaves* copious, from two to four inches long, on stalks about half their length. *Flower-stalks* axillary, chiefly about the upper part of the stem, and extending beyond the leaves, so as to give the whole plant a panicled appearance. *Bracteas* oblong, obtuse. Each *flower* is nearly sessile, of a bright light blue, with a long slender tube. Segments of the *calyx* hispid, linear, very narrow, one of them twice as broad as the rest. Sloane says the *capsule* throws out the *seeds* with violence, when it is either touched or wetted at the end.

7. R. *tuberosa*. Tuberous-rooted Ruellia. Linn. Sp. Pl. 885. Willd. n. 19. Ait. n. 7. (Gentianella flore cæruleo, integro vasculo seminali ex humidi contactu impatiente; Sloane Jam. v. 1. 149. t. 95. f. 1.)—Leaves ovate-wedge-shaped, crenate. Flower-stalks deeply-three-cleft. Stem simple.—Native of Jamaica, in bushy places near Kingston, flowering after the rainy season. The perennial *root* consists of many long fleshy knobs. *Stem* erect, herbaceous, a foot high, a little hairy. *Leaves* spreading, minutely and sparingly hairy, each tapering down into a long *footstalk*. *Flower-stalks* slender, axillary, solitary, shorter than the leaves. *Calyx* very long and slender, rough with close bristles. *Corolla* large, of a fine blue. *Capsule* the length of the calyx; we do not perceive it to be more angular than that of *R. clandestina*, though Dillenius indicates the contrary. *Seeds* numerous.

8. R. *biflora*. Two-flowered Ruellia. Linn. Sp. Pl. 886. Willd. n. 21. Ait. n. 8. (R. oblongifolia; Michaux Boreali-Amer. v. 2. 23? Pursh n. 2?)—"Flowers in pairs, sessile.—Native of Carolina, from whence it was sent to Kew, in 1765, by Mr. John Cree. It is kept in the greenhouse, being an herbaceous perennial, flowering in July. We have seen no authentic specimen, nor have we any further knowledge of this species than what occurs in Linnæus. *R. oblongifolia* of Michaux, suspected by Mr. Pursh to be the same plant, is described as "ascending, all over minutely and densely downy, with erect, nearly sessile, obovate-oblong *leaves*, and mostly solitary *flowers*." Pursh adds that "the *bracteas* are the length of the *calyx*, whose thread-shaped segments are the length of the tube of the *corolla*." He adds that it grows "in sandy pine woods of Georgia, flowering in June and July," and that "the *flowers* are a yellowish-blue," a colour not very intelligible to us; but the author only saw them dried.

9. R. *ocymoides*. Brasil-leaved Ruellia. Cavan. Ic. v. 5. 9. t. 416. Ait. Hort. Kew. Epit. 373.—Stem branched, erect. Leaves ovate, obtuse, entire; glaucous beneath. Flowers axillary, ternate. Bracteas ovate. Calyx tubular at the base.—Native of Mexico; cultivated in the garden of Madrid, and introduced at Kew in 1798. It is biennial, flowering in the stove from July to September, and may perhaps be perennial in its native country. The *stem* is about six inches high, branched from the bottom, somewhat downy like the rest of the plant. *Leaves* opposite, on long stalks, concave; dark green above; glaucous beneath. *Flowers* sessile, with an ovate stalked *bractea* at the base of each. *Calyx* with a perceptible tube, though much shorter than the last; its segments awl-shaped, rather unequal. *Corolla* pale blue, with a white tube.

10. R. *formosa*. Large Scarlet Ruellia. Ait. n. 10. Andr. Repos. t. 610. Curt. Mag. t. 1400.—Leaves stalked, ovate, entire, downy on both sides. Stalks axillary, alternate, very long, with few flowers. Corolla somewhat ringent. Native of Brasil. Said to have been introduced into England by sir Charles Cotton, in 1808. It proves a great ornament to our stoves, which are decorated all summer long with its very large and splendid scarlet *flowers*. The *stem* is in some degree shrubby, erect, three or four feet high, square, finely hairy, as well as the rest of the herbage, whose colour is a greyish-green. *Flower-stalks* twice or thrice as long as the leaves. Segments of the *calyx* deep and linear. Lobes of the *corolla* emarginate. *Capsule* obovate, the length of the calyx. *Seeds* numerous, lenticular, rough. Very different from the *macrophylla* of Vahl's Symbolæ, v. 2. 72. t. 39, which, according to Mr. Brown, is no *Ruellia*, having but two seeds in each cell, and still generically different, as he thinks from *R. intrusa*, &c. mentioned in our introductory part of this article.

11. R. *fulgida*. Lesser Scarlet Ruellia. Ait. n. 11. Andr. Repos. t. 527.—Leaves stalked, ovate, pointed, crenate, hairy. Tufts many-flowered, on long axillary stalks. Corolla somewhat ringent, with a nearly cylindrical tube.

tube.—Native of the Weſt Indies. It made a part of a fine collection of ſtove plants, brought over by the late much-lamented earl of Seaforth, and given by his lordſhip to A. B. Lambert, eſq. This plant firſt flowered in Mr. Lambert's ſtove, in June, 1807. Its habit is ſhrubby. *Leaves* different from the laſt, in being crenate and wavy. *Flowers* remarkably abundant, their ſtalks aſſembled in a corymboſe manner. *Corolla* of a rich orange-ſcarlet, but ſcarcely one-third the ſize of the *R. formoſa*. *Seeds* with a white border.

12. R. *ſecunda*. Yellow Ruellia. "Vahl. Symb. v. 3. 84." Willd. n. 36.—"Leaves ovate, ſomewhat heart-ſhaped, entire, villous. Cluſters axillary, turned one way."—Native of the Eaſt Indies. *Herbage* downy. *Leaves* ſtalked, an inch long, obtuſe; the younger ones hoary, rather pointed. *Footſtalks* widely ſpreading, ſcarcely ſhorter than the leaves. *Cluſters* almoſt a ſpan long; the partial flower-ſtalks ſhort and diſtant. *Bracteas* ſetaceous, ſtill ſhorter. *Calyx* hairy. *Corolla* ſmooth, yellow, an inch long. *Germen* villous and hoary. *Vahl.* Mr. Brown, not having perhaps inveſtigated the fruit of this ſpecies, has marked its genus as doubtful.

13. R. *reptans*. Creeping Ruellia. Forſt. Prodr. 44. Willd. n. 37.—"Leaves ſtalked, ovate, obtuſe, bluntly ſerrated. Flower-ſtalks terminal, ſomewhat ſpiked."—Native of the iſland of Tanna. We have ſeen no ſpecimen, but Mr. Brown has aſcertained this to be a true *Ruellia*.

14. R. *auſtralis*. Southern Ruellia. Cavan. Ic. v. 6. 62. t. 586. f. 1. Brown n. 1.—Flowers axillary, nearly ſeſſile, ſolitary or ternate. Segments of the calyx awl-ſhaped, rough, ſeparate to the baſe. Leaves ſtalked, elliptic-oblong, entire, ſmooth. Stem diffuſe.—Native of New South Wales, from whence we received ſpecimens from Dr. White in 1792. Mr. Brown has alſo obſerved it in the tropical part of New Holland. The *ſtem* is of humble growth, rather ſhrubby, more or leſs diffuſe, branched, ſlender, quadrangular, ſmooth. *Leaves* moſt crowded towards the tops of the branches, ſmall, hardly an inch long; paler beneath. Tube of the *corolla* not much longer than the calyx; its limb dilated and ſpreading, with rounded, entire, nearly uniform ſegments. We know nothing of the colour. The figure in Cavaniller is not characteriſtic. Its *flowers* are much too ſmall in the limb. The name too is faulty.

15. R. *pumilio*. Dwarf Ruellia. Brown n. 2.—"Flowers axillary, ſolitary, nearly ſeſſile. Bracteas minute. Calyx ſmooth, tubular at the baſe. Leaves narrow-oblong, obtuſe. Stem diffuſe."—Gathered by Mr. Brown at Port Jackſon, New South Wales.

16. R. *acaulis*. Humble Ruellia. Brown n. 3.—"Stem ſhort. Leaves oblong-wedge-ſhaped, obtuſe. Stalks axillary, ſingle-flowered, ſeveral times longer than the capſule. Calyx nearly ſmooth, without bracteas."—Gathered by ſir Joſeph Banks and Dr. Solander, in the tropical region of New Holland.

17. R. *bracteata*. Bracteated Ruellia. Brown n. 4.—"Flowers axillary. Bracteas leafy, large, deciduous. Tube of the corolla elongated; its limb nearly equal. Capſule with a taper baſe. Leaves oblong or elliptical. Stem erect."—Gathered by Mr. Brown, in the tropical part of New Holland.

By a miſtake, as we preſume, *R. ringens* of Linnæus is retained as ſuch in Hort. Kew. without any remark, and even with the erroneous ſynonym, which is directed to be ſtruck out in Mr Brown's Prodromus, 479, where the plant in queſtion makes a new genus. See HYGROPHILA.

Mr. Purſh has three North American ſpecies, beſides thoſe to which we have adverted above, called *hybrida*, *ciliaſa*, and the *humiſtrata* of Michaux. Theſe we dare not admit, becauſe it does not appear that their generic characters have been critically examined by any body; at leaſt not with a reference to the above limitations of *Ruellia*.

RUEMANNSFELDEN, in *Geography*, a town of Bavaria; 36 miles E. of Ratiſbon.

RUENGAS, a country of Africa, S. of Monoemugi, about S. lat. 7°.

RUERLOO, a town of Holland, in the county of Zutphen; 4 miles W. of Borckeloe.

RUESCAR, a town of Spain, in the province of Grenada; 15 miles E. of Almeria.

RUESTA, a town of Spain, in Aragon, on the Aragon; 24 miles W. of Jaca.

RVEUTZENDORFF, a town of Auſtria; 4 miles E.N.E. of Entzerſtorff.

RUFF, or RUFFLE, in *Military Language*, a beat on the drum. Lieutenant-generals have three ruffles, major-generals two, brigadiers and governors one, as they paſs by the regiment, guard, &c. See DRUM.

RUFF-*trees*. See ROOF-*trees*.

RUFFACH, in *Geography*, a town of France, in the department of the Upper Rhine; 8 miles S. of Colmar.

RUFFE, in *Ichthyology*, the Engliſh name of the *cernua*, or ſmall gilded pearch, a fiſh common in our rivers, and much reſembling the pearch in figure, though of a more ſlender form.

The ruffe is called by the generality of authors *cernua fluviatilis*; and by ſome *chærus acerina* and *aſpredo*. It is called by Johnſon and Charleton alſo *ſcrollus*. Willughby, as well as theſe authors, has mentioned the ſcrollus as another ſpecies of fiſh; but it is proved, by obſervation, that they are evidently the ſame ſpecies. Artedi makes this fiſh a pearch, or *perca*; and accurately diſtinguiſhes it from the other fiſh of that genus by the name of the pearch with only one fin on the back, and with a cavernous head. In the Linnæan ſyſtem it is the PERCA *Cernua*; which ſee.

This fiſh may be preſerved in glaſs jars with freſh water, and be made very tame. It muſt be fed, for it cannot ſubſiſt on the animalcula of river-water, as ſmall dace can.

No fiſh ſhews the circulation of the blood in a finer manner than ruffes, whoſe fins are exceedingly tranſparent. Beſides, it is a creature vaſtly tenacious of life, and will live twenty or thirty minutes out of water, without receiving much damage. Phil. Tranſ. N° 478. p. 26.

RUFFE, in *Ornithology*, the name of a male ſpecies of bird, the female of which is called *reeve*, and the Latin name for which is *avis pugnax*, or the fighting bird.

This ſpecies is the TRINGA *pugnax* of Linnæus; which ſee.

The feathers of the male aſſume in ſeveral parts a variety of colours; but they are diſtinguiſhed by a very remarkable circle of long feathers, ſurrounding their necks; whence their name: on the back of their necks they have a tuft of feathers, which ſpread wide on both ſides; theſe feathers around the neck are black in ſome birds; and in others white, yellow, or ferruginous; and they frequently differ in colour, even in the ſame bird; the coverts of the wings are brown or aſh-coloured; the feathers on the breaſt black or duſky; the four exterior feathers of the tail of a cinereous brown, and the four middle barred with black and brown; the bill is black towards the end, and red at the baſe; the legs are yellow. In moulting they loſe the neck-feathers, nor do they recover them till after their return in the following ſpring, when a ſet of ſmall pear-ſhaped yellow

pimples break out on the face above the bill. The male birds of the first year want these marks: and the older they are, the more numerous are the pimples, and the fuller and longer the ruffs. The length of the male to the tip of the tail is one foot, the breadth two; of the reeve ten inches, the breadth nineteen: the weight of the former, when just taken, is seven ounces and a half, and of the latter only four. The reeves never change their colour, which is pale brown; the back spotted with black, slightly edged with white; the tail brown; the middle feathers spotted with black; the breast and belly white; and the legs of a pale dull yellow. They come over to us in vast numbers early in the spring, and disappear about Michaelmas, building in some parts of Lincolnshire, particularly in the fenny country about Croyland. They are found also in the isle of Ely, and in the East Riding of Yorkshire, and for about three weeks at Martin-mere, in Lancashire. The reeves lay four eggs, which are white, marked with large rusty spots, in a tuft of grass, the first week in May, and sit about a month. Soon after their arrival, the males begin to *hill*, *i. e.* to collect on some dry bank, near a pool of water, in expectation of the females, who resort to them. Each male keeps possession of a small piece of ground, which it runs round till the grass is worn quite away, and nothing but a naked circle left; and when a female lights, the ruffs immediately fall to fighting. When a fowler discovers one of those hills, he places his net at night, and at day-break resorts to his stand; and at the first pull takes those birds that are within reach; he then places his stales, or stuft birds, to entice those that are traversing the fen. In this way a fowler will take forty or fifty dozen in a season. When they first come over, there are many more males than females among them; but these are so continually fighting, that their numbers soon decrease below an equality. They are fed after they are taken with bread and milk, hemp-seed, and sometimes boiled wheat; to which, if expedition is required, they add sugar, and thus they become very fat. They are killed by cutting off the head with a pair of scissars; and they discharge a great quantity of blood, considering their size. They are dressed like woodcocks, with their intestines; and when killed at the proper time, they are reckoned by the epicures very delicious. Ray and Pennant.

Ruffe is also the name of a particular species of pigeon, called by Moore the *columba cucullata rudis*.

It is in shape very like that species of pigeon called the *jacobine*, but is larger, and has a longer beak. The iris of the eye is sometimes red, sometimes pearl-coloured; the feathers of the hood and chain are much longer than the jacobine, though they do not come down so low to the shoulders of the wings, nor are they so compact and close, but are apt to blow about with every little blast of wind, and fall more backward off the head, and lie in a rough confused manner.

It is a common thing to match the jacobine pigeon with this species, with intent to improve its chain by the length of the ruffe's feathers; but the event is, that the pigeon is always worse instead of better, being longer beaked, and looser in its head and chain, without any real advantage.

RUFFEC, in *Geography*, a town of France, and principal place of a district, in the department of the Charente; 34 miles S. of Poitiers. The place contains 2110, and the canton 12,668 inhabitants, on a territory of 250 kiliometres, in 20 communes. N. lat. 46° 2′. E. long. 0° 17′.

RUFFI, Antony de, in *Biography*, a lawyer and historian, was born at Marseilles in 1607, and in process of time he became a counsellor in the seneschalcy of Marseilles, an office of considerable importance, and which he discharged with diligence and great integrity. He was made counsellor of state in 1654, and died in 1689, at the age of 82. His leisure time, he had, during his long life, employed in learned enquiries, of which the fruits were, 1. An elaborate "History of Marseilles," fol. 2. "The Life of Gaspard de Sinicane, known by the name of the Chevalier de Coste." 3. "The History of the Counts of Provence:" and he left in MS. "A History of the Generals of the Gallies." He had a son, Louis Antony, who pursued a similar line of study, and added to his father's History of Marseilles a second volume, in an edition published in 1696. He was author, likewise, of "Dissertations Historiques et Critiques sur l'Origine des Comtes des Provence, de Venaissin, de Forcalquier, et des Vicomtes de Marseille;" and in 1716 he published "Une Dissertation Historique, Chronologique, et Critique sur les Evêques de Marseille." He died in 1724, at the age of 66.

RUFFIEUX, in *Geography*, a town of France, in the department of Mont Blanc, and chief place of a canton, in the district of Chambéry. The place contains 1048, and the canton 5110 inhabitants, on a territory of 100 kiliometres, in 8 communes.

RUFFINUS, in *Biography*, surnamed by some authors *Toranius*, a celebrated ecclesiastical writer and scripture commentator, who flourished in the fourth and fifth centuries, was probably a native of Aquileia, but the time of his birth is unknown. Having made choice of the ecclesiastical profession, he was baptized in the year 369, and became a presbyter of the church in that city. Here he contracted a most intimate friendship with St. Jerome, who, in his letters to his friends, extolled in the highest terms the virtues and sanctity of Ruffinus, though at a later period he proved his most bitter enemy. In or about the year 371 Ruffinus quitted Aquileia, with the determination of devoting himself to the austerities of the monastic life, under the monks in the deserts of Egypt. Coming to Rome in his way to Africa, his design recommended him to the confidence of Melania, a Roman widow of noble family and vast opulence, who resolved to accompany him to that country, and to expend her riches in the establishment of monastic and charitable institutions. In Egypt, Ruffinus spent several months in conversing with the monks, whose solitary cells were scattered throughout the deserts of Nitria, and in attending the lectures of Didymus, master of the catechetical school in Alexandria. By the Arians, who at this time were protected by the emperor Valens, Ruffinus was persecuted, thrown into prison, cruelly treated, and at length banished to a distant desert. His female friend, Melania, however, found means to purchase his redemption, and removed with him from Egypt into Palestine, where they visited the holy place, and took up their residence at Jerusalem. In this city, Ruffinus, supported by the munificence of his patroness, built a convent for upwards of fifty females, who renounced the world and devoted themselves to a religious life, over whom Melania presided. Connected with this convent were apartments for the accommodation of the pilgrims who came to visit the holy city, and who were received, and hospitably entertained, at the expence of the foundress. Here Ruffinus spent all his leisure time in study and composition. About the year 390, a violent quarrel arose between Epiphanius, and John, patriarch of Jerusalem, concerning the opinions of Origen, in which Ruffinus took such a part as to give great offence to his friend Jerome. Their friendship was now broken off, but was in a few years renewed through the mediation of Theophilus, patriarch of Alexandria. In the year 397, Ruffinus and Melania took their leave of Jerusalem, and embarked for

Italy. Having arrived at Rome, Ruffinus almoſt immediately publiſhed a Latin verſion of the firſt book of the "Apology for Origen," which was followed by another piece, intended to prove that the works of Origen had been corrupted and interpolated, and a defence of him drawn up from his own letters. At this period our author publiſhed his tranſlation of Origen's "Book of Principles," with a preface, in which he applauded the high opinion which, in the earlier part of his life, Jerome had entertained of that author and his writings. This conduct was warmly reſented by Jerome, who publiſhed "An Apology" for himſelf, in which he attacked Ruffinus in the moſt acrimonious terms, treating him as a heretic. About the year 400 he publiſhed an eloquent and indignant reply to the accuſations in his "Two Books of Invectives." Ruffinus, whatever might be the nature of his arguments, was in other reſpects the leaſt powerful, and he thought it adviſeable to retire to Aquileia. He was ſummoned to Rome by Anaſtaſius, to vindicate himſelf againſt the accuſations of Jerome, but he did not think it fit to obey the ſummons, contenting himſelf with ſending a declaration of the conformity of his faith with that of the Catholic church, and ſtating that, with reſpect to his tranſlation of Origen's work, he had neither approved nor diſapproved, but barely refuted the ſentiments of that writer. Not ſatisfied with this declaration, Anaſtaſius condemned him as a heretic; but the papal anathema ſeems to have produced little effect on Ruffinus, ſince it did not prevent him from continuing his controverſy with Jerome, or interrupt his tranquillity or his ſtudies. In the year 410, the ravages of the Viſigoths in Italy, under Alaric, compelled him to fly from Aquileia, when he took refuge in the iſland of Sicily, where he appears to have died, either in the ſame or the ſucceeding year. Various characters have been given of this father. Moſheim obſerves, that "he would have obtained a very honourable place among the Latin writers of this century, had it not been his misfortune to have had the powerful and foul-mouthed Jerome for his adverſary:" and Dupin acknowledges, "that though very ill uſed by St. Jerome, he was one of the ableſt men in his time: perhaps he had not ſo much learning as that father, but his temper was better and leſs violent." His ſtyle is neat, and ſufficiently pure in point of latinity. In his commentaries on divers parts of the ſcriptures, he explains the text in an elegant and natural way, chiefly adhering to the literal ſenſe, without entangling himſelf in allegories. In his character of a tranſlator from the Greek to the Latin, he takes conſiderable liberties, but he honeſtly acknowledges them. His original works, beſides the pieces in controverſy with Jerome, already noticed, comprize commentaries on different parts of the Old Teſtament; two books of Eccleſiaſtical Hiſtory, added by him to his verſion of Euſebius, and continuing the hiſtory of the church to the death of the emperor Theodoſius. Other works have been aſcribed to him. The whole of what belongs to Ruffinus, excepting his apologies for Origen and declaration to Anaſtaſius, were publiſhed in a folio volume at Paris, in 1580. He tranſlated the works of Joſephus, the Eccleſiaſtical Hiſtory of Euſebius, and many other works from the Greek to the Latin. Moreri. Dupin. Moſheim.

RUFINUS, miniſter of ſtate to the emperors Theodoſius and Arcadius, was a native of Eluzzo, now named Eauſe, a town of France, in the department of Gers, according to the modern diviſions of that kingdom, which in the time of Ruſinus was a celebrated city, and paſſing from the Romans to the Goths, was taken from them by Clovis. Rufinus was brought up to the profeſſion of the law, and being poſſeſſed of a bold and ready elocution, with much addreſs, and an advantageous perſon, he attracted ſome conſiderable ſhare of notice at the court of Conſtantinople, and about 390 was raiſed by Theodoſius to the poſt of maſter of the offices. In 392 he was nominated to the conſulſhip, with Arcadius for a colleague; and during the ſame year he was entruſted with the important poſt of prefect of the Eaſt. He diſguiſed his ambition and other vices under the maſk of piety, by which he ſecured the confidence of the emperor, and obtained the friendſhip of Ambroſe, and other dignified eccleſiaſtics. Having built a ſumptuous palace and church at Chalcedon, he aſſembled the moſt illuſtrious biſhops of the Eaſt to aſſiſt at the dedication, taking occaſion, at the ſame time, to receive the rite of baptiſm, which in that age was often deferred to a late period. By nature he was cruel and vindictive, and committed many atrocious acts: he ſtimulated his maſter to order the dreadful maſſacre of Theſſalonica: he procured the diſgrace and exile of the brave general Promotus, who had chaſtiſed his inſolence by a blow: and he effected the ruin of the prefect Tatianus, and the execution of his ſon Proculus, in order to make way for his own prefecture of the Eaſt. "The puniſhment of the two prefects," ſays Gibbon, "might, perhaps, be excuſed by the exceptionable parts of their own conduct: the enmity of Rufinus might be palliated by the jealous and unſociable nature of ambition. But he indulged a ſpirit of revenge, equally repugnant to prudence and to juſtice, when he degraded their native country of Lycia, from the rank of Roman provinces; ſtigmatized people with a mark of ignominy; and declared that the countrymen of Tatianus and Proculus ſhould ever remain incapable of holding any employment of honour or advantage, under the imperial government."

After the death of Theodoſius, in 395, Rufinus ſucceeded to abſolute authority over the Eaſtern empire, in the name of Arcadius, and he made uſe of his power for the gratification of his paſſions, eſpecially that of avarice. He exhibited a very remarkable inſtance of his arbitrary and violent conduct in the treatment of Lucian, who had purchaſed his favour, and the office of count of the Eaſt. This unfortunate perſon, whoſe adminiſtration is ſaid to have been exemplary, affronted the emperor's uncle by the refuſal of an unjuſt requeſt. On the complaint of Arcadius to Rufinus, the latter, without acquainting any one with his deſign, ſet off for Antioch, and performing the journey with great celerity, entered that capital in the dead of the night, and commanded the prefect to be brought before him. Without pretending to hear any thing in proof of his innocence, he cauſed Lucian to be ſcourged to death. In the mean time his own fall was rapidly approaching. To ſecure his authority, and with a view of raiſing himſelf to a partnerſhip in the empire, he had planned the marriage of his daughter to the emperor. But the chamberlain, Eutropius, contrived to place in his view Eudoxia, the beautiful daughter of Frank Bauto. He became enamoured at the ſight, and Rufinus, after his return, was mortified by the emperor's marriage with his daughter's rival. This diſappointment, and the fear of loſing the power which he poſſeſſed, inſpired him, it is ſaid, with plotting the deſtruction of his ſovereign, and with inviting the Huns and Goths to invade the empire, in order to create a general confuſion. The famous Stilicho was at this time omnipotent in the Weſtern empire as miniſter of the young Honorius, brother to Arcadius; and claiming from the appointment of Theodoſius the guardianſhip of both his ſons, he prepared to march into the Eaſt, in order to aſſert his authority there. At the head of the armies of both parts of the empire he had croſſed the Alps, and was near Theſſalonica, when Rufinus,

finus, dreading his approach, procured an order from Arcadius for the Eastern forces to separate from Stilicho and march to Constantinople. The general did not venture to disobey, and placed them under the command of Gainas, the Goth, with whom he had concerted his plan. The army arrived before the capital of the East, in November 395, and the emperor, with Rufinus, went out to meet it. At the distance of a mile from the capital, in the field of Mars, the troops halted. Arcadius and his minister advanced, according to an ancient custom, respectfully to salute the power that supported the throne. Rufinus expected that his partizans would take that opportunity of proclaiming him emperor, and had actually prepared the purple robe, diadem, and royal donative for the occasion. By the direction of Gainas, however, the wings wheeled round and inclosed their victim, and upon a signal given, a soldier plunged his sword into his breast. Rufinus fell, groaned, and expired at the feet of the affrighted emperor. His mangled body was abandoned to the brutal fury of the populace of both sexes, who hastened in crowds, from every quarter of the city, to trample on the remains of the haughty minister, at whose frown they had so lately trembled. His right hand was cut off and carried through the streets of Constantinople, in mockery, to extort the contributions for the avaricious tyrant, whose head was publicly exposed, borne aloft on the point of a long lance. According to the savage maxims of the Greek republics, his innocent family would have shared the punishment of his crimes; but they fortunately took refuge in a sanctuary, which protected them from the raging madness of the people, and they were permitted to spend the remainder of their lives in the exercises of Christian devotions, as they were called, in the peaceful retirement of Jerusalem.

Rufinus is said to have been well versed in elegant literature, yet a poet has been the bitterest foe to his memory. Claudian has made him the subject of two books of invectives, probably for the purpose of ingratiating himself with Stilicho, the avowed enemy of Rufinus. Univer. Hist. Gibbon, vol. v.

RUFISCO, in *Geography*, a town of Africa, in the kingdom of Kayor, situated on the sea-coast. Its name is a corruption of "Rio-fresco," its Portuguese appellation. It contains about 300 houses, and the inhabitants carry on a considerable trade with Europeans in slaves, skins, gum, ivory, ostrich feathers, cotton, indigo, &c.; 60 miles W.N.W. of Amboul.

RUFS, a town of Prussian Lithuania; 20 miles N.W. of Tilsit.

RUFTER-HOOD, among *Falconers*, a plain leathern hood, large and open behind, to be worn by a hawk when she is first drawn.

RUFUMBA, in *Geography*, a town of Mombique, on the Suabo. S. lat. 6° 25′. E. long. 35° 30′.

RUFUS, the Ephesian, in *Biography*, a physician and anatomist of considerable eminence, in the reign of the emperor Trajan, was apparently entitled to the reputation which he obtained by his extensive knowledge and experience. Galen esteemed him one of the most able of the physicians who had preceded him. Rufus appears to have cultivated anatomy, by dissecting brutes, with great zeal and success. He traced the origin of the nerves in the brain, and considered some of them as contributing to motion, and others to sensation. He even observed the capsule of the crystalline lens in the eye. He considered the heart as the seat of life, and of the animal heat, and as the origin of the pulse, which he ascribed to the *spirit* of its left ventricle and of the arteries; and he remarked the difference in the capacity and thickness of the two ventricles. He deemed the spleen to be a very useless viscus, and his successors have never discovered its use. He examined very fully the organs of generation, and the kidnies and bladder; he has left, indeed, a very respectable treatise on the diseases of the urinary organs, and the methods of cure. He also wrote a good work on purgative medicines, mentioning their different qualities, the countries from which they were obtained; and a little treatise on the names given by the Greeks to the different parts of the body. Galen affirms also that Rufus was the author of an essay on the *materia medica*, written in verse; and Suidas mentions a treatise of his on the *atra bilis*, with some other essays; but these are lost. See Sprengel, Geschichte der Arzneikunde, 2 theil, p. 63; and Le Clerc, Histoire de la Médécine, part iii. p. 104.

RUFUVEILLE, in *Geography*, a town of France, in the department of the Channel; nine miles W. of Mortain.

RUGBY, a small market-town and parish in the hundred of Knightlow, and county of Warwick, England, is situated at the distance of 19 miles E.N.E. from Warwick, 12 miles E. from Coventry, and 84½ miles N.W. by N. from London. This place is called Rocheberie in Domesday-book, as Dugdale conjectures, from the word Roche, signifying a rock, or quarry of stone, and Berie, a court, or habitation of note. Hence it has been supposed to have been a town of importance in early Saxon times, but the records of its remote history have entirely perished. After the Conquest it formed part of the possessions of Turchil de Warwick, from whom it was held by one Eddulfus, whose posterity continued to enjoy it till the reign of Edward I., when it was conveyed, by marriage, to the family of Goband, from whom it passed to the barons of Stafford. The situation of Rugby is lofty, and commands an extensive view over the adjacent country. The houses are disposed in the most irregular manner, and are, in general, constructed of wood. Here is a charity school, founded and endowed for the education of thirty boys, by Richard Elborow, esq.; also a grammar-school, which was founded by Laurence Sheriff, esq., in the ninth year of the reign of queen Elizabeth. The latter is a very important establishment, and is under the direction of twelve trustees, who are appointed from among the nobility and principal gentry of the county. By judicious management the property of this school, though originally trifling, has become extremely valuable, yielding a rent of 2000*l.* *per annum*, and when the present leases shall expire, the rent will doubtless be considerably increased. The trustees hold regular meetings for the transaction of business; and in August an annual examination of the pupils takes place before them. There are fourteen exhibitioners sent from this school to the universities, each of whom is allowed 40*l.* a-year. When vacancies occur, they are filled up at the annual examinations, which are attended by a member from both universities, appointed for the purpose by the vice-chancellor. The scholars at present amount to about 330 in number, of whom 50 are on the foundation. The old buildings of this school having been found unsuitable to its extended condition from the period of their erection, a new structure has been raised nearly on the same scite, since the year 1808. This edifice is built in the style of architecture prevalent in the reign of queen Elizabeth, when the school was founded, and is admirably adapted to the purposes for which it was erected. It is composed of white brick, but the angles, cornices, and dressings to the windows and entrances, are of stone. The principal front extends 220 feet in length, and has a tower gateway in the centre, which leads into the principal court, a fine area 90 feet long, by 75 wide, with a plain cloister on three sides.

On the ſouth ſide of the court are, the dining-hall for the boys in the head-maſter's houſe, and three ſchools for different claſſes; the weſt ſide is occupied by the great ſchool, and that on the north by the French and writing ſchools. The head-maſter's houſe is placed at the eaſtern end of the ſouth front; and between it and the ſchools is a range of building, divided into ſmall apartments, appropriated to the uſe of the ſtudents. About ſixty boys are thus accommodated; the remainder lodge with the other maſter, or at boarding-houſes in the town. This building was deſigned and erected by Henry Hakewill, eſq., architect.

The church of Rugby is not worthy of notice, but the church-yard is remarkable for various eccentric inſcriptions. The market-day here is Saturday, weekly; and fairs are held on the 17th February, 31ſt March, 15th May, 7th July, 21ſt Auguſt, Monday before the 29th of September, 22d November, and 10th December. No manufacture of any importance is carried on in this town, but it has acquired a ſmall trade for the ſupply of the adjacent country, ſince the formation of the Oxford canal, which paſſes about a mile to the northward, and forms a branch of the ſyſtem of inland navigation, which connects all the principal rivers and towns in England.

Adjoining to Rugby, on its north-eaſtern ſide, is an eminence called Caſtle mount, from the circumſtance of its having been formerly the ſcite of a caſtle. Dugdale is of opinion that this fortreſs was one of thoſe erected in king Stephen's time, when he was threatened with invaſion by the empreſs Maud, whoſe crown he had uſurped. It was moſt probably demoliſhed by order of king Henry II. in the third year of his reign. The only veſtiges of it now viſible are parts of the moat and ſome embankments.

According to the parliamentary returns for 1811, Rugby pariſh contains 335 houſes, and 1805 inhabitants, of whom nearly 1000 reſide in the town. The Antiquities of Warwickſhire, &c. by William Dugdale, fol. London, 1657. Beauties of England and Wales, vol. xv. 1814, by I. N. Brewer.

RUGEL, a town of Baden, near the Rhine; 10 miles N.N.W. of Friburg.

RUGEN, an iſland in the Baltic, ſeparated from the coaſt of Pomerania, by a ſtrait not above a mile wide; about 60 miles in circumference, without including the indentations of the coaſt. Its name is ſaid to be derived from the Rugi, who firſt inhabited the Pomeranian coaſt beyond the Oder, but afterwards removed on this ſide of that river, taking up their chief reſidence in the country called after their name. On the deceaſe of the laſt prince of Rugen, duke Wartiſlav XI., in 1478, Rugen became united with Pomerania. In 1168 it was ſubdued by Waldemar I., king of Denmark, its temple was demoliſhed, the pagan worſhip ſuppreſſed, and Chriſtianity eſtabliſhed. There the divines of Rugen became vaſſals to the crown of Denmark. At the treaty of Weſtphalia, Rugen was added to Sweden, as a particular principality. At the peace of Roſchild in 1658, and alſo at that of Copenhagen in 1660, Denmark ceded to Sweden the whole juriſdiction, civil and eccleſiaſtical, which it had previouſly exerciſed over certain lands in the principality of Rugen. This iſland is not only encompaſſed by the ſea, but ſo penetrated by it, that ſeveral other iſlands and peninſulas are thus formed. The ſoil is fruitful, particularly in all kinds of grain, ſo that ſome thouſands of laſts are annually ſhipped off for Stralſund. It breeds likewiſe large ſtocks of cattle, and yields a large quantity of fiſh; but Pomerania ſupplies it with fuel. The nobility are numerous, and inveſted with conſiderable privileges. The preſident of the provincial tribunal, who muſt be a native, and a nobleman, is the prefect or governor, and he is aſſiſted in the adminiſtration by a ſecretary and purveyor. Rugen contains 27 pariſhes, and 21,240 inhabitants. Its capital is Bergen. N. lat. 54° 30′. E. long. 13° 30′.

RUGENWALDE, a town of Hinder Pomerania; 20 miles N.E. of Coſlin. N. lat. 54° 33′. E. long. 16° 7′.

RUGGA, a town of Africa, in Tunis, anciently called "Carago;" 40 miles S. of Cairoan.

RUGGARD, a town of Denmark, in the iſland of Funen; 10 miles W. of Odenſee.

RUGGED Isle, a ſmall iſland near the S. coaſt of Ireland, and county of Cork. N. lat. 51° 30′. W. long. 9° 2′.

Rugged *Point*, a cape on the N. coaſt of Cumbava. S. lat. 8° 9′. E. long. 118° 58′.

RUGGIOLA, a ſort of Spaniſh ſlate, ſerving in many places in the room of tiles and brick. It is a flaky ſtone of the nature of ſome of our grey ſlates, and is cut out of a mountain near Cordova; a plate of this being well heated on both ſides, will retain its warmth for twenty-four hours.

The people of Cornwall and ſome parts of Yorkſhire uſe a ſtone, which is of a talcky nature, to warm themſelves when in bed, applying it at the feet of the bed. This they call the warming ſtone, from its uſe, and it will retain a ſenſible heat ſix or eight hours, after once moderately warming. Plot's Oxfordſhire, p. 258.

RUGLERSREUT, in *Geography*, a town of Saxony, in the principality of Culmbach; three miles N. of Gefrees.

RUGLES, a town of France, in the department of the Eure, and chief place of a canton, in the diſtrict of Evreux; 21 miles S. of Evreux. The place contains 1564, and the canton 12,105 inhabitants, on a territory of 240 kiliometres, in 26 communes.

RUGLEN. See Rutherglen.

RUGMAN, Jonas John, in *Biography*, a learned Icelander, was born in 1636, and received his early education at the ſchool of Hulum. He afterwards ſet out for Copenhagen, in order that he might enter himſelf at the univerſity, but Denmark and Sweden being, at that time, engaged in war, he was made priſoner on the way, in 1658, and carried to Gottenburg, where he was patronized by a perſon named Brahe, who placed him at Wiſſenborg ſchool, whence he was ſent to the academy of Upſal, with a penſion from the king. He became acquainted with Olof Verelius, the Swediſh hiſtorian and antiquary, who, immediately after the peace, ſent him to Copenhagen, and thence to Iceland, for the purpoſe of collecting ancient manuſcripts, a great number of which he brought to Sweden. He went again to Copenhagen in 1665, and brought back with him a tranſcript of Oluf Trygveſſen's Hiſtory, "Ex Codice Wormiano Membranaceo." When the college of antiquities was eſtabliſhed at Upſal in 1667, he was one of the earlieſt members, but died in two years afterwards, at the age of 43. He was author of many learned works, the titles of which are given in the General Biography. Among them may be mentioned "Fragmenta quædam Legum veterum collecta ex diverſis Scriptoribus et Hiſtoriis, Lingua eadem;" "Verſio Svetica Hiſtoriæ Veteris Iſlandica Lingua ſcriptæ de Regibus Norvagorum, quæ vulgo Konuriga-Sagur nuncupantur." Gen. Biog.

RUGOSUM, Folium, in *Botany*. See Leaf.

RUGUPORUM, in *Geography*, a town of Hindooſtan, in Golconda; 25 miles S.W. of Warangole.

RUHELAND, a town of Germany, in the principality of Blankenburg; five miles S.S.W. of Blankenburg.

RUHLA,

RUHLA, a town of Saxony, in the principality of Eifenach, celebrated for its manufacture of knives; four miles S. of Eifenach.

RUHLAND, or RULAND, a town of Upper Lufatia, on the river Elfter; 27 miles N. of Drefden. N. lat. 51° 27′. E. long. 13° 50′.

RUHNKEN, DAVID, in *Biography*, an eminent critic, was born in 1723, at Salop, in Pomerania, of parents in a reputable fituation of life. He received the early part of his education at his native place, after which he went to the Frederician college at Konigfberg, from whence, at 18, he proceeded to the univerfity of Wittemberg, where he paid particular attention to the lectures of Ritter on jurifprudence and hiftory, and thofe of Berger on Roman eloquence and antiquities; he did not, however, neglect other important branches of ftudy, *viz.* the mathematics and philofophy. He was intended, by his parents, for the church, and they were defirous that he fhould conclude his ftudies with a courfe of theology; but the ardour which he had imbibed for philological enquiries induced him to repair to Leyden, where the learned Hemfterhuys was then in the height of his reputation. To this profeffor he particularly attached himfelf, who, in return, recommended him feveral private pupils. Ruhnken refolved to fettle in that country, as well on account of the felect fociety, as of the philofophical liberty for which Holland was, at that period, peculiarly diftinguifhed. In the year 1749, being the fixth year of his refidence at Leyden, he firft made himfelf known as a critic by a Latin epiftle to the celebrated Valekenaer on Homer's hymns, and Hefiod, which was followed, in 1751, by another to Ernefti, on Callimachus and Apollonius Rhodius. Both of thefe difplayed confummate fkill in the Greek language, with great compafs of erudition and elegance of tafte. At this time, by the advice of Hemfterhuys, he renewed his ftudy of jurifprudence, in order to qualify himfelf for a profefforfhip, thofe of polite literature being pre-occupied; and in 1752 he edited fome Greek commentaries upon a part of the Code and Digeft with a Latin verfion and learned notes. He next edited "Timæi Lexicon Vocum Platonicarum," a piece which gave full fcope to that grammatical criticifm in which he particularly excelled. "This," according to the learned Brunk, "in the whole circle of Greek literature, is both the fhorteft and moft learned work." In the year 1755, Ruhnken vifited Paris, where he remained a year moft affiduoufly occupied in copying and collating MSS. in the public libraries. After his return, in 1757, he was appointed reader of the Greek in the univerfity, and upon this occafion he pronounced an oration "De Græcis Artium et Doctrinarum Inventrice." In four years after this, he fucceeded to the chair of hiftory and eloquence, delivering for his inaugural fpeech an oration "De Doctore Umbratico." By this appellation, fays his biographer, he meant to characterize the man of letters who confines himfelf to the *fhade* of his own fchool, furrounded by admiring fcholars, and fhunning the commerce of the world at large; and the picture which he drew was fo well delineated, that it gave offence to certain perfons who fuppofed it to be defigned as a portraiture of themfelves. About this period he refufed a profefforfhip at Gottingen, recommending Heyne to fill the office. In his forty-firft year he married a beautiful young woman of eighteen, by whom he had two daughters, but the comfort of this alliance was, in a few years, deftroyed by an apoplectic attack, which deprived his wife of fight and fpeech. He feems hitherto to have lived in a focial unfhackled manner, enjoying the company of his friends, and participating in all common amufements. He was remarkably fond of hunting, or rather courfing, a fport of which he was a great mafter, few furpaffing him in the breed of his greyhounds, or in agility in leaping over the water-ditches, fo frequent about Leyden. This paftime, apparently fo very uncongenial to a literary mind, he continued almoft to the laft year of his life, and he thought it enabled him to refume his ftudies with peculiar fpirit and effect. In the year 1767 he was Rector Academiæ, and on quitting his office he pronounced a very elegant eulogy on Hemfterhuys, who had died in the preceding year. In 1774 he was made librarian to the univerfity, in which ftation he took great pains in making additions to the ftock of valuable books. He preferved his health to an advanced age, till at length he became fubject to catarrhal and dropfical complaints, under which he funk in May 1798, in the 76th year of his age. He was the editor of many learned works, among which are the following: "Rutilius Lupus," with "Aquila Romanus," and "Julius Rufianus;" "De Figuris fententiarum;" "De Vita et Scriptis Longini;" "Velleius Paterculus;" "Homer's Hymns;" a very much enlarged edition of "Timæi Lexicon;" an edition of the "Works of Muretus:" the two laft were publifhed in the year 1789. He afterwards employed himfelf in an edition of the Scholiafta of Plato; and an improved edition of Scheller's Latin dictionary. This learned man placed all his glory in philological acquirements, which he feemed to regard as the higheft fpecies of knowledge. He not only made very light of theological ftudies himfelf, but difcouraged them in all young men who poffeffed ftrong natural talents and promifing abilities. A very tenacious memory had ftored his mind with a vaft mafs of critical matter, efpecially of every thing that related to grammar, which he applied with much clearnefs and fagacity. He was one of the moft correct Grecians of his age, and was furpaffed by none in the purity and elegance of his latinity, both in fpeaking and writing. He left very little property behind him, excepting a library, rich in valuable printed books and manufcripts, which were purchafed by the ftates of Holland for the univerfity of Leyden, upon the condition of annuities for life to his widow and daughters.

RUHR, in *Geography*. See ROER.

RUHRORT. See ROERORT.

RUHTE, a town of Weftphalia, in the bifhopric of Hildefcheim, at the conflux of the rivers Innerfee and Leine; feven miles N.W. of Peine.

RUJAMPET, a town of Hindooftan, in Tellingana; 22 miles S. of Ramgur.

RUIB, a fmall ifland in the Pacific ocean, near the coaft of Waygoo. N. lat. 0° 4′. E. long. 130° 20′.

RUIJUEAH, a town of Hindooftan, in Lahore; 36 miles W. of Lahore.

RUINART, THIERRY, in *Biography*, a learned French writer, who flourifhed at the clofe of the 17th and at the beginning of the 18th centuries, was born at Rheims in the year 1657. When very young he took the habit among the Benedictine monks of the congregation of St. Maur, and, after going through the ufual courfe of philofophy and divinity in the abbey of St. Peter at Meaux, devoted his chief attention to the ftudy of the facred fcriptures, the fathers, and the ancient ecclefiaftical writers. Thefe branches of learning he cultivated with fo much ardour and fuccefs, that he was foon felected by father Mabillon to be his affiftant in his learned labours. In 1689 he fhewed his talents as an author, by publifhing at Paris "Acta primorum Martyrum fincera et felecta, collecta et edita cum notis," with a learned preface, in which

which he undertakes to refute the hypothesis of Dodwell, "De paucitate Martyrum." This work was several times reprinted with considerable additions. The next publication was an improved edition, in 1694, of "Victoris Vitensis Historia Persecutionis Vandalicæ." In 1699 he published a new and greatly esteemed edition of "S. Gregorii Turgonensis Episcopi, Opera Omnia, necnon Fredegarii Scholastici Epitome et Chronicon cum suis continuatoribus et aliis antiquis Monumentis:" he was the author and editor of many other works, and in 1709 he published a sketch of the "Life of Father Mabillon," and he died in the same year at the age of 52. His works afford abundant evidence that he was a man of deep research and profound learning: they recommend themselves by their accuracy, perspicuity, and neatness of style. The author, however, was not more respected for his learning, than he was esteemed for his humility, modesty, and piety.

RUINES, in *Geography*; a town of France, in the department of the Cantal, and chief place of a canton, in the district of St. Flour; six miles E.S.E. of St. Flour. The town contains 649, and the canton 7994 inhabitants, on a territory of 275 kiliometres, in 15 communes.

RUININE Oil, a name given by some authors to the oil of the palma Christi, which is very common in the West Indies, and is used by the common people in lamps. It is a delicate, sweet, and transparent oil, and has no peculiar operation in physic. They often give it in glysters from one spoonful to three at a time, and it has only the effect of common oil; but the leaves of the plant are one of the grand medicines of the Negroes; bruised and applied to the head, they are thought to be an almost infallible remedy for the head-ache, of whatever kind, or from whatever cause. See Castor-*Oil*.

RUINS, a term particularly used for magnificent buildings fallen to decay by length of time, and of which there only remains a confused heap of materials.

Such are the ruins of the tower of Babel, of the tower of Belus, two days journey from Bagdat, in Syria, on the banks of the Euphrates; which are now no more than a heap of bricks, cemented by bitumen; and of which we only perceive the plan to have been square.

Such also are the ruins of a famous temple, or palace, near Schiras, in Persia, which the antiquaries will have to have been built by Ahasuerus; and which the Persians now call Tchelminar, or Chelminar; *q. d.* the forty columns; because there are so many columns remaining pretty entire, with the traces of others; a great quantity of basso relievos, and unknown characters, sufficient to shew the magnificence of the antique architecture. The ruins of Palmyra may also be reckoned in the class of famous ruins.

RUISCH, Rachel, in *Biography*, was born at Amsterdam in 1664, the daughter of Frederick Ruisch, or Ruysch, the celebrated professor of anatomy. The very early disposition she exhibited for drawing flowers, and the extreme accuracy and minuteness with which she had copied prints without assistance, induced her father to place her under the tuition of William Van Aelst, an eminent flower-painter.

In a few years she became the rival of her master, and at length surpassed him; and indeed, as far as a neat and correct imitation of a single flower, a leaf, or an insect goes, she has been equalled by few. The great defect in her productions is a want of combination, the parts being separated, and the masses weak; which is the more to be lamented, as her choice of objects was remarkably elegant, and her manner of treating them perfection itself, even to illusion.

Her extraordinary talents recommended her to the peculiar patronage of the elector palatine, who in 1708 appointed her his paintress; and he was so great an admirer of her works, that he possessed a considerable portion of them, and rewarded their author munificently. She continued to exercise her talents, with almost unimpaired success, to a very advanced period of her existence, and died at Amsterdam in 1750, at the age of 86.

RUISSEAU, Grand, in *Geography*, a settlement in the Indiana territory, on the left bank of the Missisippi.

RUISSKAR, a small island on the east side of the gulf of Bothnia. N. lat. 61° 24′. E. long. 21° 8′.

RUIVAINS, a town of Portugal, in the province of Tras os Montes; nine miles S. of Montalegre.

RUIZIA, in *Botany*, named by Cavanilles in honour of Don Hippolito Ruiz, a Spanish botanist, who studied under the celebrated Mutis in South America, and who in conjunction with Pavon, another pupil of Mutis, published the splendid *Flora Peruviana*.—Cavan. Diss. 3. 117. Schreb. 466. Willd. Sp. Pl. v. 3. 798. Ait. Hort. Kew. v. 4. 221. Juss. 275.—Class and order, *Monadelphia Polyandria*. Nat. Ord. *Columniferæ*, Linn. *Malvaceæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, double; outer of three, ovate, concave, acute, deciduous leaves; inner of one leaf, permanent, cloven into five, lanceolate segments. *Cor.* Petals five, obliquely sickle-shaped, rounded at the tip, undivided, flat, spreading, fastened to the bundle of stamens. *Stam.* Filaments numerous, generally from thirty to forty, shorter than the corolla, united at their base into the form of a pitcher, inclosing the germen; anthers oblong, incumbent. *Pist.* Germen superior, globose, ten-furrowed; styles ten, short; stigmas simple. *Peric.* Capsules ten, compressed, membranaceous, woody on the back, boat-shaped, of one cell, united into a globular, umbilical whorl. *Seeds* two, roundish, or slightly triangular, pointed.

Obs. This genus is nearly akin to Assonia; see that article.

Ess. Ch. Calyx double; outer of three leaves. Styles ten. Capsules ten, of one cell, with two seeds, and disposed in a circle.

1. R. *cordata*. Heart-leaved Ruizia. Willd. n. 1. Cavan. Diss. t. 36. f. 2.—Leaves heart-shaped, lanceolate, wavy.—Native of the Isle of Bourbon, where it flowers in March and April. *Stem* shrubby, branched. *Leaves* alternate, stalked, numerous, ovate, pointed, notched. *Stipulas* awl-shaped, whitish, powdery, deciduous. *Flowers* in umbel-like terminal corymbs, sulphur-coloured, each on a short stalk.

2. R. *lobata*. Lobed Ruizia. Willd. n. 2. Cavan. Diss. t. 36. f. 1.—Leaves heart-shaped, five-lobed, notched.—Found also in the Isle of Bourbon, flowering in February and March. A handsome *shrub*, five or six feet high, much branched, with a greyish-white *bark*. *Leaves* crowded together at the extremities of the branches, alternate, stalked, smooth above, white and dusty beneath, the older divided into five, rarely into seven, lobes. *Stipulas* awl-shaped, erect, downy or powdery, deciduous. *Flowers* like those of the above species in form and colour.

3. R. *variabilis*. Various-leaved Ruizia. Willd. n. 3. Jacq. Hort. Schoenbr. v. 3. 24. t. 295. (R. palmata and R. laciniata; Cavan. Diss. t. 37. f. 1, and 2.)—Leaves of the flowering branches palmate; those of the barren ones digitate.—Native of the Isle of Bourbon, and introduced at Kew, in 1792, where it flowers in May. A very handsome *shrub* of rather humble, but diffuse, growth. *Stems* wavy, furrowed, brown. *Leaves* alternate, stalked, dark green above, whitish underneath, extremely curious for the variety

variety of their ſhape, expreſſed in the ſpecific character, and which is admirably ſhewn in Jacquin's figure. *Flowers* in umbel-like corymbs, of a pale red or crimſon colour, with deep red claws. The name of this is by miſtake engraved *R. diverſifolia*, inſtead of *variabilis* in Jacquin's plate.

In Commerſon's MSS. this genus was called *Kænigia*.

RUKHADORFF, in *Geography*, a town of Auſtria; four miles N.N.E. of Sonneberg.

RUKI, a town of Mingrelia, in which the palace of the prince is ſurrounded with a thick wall, ſeated on a river which runs into the Black ſea; 200 miles W. of Teflis.

RUKKIA, in *Zoology*, a name given by ſome to a peculiar kind of ſquirrel, found in the iſland of Ceylon.

RUKMENI, in *Hindoo Mythology*, is the name of one of the wives of Kriſhna, who being an incarnation of Viſhnu, his heavenly conſort Lakſhmi, is repreſented to have alſo deſcended in this form of Rukmeni to accompany him. In many authorities ſhe appears to be the ſame perſon as Radha, Kriſhna's favourite wife: but others make a difference, ſtating that Rukmeni was his legal worldly wife, and that Radha is a perſonification of religion. Others again ſay, that Rukmeni was the ſpiritual ſpouſe. If, however, it be admitted, that ſuch a perſon as Kriſhna ever exiſted, we may farther admit, that he had a plurality of wives, and that the two women in queſtion were among them. A liſt of his wives, eight in number, will be found under KRISHNA. Rukmeni is uſually the firſt on the liſt. She is ſaid to have been the daughter of a Raja Bhiſhmaka; and another of her names is Kantamati. On the death of Kriſhna, Rukmeni, with ſeveral others of his wives, burnt themſelves, in view to an immediate reunion with their lord in Vaikontha, the paradiſe of Viſhnu. This ſelf-immolation is called *Sati*; and under that article ſome account is given of it. Rukmeni is related to have borne a ſon to Kriſhna, of whom very frequent mention is made in Hindoo writings, being no other indeed than Kama, the god of love, incarnated in the perſon of their ſon Pradyamna. As the mother of the Hindoo Cupid, we here find Lakſhmi (recollecting that Rukmeni is that goddeſs in another form) correſponding, as in many other inſtances, with the Venus of Weſtern mythologiſts. See KAMA, LAKSHMI, PRADYAMNA, and RETI, for farther notice of theſe fables. Under KRISHNA, RADHA, and VAIKONTHA, will alſo be found ſome particulars connected with the ſubjects of this article. It may be farther noticed, that in temples dedicated to the worſhip of Kriſhna, ſtatues of Rukmeni are commonly ſeen. Caſts, ſaid to be of her, are alſo common. In other *avataras*, or *deſcents* of Viſhnu, his conſort is ſaid to have accompanied him under the name of Rukmeni. See hereon under WITTOBA.

RULE, or RULER, *Regula*, a very ſimple inſtrument, ordinarily of hard wood, thin, narrow, and ſtraight, ſerving to direct the drawing of right lines.

The rule is of principal uſe in all the mechanical arts.

To prove whether or no it be juſt, draw a line by it on paper; then turn the rule about, the right end to the left, and apply the ſame edge this way to the line; if the edge now agree exactly with the line, the ruler is true.

Deſmarets has a fine poem on the amours of the rule and compaſs. The ſtone-cutters' rule is uſually four feet long, and divided into feet and inches.

The maſons' rule is twelve or fifteen feet long, and is applied under the level to regulate the courſes, to make the piedroits equal, &c.

RULE, *Parallel*, or *Ruler*. See PARALLEL.

RULE is alſo applied to certain inſtruments which have other conſiderable uſes beſides that of drawing lines. Such are the carpenters' joint-rule, Everard's and Coggeſhall's ſliding-rules, &c.

RULE, *Carpenters' joint*, is an inſtrument uſually of box, 24 inches long, and $1\frac{1}{2}$ broad, each inch being ſubdivided into eight parts. On the ſame ſide with theſe diviſions is uſually added Gunter's line of numbers.

On the other ſide are the lines of timber and board-meaſure, the firſt beginning at $8\frac{1}{2}$, and continued to 36, near the other end; the latter is numbered from 7 to 36, 4 inches from the other end. (*Plate* VI. *Surveying, fig.* 14.) The diviſion of the timber-line is formed from a conſideration, that 1728 inches make a ſolid foot, in the following manner: thus, 9 is ſo placed againſt one of the diviſions of inches, or parts on the other ſide of the rule, beginning from the right hand, that its ſquare, which is 81 inches, multiplied by that number of inches and parts, muſt make 1728 inches; which, dividing 1728 by 81, muſt be placed againſt $21\frac{1}{3}$ from the right hand; and 10 muſt be placed againſt $17\frac{28}{100}$ inches; becauſe 1728 divided by the ſquare of 10 or 100, gives $17\frac{23}{100}$, &c. But becauſe a ſquare whoſe ſide is 1, 2, &c. to 8 inches, requires more than 24 inches in length, as a multiplier, in order to produce 1728 inches; and ſince the length of the rule is only 24 inches, there is a table upon the left end of it, which ſupplies its defect of length. In this table the upper row of figures, *viz.* 1, 2, 3, 4, 5, 6, 7, 8, denotes inches, or the lengths of the ſides of ſquares; and the ſecond and third rows are the correſpondent feet and inches to make up a ſolid foot. It is made by dividing 144 inches by the ſquares of 1, 2, 3, 4, 5, 6, 7, 8.

The line of board-meaſure is thus divided: ſuppoſe the diviſion 7 to be marked; divide 144, the number of inches in a ſquare foot, by 7, and the quotient will be $20\frac{4}{7}$ inches; whence the diviſion 7 muſt be againſt $20\frac{4}{7}$ inches on the other ſide of the rule. To mark the diviſion 8, divide 144 by 8, and the quotient, which is 18 inches, muſt be placed on the line of board-meaſure againſt 18 inches on the other ſide, &c. But becauſe the ſide of a long ſquare, that is, 1, 2, 3, 4, 5 inches, requires the other ſide to be more than 24 inches, the whole length of the rule; there is a table annexed, formed by dividing 144 inches by each of the numbers in the upper row, and then each of the quotients by 12, to reduce them into feet.

RULE, *uſe of the carpenters' joint*. The application of the inches in meaſuring lengths, breadths, &c. is obvious. That of the Gunter's line, ſee under GUNTER'S *Line*. The uſe of the other ſide is all we need here illuſtrate.

1. *The breadth of any ſurface, as board, glaſs, &c. being given, to find how much in length makes a ſquare foot.*—Find the number of inches the ſurface is broad, in the line of board-meaſure, and right againſt it, on the inches ſide, is the number of inches required. Thus, if the ſurface were 8 inches broad, 18 inches will be found to make a ſuperficial foot.

Or, more readily, thus. Apply the rule to the breadth of the board or glaſs, that end marked 36 being even with the edge; the other edge of the ſurface will ſhew the inches and quarters of inches which go to a ſquare foot.

To find the content of a given ſurface. Find the breadth, and how much makes one foot; then turn that over as many times as you can upon the length of the ſurface, and ſo many feet does the ſurface contain.

2. *Uſe of the table at the end of the board-meaſure.* If a ſurface be one inch broad, how many inches long will make a ſuperficial foot? Look in the upper row of figures for 1 inch,

1 inch, and under it, in the ſecond row, is 12 inches, the anſwer to the queſtion.

3. *Uſe of the line of timber-meaſure.* This reſembles the former; for, having learnt how much the piece is ſquare, look for that number on the line of timber-meaſure; the ſpace thence to the end of the rule is the length, which, at that breadth, makes a foot of timber. Thus, if the piece be 9 inches ſquare, the length neceſſary to make a ſolid foot of timber is 21½ inches. If the timber be ſmall, and under 9 inches ſquare, ſeek the ſquare in the upper rank of the table, and immediately under it are the feet and inches that make a ſolid foot. Thus, if it be 7 inches ſquare, 2 feet 11 inches will be found to make a ſolid foot.

If the piece be not exactly ſquare, but broader at one end than another, the method is, to add the two together, and take half the ſum for the ſide of the ſquare. For round timber, the method is, to girt it round with a ſtring, and to allow the fourth part for the ſide of the ſquare. But this method is erroneous; for hereby you loſe above ⅕th of the true ſolidity. See SLIDING *Rule* and TIMBER.

RULE, *Caliber.* See CALIBER.

RULE, *Everard's ſliding.* } See SLIDING *Rule.*
RULE, *Coggeſhall's ſliding.* }

RULE, *Regula*, alſo denotes a certain maxim, canon, or precept to be obſerved in any art or ſcience. Thus we ſay, the rules of grammar, of logic, of philoſophizing, &c.

School philoſophers diſtinguiſh two kinds of rules; *viz. theoretical*, or *rules of knowing*, which relate to the underſtanding, being of uſe in the diſcovery of truth; and *practical*, or *rules of acting*, which relate to the will, and ſerve to direct it to what is good and right.

For the management and application of theſe two ſorts of rules, there are two diſtinct arts; *viz. logic* and *ethics*: ſee each reſpectively.

RULES *of knowing*, *regulæ ſciendi*, are ſuch as direct and aſſiſt the mind, in perceiving, judging, and reaſoning.

RULES *of acting*, *regulæ agendi*, are thoſe by which the mind is guided in her deſires, purſuits, &c.

Authors are extremely divided about the regard to be had to the rules of poetry fixed by the ancients, Ariſtotle, Horace, Longinus, &c. and admitted by the modern critics, as Boſſu, &c. ſome contending, that they muſt be inviolably obſerved; others pleading for liberty to ſet them aſide on occaſion. Rules, it is complained, are fetters; rank enemies to genius; and never religiouſly obſerved by any, but thoſe who have nothing in themſelves to depend on. Voiture frequently neglected all the rules of poetry, as a maſter who ſcorned to be confined by them.

The theatre has its particular rules, as the rule of twenty-four hours, the unities of action, time, and place, &c. If it be true, ſays Moliere, that plays conducted according to the rules do not pleaſe, but thoſe which are not, do, the rules muſt be naught. For myſelf, when a thing hits and diverts me, I do not enquire whether I have done amiſs, nor whether Ariſtotle's rules forbid me to laugh.

RULES *of philoſophizing.* See PHILOSOPHIZING.

RULE, in *Arithmetic*, denotes a certain method of performing particular arithmetical operations, as the rules of addition, ſubtraction, multiplication, and diviſion; which four are called the fundamental rules of arithmetic, all other operations being dependant on one or more of theſe. See ADDITION, SUBTRACTION, &c.

From the combination of theſe rules various others are derived, and, we muſt add, many more than ought to be diſtinctly characterized. Thus, our writers on arithmetic give us the rules of barter, ſimple intereſt, brokerage, factorage, rebate and diſcount, exchange, tare and tret, and a vaſt variety of others, which are, in fact, only ſo many examples in the rule of proportion (or, as it is commonly called, the rule of three), and ought, therefore, to be included under that general term.

At a time when arithmetic and geometry formed almoſt the only ſubjects of a mathematical education, long ſpun-out treatiſes of arithmetic, and extenſive elementary works on geometry, were at leaſt excuſable; but ſince the improvements that have been made in analyſis, the two former ſubjects form but a very ſmall part of what is neceſſary to be known, for a perſon to have any pretenſions to the character of a mathematician; and it is, therefore, aſtoniſhing that writers on thoſe ſubjects, particularly thoſe on arithmetic, have not thought of contracting their works, by condenſing under one head a number of different rules, now given under diſtinct titles, and transforming others, ſuch as poſition, alligation, &c. to introductory treatiſes on algebra, to which branch they more properly belong. By a judicious arrangement of this kind, the two ſubjects of arithmetic and elementary algebra might be very well condenſed into the uſual ſize of an arithmetic, and a boy be made to acquire a competent knowledge of both ſubjects, in leſs time than is uſually employed in taking him through arithmetic only.

RULE *of Three*, or *Rule of Proportion*, by ſome former writers called alſo the *Golden Rule*, is one of the moſt extenſive and uſeful rules in arithmetic, teaching how to find a fourth proportional to three given numbers.

The rule of three has commonly been divided into two caſes, *direct* and *inverſe*, a diſtinction, however, which is totally uſeleſs, and which has been avoided by ſome of our beſt modern writers; it may not, however, be amiſs to explain, in this place, the difference that was formerly underſtood between the direct and the inverſe rule of three.

The *rule of three direct*, is when more requires more, or leſs requires leſs, as in this example. If 3 men will perform a piece of work, as, for inſtance, dig a trench 48 yards long in a certain time, how many yards will 12 men dig in the ſame time? Here it is obvious, that the *more* men there are employed, the *more* work will they perform; and therefore, in this inſtance, more requires more. Again; if 6 men dig 48 yards in a given time, how much will 3 men dig in the ſame time? Here leſs requires leſs; for the *leſs* men there are employed, the *leſs* will be the work done in the ſame time. And all queſtions falling under either of theſe caſes are ſaid to be in the rule of three direct.

The *rule of three inverſe*, is when more requires leſs, or leſs requires more, as in this example. If 6 men dig a certain quantity of trench in 14 hours, how many hours will it require for 12 men to dig the ſame quantity? Or thus: If 6 men perform a piece of work in 7 days, how long will 3 men be in performing the ſame work? Theſe examples are both in the inverſe rule; for in the firſt, more requires leſs, that is, 12 men being *more* than 6, they will require *leſs* time to perform the ſame work; and in the latter, the number of men being *leſs*, they will require a *longer* time. All queſtions of this claſs are ſaid to be in the rule of three inverſe. Theſe two caſes, however, as we before obſerved, may be included under one general rule, as follows.

Rule.—Of the three given terms, ſet down that which is of the ſame kind with the anſwer towards the right hand; and then conſider, from the nature of the queſtion, whether the anſwer will be more, or leſs, than this term. If the anſwer is to be greater, place the leſs of the other two terms on the left, and the remaining term in the middle; but if it is to be leſs, place the greater of the two given quantities on the left, and the leſs in the middle; and in either caſe, multiply the ſecond and third terms together, and divide by the firſt term for the anſwer, which will always be of the ſame denomination as the third term.

Note 1.—If the firſt and ſecond terms contain different denominations, they muſt both be reduced to the ſame denominations; and if the third term be a compound number, it is generally moſt convenient to reduce it to the loweſt denomination contained in it.

Note 2.—The ſame rule is applicable, whether the given quantities be integral, fractional, or decimal.

Examples.

If an acre of land be worth 73*l.* 1*s.*, how much land may be bought for 250*l.* 10*s.*?

Integral.

```
     £   s.     £   s.     Acre.
As  73   1  :  250  10  ::  1
    20          20
   ----        ----
   1461     :  5010     ::  1
                  1
                ----
        1461)5010(3 acres.
             4383
             ----
              627
                4
             ----
        1461)2508(1 rood.
             1461
             ----
             1047
               40
             ----
        1461)41880(28 324/487 perches.
             2922
             ----
             12660
             11688
             ----
              972
             ----  = 324/487.
             1461
```

By Fractions.

As $73\frac{1}{20}$: $250\frac{1}{2}$ :: 1

Or, as $\frac{1461}{20}$: $\frac{501}{2}$ :: $\frac{1}{1}$

Whence $\frac{20}{1461} \times \frac{501}{2} \times \frac{1}{1} = \frac{5010}{1461} =$ 3 acres, 1 rood, $28\frac{324}{487}$ perches.

By Decimals.

```
As 73.05  :  250.5  ::  1
                  1
                ----
        73.05)250.50(3.4291 = 3 ac. 1 r. 28.656 p.
              21915
              -----
              31350
              29220
              -----
               21300
               14610
               -----
                66900
                65745
                -----
                 11550
                  7305
                 -----
                  4245
```

Example 2. If 3 pounds be bought for 17*s.* how many will 170*s.* buy? Since as 17*s.* are to 170*s.* ſo are 3 pounds to the pounds required; the number will be found thus:

```
17s.  :  170s.  ::  3lb.
            3
          ----
      17)510(30lb.
          51
          ---
          00
          ---
```

Example 3. If 3 pounds and 4 ounces coſt 2*s.* 4*d.* what will 2 pounds coſt? The operation will be thus:

```
3 lb.   4 oz.  :  2 lb.  ::  2s. 4d.
16                16          12
---               ---         ---
52                32          28
                  28
                  ---
                  256
                  64
                  ---
              52)896(17d. 12/52 of a penny.
                  52
                  ---
                  376
                  364
                  ---
                   12
```

In many caſes of commerce and accompts, we have more compendious ways of working queſtions that come under the rule of three than by the rule itſelf; which, by reaſon of their expediting practice, are called *practice*, and conſtitute a particular rule of themſelves.

According to the above rule, it will be obſerved, that the third term is of the ſame kind or name as the fourth term or anſwer, and the ſecond of the ſame name with the firſt; ſo that the analogy in both pair of terms is between quantities of the ſame kind; which is, in fact, neceſſary to conſtitute a proportion, according to Euclid's definition: whereas, by ſome ſtrange overſight, it will be found that moſt of our writers on arithmetic, by making the middle term like the anſwer, have neceſſarily to conſider the ratio of incongruous quantities, or at leaſt the ratio between the abſtract numbers by which they are expreſſed.

Rule *of Compound Proportion*, or *Double Rule of Three*, or, as it is otherwiſe called, the *Rule of Five*, is the method of ſolving, at one operation, ſuch queſtions as would require two or more ſtatings by the common or ſimple rule of three.

Rule.—1. Set down the terms expreſſing the condition of the queſtion, in one line. 2. Under each conditional term ſet its correſponding one in another line. 3. Multiply the producing terms of one line, and the produced term of the other line continually, and take the reſult for a dividend. 4. Multiply the remaining terms continually, and let the product of them be a diviſor. 5. The quotient of this diviſion will be the term required.

By producing terms here, are meant whatever neceſſarily and jointly produce any effect; as the cauſe and the time; length, breadth, and depth; buyer and his money; ſeller and his goods; all neceſſarily inſeparable in producing their ſeveral effects.

In a queſtion where a term is underſtood, and not expreſſed, that term may be expreſſed by unity.

Example.—If 250*l.* ſerve ſix perſons for nine months; how long will 1000*l.* ſerve four perſons at the ſame rate?

Here the terms which expreſs the condition are,

	£		Per.		Mon.
	250	:	6	:	9
correſponding terms	1000	:	4	:	Q

where Q is put to repreſent the term required.

Among the conditional terms, ſix perſons and nine months are producing, and 250*l.* is produced: among their correſponding terms, four perſons and Q are producing, and 1000*l.* is produced.

But it being impoſſible to multiply the producing terms in the ſecond line, and the produced in the firſt, becauſe Q is unknown; therefore, multiply the producing terms of the firſt line by the produced in the ſecond, and divide by the product of the reſt.

Then will $Q = \frac{6 \times 9 \times 1000}{4 \times 250} = 6 \times 9 = 54$. See Mr. Dodſon's Anti-Logarithmic Canon, p. 38, et ſeq.

But if the notion of producing and produced terms ſhould ſeem obſcure, thoſe who have a knowledge of the doctrine of compound ratios will eaſily perceive that, in the foregoing queſtion, Q is to 9 months in the compound ratio of four perſons to ſix perſons inverſely, and of 1000*l.* to 250*l.* directly, that is, $\frac{Q}{9} = \frac{6}{4} \times \frac{1000}{250}$, therefore $Q = \frac{6 \times 9 \times 1000}{4 \times 250} = 54$, as before. And in like manner may other queſtions, relating to the compound rule of proportion, be ſtated and ſolved, however complex.

The above rule may be expreſſed ſomewhat ſimpler, as follow:

Rule 2.—Set that term, which is of the ſame kind with the anſwer, on the right, and take any two of the other given terms which are of the ſame name, and conſider, from the nature of the queſtion, whether, if theſe three were the only given terms, the anſwer ought to be more or leſs than the above-mentioned right-hand term, and arrange theſe two terms accordingly, as in the rule of three.

Conſidering ſtill the ſame right-hand term as common to every ſtating, take two other terms which are of the ſame kind, and arrange them as above, according as, in this caſe, the anſwer ought to be more or leſs than the right-hand term; and proceed in the ſame manner with every pair of terms that are of the ſame name. Then multiply all the firſt terms together for a diviſor, and all the other terms together for a dividend, and the quotient thence ariſing will be the anſwer ſought.

Example.—If 248 men, in 5 days of 11 hours each, can dig a trench 230 yards long, 3 wide, and 2 deep; in how many days, of 9 hours each, will 24 men dig a trench 420 yards long, 5 wide, and 3 deep?

Men	24	:	248	
Hours	9	:	11	
Length	230	:	420	:: 5 days, *common term.*
Width	3	:	5	
Depth	2	:	3	

Then $\frac{248 \times 11 \times 420 \times 5 \times 3}{24 \times 9 \times 230 \times 3 \times 2} = 288\frac{50}{207}$ days, the term required.

RULE, *Central.* See CENTRAL.

RULE, in a monaſtic ſenſe, is a ſyſtem of laws, or conſtitutions, by which religious houſes are eſtabliſhed and regulated; and which the religious make a vow to obſerve at their entrance.

The monaſtic rules are all to be approved of by the pope, in order to make them valid. The rule of St. Benedict is, by ſome authors, called the *holy* rule.

Thoſe of St. Bruno and St. Francis are, of all others, the moſt auſtere. See CARTHUSIANS.

When a religious cannot ſupport the auſterities of his rule, he ſues for a diſpenſation.

RULE, in the *Canon Law.* The rule *de veriſimili notitia, of probable notice,* in the Romiſh church, renders all proviſions to a benefice, vacant by death, null, if it appear, that, from the day of the deceaſe to the day of the date of the proviſions, or to the day when the courier arrives from Rome, there has not been time ſufficient for regular notice of the perſon's deceaſe to be conveyed to the pope.

Proviſions are even null, if it be proved the courier ſet out before the perſon was deceaſed. This rule was, according to the old conſtitution, ſtrictly obſerved in France; in other countries the pope finds frequent occaſions to diſpenſe with it. See PROVISIONS.

RULE *of twenty Days, Regula viginti Dierum.* By this rule, if an eccleſiaſtic reſign his benefice, to make the reſignation valid, the reſigner muſt ſurvive its admiſſion in the court of Rome twenty days. If he die before the expiration of the twenty days, the reſignation is void, and the benefice becomes vacant by death.

This rule does not hold of the proviſions of ordinary collators; nor of ſimple and pure reſignations into the hands of the ordinary; but only in caſe of proviſions of the pope, diſpatched on reſignations *in favorem.*

This rule anciently extended to ſuch as reſigned in time of health, as well as of ſickneſs. Pope Boniface reſtrained it to the latter; whence it is commonly called *regula de infirmis reſignantibus.*

RULE *de Publicandis.* By this rule, the reſignee of a benefice, if he have a proviſion from the court of Rome, is obliged to publiſh the reſignation, and take poſſeſſion within ſix months; or, if he have it from the ordinary collator, within one month. Otherwiſe, if the reſigner die, the reſignation becomes null.

RULES *of Court,* in *Law,* are certain orders made, from time to time, in the courts of law, which attornies are bound to obſerve, in order to avoid confuſion; and both the plaintiff and defendant are at their peril alſo bound to pay obedience to rules made in court relating to the cauſe depending between them. It is to be obſerved, that no court will make a rule for any thing that may be done in the ordinary courſe; and that if a rule be made, grounded upon an affidavit, the other ſide may move the court againſt it, in order to vacate the ſame, and thereupon ſhall bring into court a copy of the affidavit and rule. On the breach and contempt of a rule of court an attachment lies; but it is not granted for diſobedience to a rule, when the party has not been perſonally ſerved; nor for diſobeying a rule made by a judge in his chamber, which is not of force to ground a motion upon, unleſs the ſame be entered. A rule of court is granted every day, whilſt the courts of Weſtminſter ſit, to priſoners of the king's bench, or Fleet priſon, to go at large about their private affairs.

RULES, *Clerk of the.* See CLERK.

RULE *Water,* in *Geography,* a river of Scotland, which runs into the Teviot, 4 miles S.W. of Jedburgh.

RULER, PARALLEL. See PARALLEL *Ruler.*

RULLE, in *Geography,* a town of Weſtphalia, in the biſhopric of Oſnabruck; 7 miles N.E. of Oſnabruck.

RUM, a ſpecies of vinous ſpirit, drawn by diſtillation from ſugar-canes.

The word rum is the name it bears among the native Americans.

Rum is very hot and inflammable, and is in the ſame uſe among the natives of the ſugar-countries, as brandy among the French.

Rum differs from what we ſimply call ſugar-ſpirit, in that it contains more of the natural flavour or eſſential oil of the ſugar-cane; a great deal of raw juice, and parts of the cane itſelf, being often fermented in the liquor, or ſolution of which the rum is prepared.

The unctuous or oily flavour of rum is often ſuppoſed to proceed from the large quantity of fat uſed in boiling the ſugar; which fat, indeed, of courſe, will uſually give a ſtinking flavour to the ſpirit in our diſtillation of the ſugar liquor, or waſh, from our refining ſugar-houſes; but this is nothing like the flavour of the rum, which is really the effect of the natural flavour of the cane. The method of making rum is this:

When a ſufficient ſtock of the materials is got together, they add water to them, and ferment them in the common method, though the fermentation is always carried on very ſlowly at firſt; becauſe at the beginning of the ſeaſon for making rum in the iſlands, they want yeaſt, or ſome other ferment, to make it work; but by degrees, after this, they procure a ſufficient quantity of the ferment, which riſes up as a head to the liquor in the operation, and thus they are able afterwards to ferment and make their rum with a great deal of expedition, and in large quantities.

When the waſh is fully fermented, or to a due degree of acidity, the diſtillation is carried on in the common way, and the ſpirit is made up proof; though ſometimes it is reduced to a much greater ſtrength, nearly approaching to that of alcohol or ſpirit of wine, and is then called double-diſtilled rum. It might be eaſy to rectify the ſpirit, and bring it to much greater purity than we uſually find it to be of; for it brings over in the diſtillation a very large quantity of the oil; and this is often ſo diſagreeable, that the rum muſt be ſuffered to lie by a long time to mellow before it can be uſed; whereas, if well rectified, it would grow mellow much ſooner, and would have a much leſs potent flavour.

The beſt ſtate to keep rum in, both for exportation and other uſes, is doubtleſs that of alcohol, or rectified ſpirit. In this manner it would be tranſparent in one-half the bulk it uſually is, and might be let down to the common proof ſtrength with water when neceſſary. For the common uſe of making punch, it would likewiſe ſerve much better in the ſtate of alcohol; as the taſte would be cleaner, and the ſtrength might always be regulated to a much greater exactneſs than in the ordinary way.

The only uſe to which it would not ſerve ſo well in this ſtate, would be the common practice of adulteration among our diſtillers; for when they want to mix a large portion of cheaper ſpirit with the rum, their buſineſs is to have it of the proof ſtrength, and as full of the flavouring-oil as they can, that it may drown the flavour of the ſpirits they mix with it, and extend its own. If the buſineſs of rectifying rum was more nicely managed, it ſeems a very practicable ſcheme to throw out ſo much of the oil, as to have it in the fine light ſtate of a clear ſpirit, but lightly impregnated with it; in this caſe it would very nearly reſemble arrac, as is proved by the mixing a very ſmall quantity of it with the taſteleſs ſpirit, in which caſe the whole bears a very near reſemblance to arrac in flavour.

Rum is uſually very much adulterated in England; ſome are ſo barefaced as to do it with malt-ſpirit; but when it is done with melaſſes-ſpirit, the taſtes of both are ſo nearly allied, that it is not eaſily diſcovered. The beſt method of judging of it is by ſetting fire to a little of it; and, when it has burnt away all the inflammable part, examining the phlegm both by the taſte and ſmell. Shaw's Eſſay on Diſtillery.

Mr. B. Edwards, in his "Hiſtory of the Weſt Indies," vol. ii. has given the following account of the proceſs for extracting rum from the ſugar-cane, or from the very dregs and feculencies of the plant, by fermentation and diſtillation. He commences his account with obſerving, that the ſtill-houſes on the ſugar-plantations in the Britiſh Weſt Indies, vary greatly in point of ſize and expence, according to the fancy of the proprietor, or the magnitude of the property. In general, however, they are built in a ſubſtantial manner of ſtone, and are commonly equal to the boiling and curing-houſes together. (See SUGAR.) For a plantation making, *communibus annis*, 200 hogſheads of ſugar of 1600 weight, our author conceives, that two copper ſtills, the one of 1200, and the other of 600 gallons, wine meaſure, with proportionate pewter worms, are ſufficient. The ſize of the tanks (or tubs) for containing the cold water in which the worms are immerſed, muſt depend upon circumſtances; if the advantage can be obtained of a running ſtream, the water may be kept abundantly cool in a veſſel barely large enough to contain the worm. If the plantation has no other dependance than pond-water, a ſtone tank is much ſuperior to a tub, as being longer in heating, and if it can be made to contain from twenty to thirty-thouſand gallons, the worms of both the ſtills may be placed in the ſame body of water, and kept cool enough for condenſing the ſpirit, by occaſional ſupplies of freſh water.

For working theſe ſtills and worms, it is neceſſary to provide, firſt, a dunder-ciſtern, of at leaſt three thouſand gallons; ſecondly, a ciſtern for the ſcummings; and laſtly, twelve fermenting vats, or ciſterns, each of them of the contents of the largeſt ſtill, *viz.* 1200 gallons. In Jamaica, ciſterns are made of plank, fixed in clay; and are univerſally preferred to vats or moveable veſſels, for the purpoſe of fermenting. They are not ſo eaſily affected by the changes of the weather, nor ſo liable to leak as vats, and they laſt much longer. But in the Britiſh diſtilleries, fermenting ciſterns, it is ſaid, are unknown. To complete the apparatus, it is neceſſary to add two or more copper pumps for conveying the liquor from the ciſterns, and pumping up the dunder, and alſo butts or other veſſels for ſecuring the ſpirit when obtained; and it is uſual to build a rum-ſtore adjoining the ſtill-houſe.

The ingredients or materials for the proceſs conſiſt of melaſſes, or treacle drained from the ſugar; ſcummings of the hot cane-juice, from the boiling-houſe, or ſometimes raw-cane liquor, from canes expreſſed for the purpoſe: lees, or, as it is called in Jamaica, "dunder," from the Spaniſh *redunder*, the ſame as *redundans* in Latin; and water. Dunder, in the making of rum, ſerves the purpoſe of yeaſt in the fermentation of flour. It is the lees or feculencies of former diſtillations; and ſome planters preſerve it for uſe from one crop to another; but this is ſaid to be a bad practice. Some fermented liquor, compoſed of ſweets and water alone, ought to be diſtilled in the firſt inſtance, that freſh dunder may be obtained. This is a diſſolvent menſtruum, and occaſions the ſweets with which it is combined, whether melaſſes or ſcummings, to yield a far greater proportion of ſpirit than can be obtained without its aſſiſtance. The water which is added acts in ſome degree in the ſame manner by dilution.

In the Windward iſlands, the proceſs, we are told, is conducted as follows: the ingredients, *viz.* ſcummings, one-third; lees or dunder, one-third, and one-third of water, are well mixed in the fermenting ciſterns, and when they are pretty cool, the fermentation will riſe, in twenty-four hours, to

to a proper height for admitting the firſt charge of melaſſes, of which ſix gallons for every hundred gallons of the fermenting liquor, is the general proportion to be given at twice; *viz.* three *per cent.* at the firſt charge, and the other ſeven *per cent.* a day or two afterwards, when the liquor is in a high ſtate of fermentation; the heat of which, however, ſhould not, in general, be ſuffered to exceed from 90° to 94° Fahrenheit. The infuſion of hot water will raiſe, and of cold water abate the fermentation. The quantity of melaſſes above-mentioned, added to a third of ſcummings, gives 11½ *per cent.* of ſweets, ſix gallons of ſcummings being reckoned equal to one gallon of melaſſes. When the fermentation falls by eaſy degrees from the fifth to the ſeventh or eighth day, ſo as then to become fine, and throw up ſlowly a few clear beads or air-globules, it is ripe for diſtillation; though when the liquor is firſt ſet at the beginning of the crop (the houſe being cold, and the ciſterns not ſaturated) it will not be fit for diſtillation under ten or twelve days. When this is the caſe, at a longer or ſhorter period, the liquor or waſh being conveyed into the largeſt ſtill, which muſt not be filled higher than within eight or ten inches of the brim, leſt the head ſhould fly, a ſteady and regular fire muſt be kept up until it boils, after which a little fuel will ſerve. In about two hours the vapour or ſpirit, being condenſed by the ambient fluid, will force its way through the worm in the ſhape of a ſtream, as clear and tranſparent as cryſtal, and it is ſuffered to run until it is no longer inflammable. The ſpirit thus obtained is known by the appellation of "low wines." To make it rum of the Jamaica proof, it undergoes a ſecond diſtillation. Between the practice of the Jamaica diſtillers, and that of thoſe of the Windward iſlands, there is ſome little variation in the firſt proceſs. This conſiſts chiefly in the more copious uſe of dunder. As dunder ſerves to diſſolve the tenacity of the ſaccharine matter, it ſhould be proportioned, not only to the *quantity*, but alſo to the *nature* of the ſweets. If the ſweets in the fermenting ciſtern conſiſt of melaſſes alone, which is generally the caſe after the buſineſs of ſugar-boiling is finiſhed, when no ſcummings are to be had, a greater proportion of dunder is neceſſary; becauſe melaſſes are a body of greater tenacity than cane-liquor, and are rendered ſo viſcous and indurated by the action of fire, as to be unfit for fermentation without the moſt powerful ſaline and acid ſtimulators. For the ſame reaſon, at the beginning of the crop, when no melaſſes can be had, and the ſweets conſiſt of cane-juice or ſcummings alone, very little dunder is neceſſary. In ſuch caſe twenty *per cent.* at the utmoſt will be ſufficient. Dunder, in a large quantity, injures the *flavour*, though it may increaſe the *quantity* of the ſpirit. Dr. Shaw ſays, that the Engliſh diſtillers add many things to the fermenting liquor or waſh, in order to augment the vinoſity of the ſpirit, or to give it a particular flavour. He obſerves, that a little tartar, nitre, or common ſalt, is ſometimes thrown in at the beginning of the operation, or in their ſtead a little of the vegetable or finer mineral acid. Theſe are thought to be of great uſe in the fermenting of ſolutions of treacle, honey, and ſimilar ſweet and rich vegetable juices, which contain a ſmall proportion of acid. A ſimilar practice is ſaid to prevail among the diſtillers in St. Chriſtopher's, ſome of which conſider an addition of ſea-water to the fermenting liquor as a real and great improvement. Shaw recommends the juice of Seville oranges, lemons, and tamarinds, or other very acid fruits, and, above all other things, an aqueous ſolution of tartar; but Mr. Edwards is of opinion, that dunder alone anſwers every purpoſe. Dr. Shaw alſo recommends to the diſtiller to introduce into the fermenting ciſtern a few gallons of the rectified ſpirit, which, he ſays, will revert, with a large addition, to the quantity of ſpirit that would otherwiſe have ariſen from the diſtillation. It is ſuggeſted by Mr. Edwards, that a ſmall quantity of vegetable aſhes, thrown into the rum-ſtill, will be found ſerviceable. The alkaline ſalts are ſuppoſed to attenuate the ſpirit, and keep back the groſs and fetid oil, which the diſtillers call the "faints," but if too freely uſed, they will alſo keep back a proportion of the fine eſſential oil, on which the flavour of the rum wholly depends. After all, the moſt important object of attention in making good rum is probably "cleanlineſs;" for all adventitious or foreign ſubſtances deſtroy or change the peculiar flavour of the ſpirit. It ſhould, indeed, be an invariable practice with the manager or diſtiller to take care that the ciſterns are ſcalded, and even cleanſed with ſtrong lime-water, every time when they are uſed; not merely on account of the rum, but becauſe it has often happened that the vapour of a foul ciſtern has inſtantly killed the firſt perſon that has entered it without due precaution.

The following improved method of conducting the proceſs, or of compounding the ſeveral ingredients, is very general in Jamaica, *viz.*

Dunder one half, or - - - - -		50 gallons	
Sweets 12 *per cent.* -	Melaſſes - -	6 gallons	42 gallons.
	Scummings -	36 gallons (equal to ſix gallons more of melaſſes)	
Water - - - - - - -		8 gallons	
		100	

Of this mixture, or "waſh," as it is ſometimes called, 1200 gallons ought to produce 300 gallons of low-wines; and the ſtill may be twice charged or drawn off in one day. The method of adding all the melaſſes at once, which is done ſoon after the fermentation commences, renders the proceſs ſafe and expeditious; whereas by charging the melaſſes at different times, the fermentation is checked, and the proceſs delayed.

The low-wines obtained in the manner above deſcribed, are drawn off into a butt or veſſel, and, as opportunity ſerves, are conveyed into the ſecond ſtill of 600 gallons, to undergo a further diſtillation. The ſteam begins to run in about an hour and a half, and will give, in the courſe of the day, 220 gallons, or two puncheons, of oil-proof rum, *i. e.* of ſpirit in which olive oil will ſink; and thus the manufacture, if ſo it may be called, is complete. There will remain in the ſtill a conſiderable quantity of weaker ſpirit, commonly about 70 gallons, which is returned to the low-wine butt. Thus 220 gallons of proof-rum are made, in fact, from 530 gallons of low-wines, or about 113 of rum from 1200 of waſh. By this proceſs the Jamaica diſtiller may fill weekly, working only by day-light (a neceſſary precaution in this employment), and at a ſmall expence of labour and fuel, twelve puncheons of rum, containing each 110 gallons of the Jamaica ſtandard. The proportion of the whole rum to the crop of ſugar, is commonly eſtimated in

in Jamaica as three to four. Thus a plantation, ſuch as we have above deſcribed, is ſuppoſed to ſupply annually 150 puncheons of rum of 110 gallons each, or 82 gallons of Jamaica proof to each hogſhead of ſugar; and this quantity is ſometimes fairly made from canes planted in rich and moiſt lands; but on a general eſtimate, Mr. Edwards thinks this to be too great an allowance; and that 200 gallons of rum to three hogſheads of ſugar, which is in the proportion of about two-thirds rum to the crop of ſugar, is nearer the truth. The following ſtatement warrants the above concluſion. The general ſupply of ſcummings to the liquor-houſe is ſeven gallons out of every 100 gallons of cane-liquor. Suppoſing, therefore, that 2000 gallons of cane-juice are required for each hogſhead of ſugar of 16 cwt., the ſcummings, on a plantation making 200 hogſheads *per annum*, will be 28,000 gallons, equal to 4666 gallons of melaſſes.

Add the melaſſes from the curing-houſe, which, if the ſugar is of a good quality, will ſeldom exceed 60 gallons *per* hogſhead	12,000
Total of ſweets	16,666 gallons.

This quantity, diſtilled at or after the rate of 12 *per cent.* ſweets in the fermenting ciſtern, will give 34,720 gallons of low-wines, which ought to produce 14,412 gallons of good proof rum, or 131 puncheons of 110 gallons each. When a greater proportion than this is made, either the ſugar diſcharges an unuſual quantity of melaſſes, or the boiling-houſe is defrauded of the cane-liquor by improper ſcumming; which latter circumſtance frequently happens.

It is the practice of late, we are told, with many planters, to raiſe the proof of rum: thus gaining in ſtrength of ſpirit what is loſt in quantity: and ſome managers make it a rule to return the ſcummings to the clarifiers, inſtead of ſending them to the ſtill-houſe. This laſt-mentioned practice reduces the crop of rum more than one-third; but is ſuppoſed to yield in ſugar more than is loſt in rum: and if the price of ſugar is very high, and that of rum very low, it may be prudent to adopt this method.

For the duty, &c. on rum, ſee *Foreign* SPIRITS.

RUM, in *Geography*, a town of Tonquin, on the coaſt. N. lat. 19° 35′. E. long. 105° 18′.—Alſo, a river of America, which runs into the Miſſiſippi, N. lat. 45°. W. long. 93° 48′.

RUM, one of the Hebrides, or Weſtern iſlands of Scotland, is ſituated to the weſtward of the iſle of Skye, and is compriſed, politically, in the pariſh of Small-Iſles, and in the county of Argyle. It derived its name from the Gaelic, *Rhum*, ſignifying extent, in alluſion to its being the largeſt iſland in the pariſh to which it belongs. It is computed to meaſure eight miles in length, and nearly the ſame in breadth; and to contain about 22,000 ſquare acres. Rum is in general rugged, mountainous, and barren, and more adapted for paſturage than for agriculture. Horſes are reared in this iſland for ſale, and though diminutive in ſize, are remarkably high mettled and hardy. Here are likewiſe reared a conſiderable number of ſheep, which are the beſt ſtock with which a mountainous country, like Rum, can be ſupplied, The general breed is a ſmall white-faced ſheep, which is much praiſed, both for the delicate flavour of its fleſh, and for the excellence of its wool. This iſland formerly abounded with deer; but that animal is now totally extirpated, owing to the copſe wood, which ſerved as a cover to their fawn, having been deſtroyed. Before the uſe of fire-arms, the method adopted by the inhabitants to kill deer was ſo ſingular as to deſerve notice. On each ſide of a glen formed by two mountains, ſtone dykes were conſtructed at a conſiderable height up the hills, and extended from thence to the lower part of the valley, always drawing nearer to each other, till they approached within three or four feet. This narrow paſs opened into a circular ſpace, incloſed by a wall of ſufficient height to reſtrain the deer, which were purſued hither and deſtroyed. The remains of one of theſe ancient deer-traps are ſtill to be traced. Birds of prey are numerous in Rum; and there are likewiſe a few grouſe, pigeons, termagants, and wild ducks, beſides thoſe birds which frequent the iſland only at ſtated ſeaſons of the year. The air of Rum, from its proximity to the weſtern ocean, is moiſt, and the weather extremely rainy. The only harbour here is Loch-Serefort, which penetrates a conſiderable way into the iſland, on its eaſtern coaſt. It is ſpacious, its ground good, and its depth of water from five to ſeven fathoms. Near the head, on the ſouth ſide of this harbour, a pier has been lately erected. The general appearance of Rum is, that the land ſlopes towards the eaſt; but on the weſt preſents precipices of a tremendous height. At the baſe of the hill Sgormor are found abundance of agates, of that ſpecies called by Cronſtedt "Achates chalcedoniſans," improperly white cornelians. Here are ſeveral remarkable ſtrata; ſuch as grey quartz; a mixture of quartz and baſaltes; a black ſtone ſpotted with white, like porphyry, but with the appearance of lava; fine grit or free-ſtone; and the cinereous indurated bole of Cronſtedt. There being no mill in this iſland, the corn is "gradanned," or burnt out of the ear, inſtead of being thraſhed. This is performed in two ways: firſt by cutting off the ears and drying them in a kiln, and then ſetting fire to them on the floor, and picking out the grains; and ſecondly, by burning the ſheaf entire, which is a moſt ruinous practice, as it deſtroys both thatch and manure. Gradanned corn is conjectured to have been the parched corn of holy writ.

Rum not being a pariſh of itſelf, its population is not ſtated in the parliamentary returns; but it is eſtimated to contain about 500 inhabitants. The Statiſtical Account of Scotland, by ſir John Sinclair, bart. 8vo. vol. xvii. 1796. Beauties of Scotland, vol. v. 8vo. 1808. Carliſle's Topographical Dictionary, 4to. 1813.

RUM *Key*. See RONCADOUR.

RUMAHIE. See ROMAHIE.

RUMB, RUM, or *Rhumb*, in *Navigation*. See RHUMB.

RUMB-*Line*, or *Loxodromia*. See RHUMB-*Line*.

RUMBLE, in *Geography*, one of the ſmaller Shetland iſlands; two miles S. of Yell. N. lat. 60°. W. long. 0° 56′.

RUMBURG, a town of Bohemia, in the circle of Leitmeritz, in which are conſiderable manufactures of linen; nine miles N.N.E. of Kamnitz.

RUMEIL, a town of Aſiatic Turkey, in the province of Diarbekir; 30 miles E. of Niſibin.

RUMELY, a town of Syria, in the pachalic of Tripoli, on the coaſt; 15 miles S. of Bairut. N. lat. 33° 33′. E. long. 35° 28′.

RUMEN, the firſt ſtomach of animals which chew the cud, and which are hence called *ruminants*.

The food is tranſmitted into the rumen without any other alteration in the mouth than being a little rolled and wrapped up together.

For an account of the rumen, ſee *Anatomy of* MAMMALIA.

RUMEX, in *Botany*, the Dock and Sorrel genus; named, as it ſeems, by the Latins themſelves, from *rumex*, a ſort of pike, ſpear, or halberd, which the ſhape of the leaves, in various

various ſpecies, much reſembles. We cannot but prefer this etymology to that taken from *rumo*, to ſuck, by which the acid flavour of Sorrel, uſeful in allaying thirſt, was ſuppoſed to be indicated.—Linn. Gen. 178. Schreb. 238. Willd. Sp. Pl. v. 2. 249. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 2. 318. Sm. Fl. Brit. 390. Prodr. Fl. Græc. Sibth. v. 1. 244. Brown Prodr. Nov. Holl. 421. Purſh 247. Juſſ. 82. Lamarck Illuſtr. t. 271. Gærtn. t. 119. (Lapathum; Tourn. Inſt. 504. Acetoſa; ibid. 502. t. 287.) —Claſs and order, *Hexandria Trigynia*. Nat. Ord. *Holeraceæ*, Linn. *Polygoneæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of three obtuſe, reflexed, permanent leaves. *Cor.* Petals three, ovate, ſimilar to the calyx, but larger, converging, permanent, forming valves over the ſeed. *Stam.* Filaments ſix, capillary, very ſhort; anthers erect, of two lobes. *Piſt.* Germen ſuperior, triangular, turbinate; ſtyles three, capillary, reflexed, projecting between the petals; ſtigmas large, laciniated. *Peric.* none, the converging, triangular, hardened corolla, enfolding the ſeed. *Seed* ſolitary, triangular.

Eſſ. Ch. Calyx of three leaves. Petals three, converging, permanent. Seed ſolitary, triangular, ſuperior, without a ſeed-veſſel. Stigmas many-cleft.

Obſ. *R. digynus* excludes one-third in the number of every part of the fructiſication, except the ſtamens. Thoſe ſpecies which compoſe the Sorrel tribe, have flowers with ſtamens on one plant, flowers with piſtils moſtly on another, being dioecious, or in ſome inſtances monoecious. *R. ſpinoſus* is monoecious; and the perianth of the female flowers becomes hooked and rigid. *R. alpinus* is polygamous. In ſeveral ſpecies the petals are diſtinguiſhed by a tumid, hard, moſtly coloured, grain, or roundiſh tubercle, at the back, moſt conſpicuous when the ſeed ripens; ſometimes of equal ſize in all, ſometimes obſolete in two of the petals. This is a genus of hardy, perennial, almoſt invariably herbaceous plants; nearly allied to RHEUM; ſee that article. They have ſmall pretenſions to be conſidered as ornamental, and, on the contrary, are generally eſteemed weeds, becauſe they moſtly grow where they are a nuiſance and encumbrance. The agriculturiſt ſtigmatizes with the name of Docks, all large, biennial or perennial, ſtrong-rooted, rank-growing herbs, and generally pays for their extirpation, according to a ſettled rate, under that denomination. The roots of the various ſpecies of *Rumex* are aſtringent; their herbage is likewiſe often ſo, though ſometimes very acid. Every part of the plant is greeniſh, with a ſtrong tendency to become red by age. Botaniſts differ about the denomination of the parts of the flower. Analogy and theory teach the whole of the integuments in this genus and *Rheum* to be a calyx; but the three inner diviſions in *Rumex* having a ſeparate inſertion, ſomewhat of a different texture or ſtructure, and being ſo remarkably altered, in moſt ſpecies, as the fruit ripens; while in ſuch ſpecies as have, after flowering, an enlarged or hardened calyx theſe inner ſegments remain unchanged, never undergoing any alteration in concert with the three outer ſegments; all this evinces that nature is not always conformable to our rules. The genus *Rumex* therefore is one of thoſe in which we are obliged to uſe our diſcretion, as to the denomination of the *calyx* and *corolla*, in ſpite of arbitrary and abſolute principles.

The ſpecies in Willdenow amount to 36. They are in general well defined, but ſeveral are miſunderſtood, or given twice; ſo that we muſt exhibit as compendious a view as poſſible of the whole, having alſo ſome to add. Eleven are natives of Britain. The Hortus Kewenſis enumerates 27, two of which do not occur in Willdenow. They are commodiouſly diſpoſed in three ſections.

Sect. 1. *Stamens and piſtils in the ſame flowers. Valves diſtinguiſhed by a granular tubercle.*

1. R. *Patientia*. Patience Dock or Rhubarb. Linn. Sp. Pl. 476. Willd. n. 1. Ait. n. 1. Ehrh. Pl. Off. n. 273. (Hippolapathum ſativum; Ger. Em. 389. H. hortenſe; Matth. Valgr. v. 1. 407.)—Flowers united. Valves entire, ovate; one of them minutely granular. Leaves ovato-lanceolate, taper-pointed.—Native of Italy. Long cultivated in kitchen or ruſtic gardens, having been ſometimes uſed as a pot-herb, and the root occaſionally employed as a purgative medicine, in the place of Rhubarb. Hence it is ſometimes called Monk's Rhubarb, though that name is now retained rather for the *Rumex alpinus*. The *Patientia* is four or five feet high, erect, ſmooth, green; its *leaves* from twelve to eighteen inches long, rather narrow. *Flowers* in whorled or tufted cluſters, copious, pendulous. *Petals* large, ovate, reticulated with veins; the midrib of one of them ſwelling, in its lower part, into an oblong, not very evident, grain. We now rather prefer the above cut of Gerarde, to that of Dodonæus cited by Linnæus.

2. R. *ſanguineus*. Bloody-veined Dock. Linn. Sp. Pl. 476. Willd. n. 2. Ait. n. 2. Purſh n. 1. Fl. Brit. n. 1. Engl. Bot. t. 1533. (Lapathum ſativum ſanguineum; Ger. Em. 390.)

β. R. acutus; Curt. Lond. faſc. 3. 21, the deſcription, not the figure. (R. Nemolapathum; Ehrh. Phytoph. n. 94. Linn. Suppl. 212. Bloodleſs Dock; Petiv. H. Brit. t. 2. f. 6.)—Flowers united. Valves entire, oblong; one of them chiefly granular. Leaves lanceolate, heart-ſhaped at the baſe.—Native of Europe, in woods and by way ſides. Dr. Sibthorp found it in Greece, and though not very common in England, it occurs in various parts. Mr. Purſh ſays it grows in ſhady woods and moiſt meadows, from Pennſylvania to Virginia, flowering in June and July. The green variety, β, is very common in England, under the ſhade of trees in rather dry woods. Perhaps it ought to be eſteemed the original ſpecies; the kind whoſe ſtalks and veins contain a crimſon juice, being perhaps the variety. This laſt appears, by Gerarde's herbal, to have been firſt known here as a pot-herb. Linnæus mentions Virginia only as its native country, and marks it as biennial. With us both varieties are certainly perennial. The plant is erect, three or four feet high, branched, rather ſlender, and of a delicate appearance. *Flowers* ſmall, in long cluſters of very numerous tufts or whorls; their *petals* oblong and obtuſe, one of them bearing an extremely large, globular, red grain.

3. R. *ſpatulatus*. Spatulate Cape Dock. Thunb. Prodr. 67. Willd. n. 3.—"Leaves obovate, obtuſe. Valves granular."—Found by Thunberg at the Cape of Good Hope.

4. R. *criſpus*. Curled Dock. Linn. Sp. Pl. 476. Willd. n. 7. Ait. n. 3. Purſh n. 2. Fl. Brit. n. 2. Engl. Bot. t. 1998. Curt. Lond. faſc. 2. t. 20. (Lapathum longifolium criſpum; Munt. Brit. t. 104.)—Flowers united. Valves ovate, wavy, entire, all granular. Leaves lanceolate, undulated, acute.—In waſte ground, paſtures, and by way ſides, common throughout Europe, as well as in North America, flowering in June and July, and accidentally throughout the ſummer. This is a very troubleſome and unprofitable weed; readily diſtinguiſhed, as a ſpecies, from all other Engliſh Docks, by the curved *leaves*, and large entire *valves*, each bearing an ovate grain. Theſe are by accidental error termed *calyx-valves* in *Engliſh Botany*. The *root* is tap-ſhaped, yelloweiſh. *Stem* two or three feet high, branched, nearly ſmooth to the touch. *Leaves* of a lightiſh green. *Cluſters* rather long; leafy in their lower part.

5. R. *verticillatus*. Whorled American Dock. Linn. Sp.

Sp. Pl. 476. Willd. n. 4. Purſh n. 3.—Flowers united. Valves ſomewhat deltoid, entire, all granular. Leaves flat, lanceolate; with tubular, membranous ſheaths embracing the ſtem. Cluſters nearly leafleſs.—In rivulets and ſhady woods, from Canada to Virginia, flowering in July, perennial. *Purſh.* The *ſtem* is ſomewhat zigzag, aſcending, angular and furrowed, ſmooth, inveſted above every leaf with a tubular, pale, membranous, intrafoliaceous *ſtipula*, or ſheath, near an inch long. *Leaves* flat and even. *Flowers* twice the ſize of the laſt, with very large oblong grains, which are often wrinkled. The *petal* itſelf is alſo ſtrongly marked with projecting reticulated veins.

6. R. *Britannica.* Virginian Water-Dock. Linn. Sp. Pl. 476. Willd. n. 5. Purſh n. 4.—Flowers united. Valves ovate, obtuſe, all granular. Leaves flat, lanceolate; with ſcarcely any ſheaths. Cluſters panicled, leafleſs.—Near rivulets in Virginia and Carolina; perennial, flowering in June and July. *Purſh.* This is readily diſtinguiſhed from the laſt, with which Linnæus ſometimes negligently confounded it, notwithſtanding his own clear definition. The want of the tubular ſheathing *ſtipulas* is alone ſufficient. The grains on the *valves* are, moreover, much ſmaller, and Mr. Purſh has well adverted to the panicled inflorescence, compoſed of numerous, lax, many-flowered *cluſters.* The ſpecific name *Britannica*, not *britannicus*, alludes to former controverſies, of Muntingius and others, about what was the true *Herba Britannica;* but why this American plant ſhould be ſo called, we know no good reaſon, nor is it worth while to examine which of the bad figures in the verboſe and uſeleſs author laſt named, is moſt, or leaſt, like our plant. None of them, we believe, is properly referrible to it. The *Herba Britannica* of the ancients is ſaid to have been a powerful antiſcorbutic, or tonic, and was found on our own, or the neighbouring, coaſts.

7. R. *perſicarioides.* Perſicaria Dock. Linn. Sp. Pl. 477. Willd. n. 9. Ait. n. 4. Purſh n. 5.—Flowers united. Valves lanceolate, taper-pointed, toothed, all granular. Leaves lanceolate, wavy, nearly entire.—In ſhady wet woods, on the banks of ditches, in Virginia and Carolina, flowering in July, annual. Sent to Kew in 1773, by the chevalier Murray, profeſſor at Gottingen, but we preſume it is ſcarcely preſerved, being ſo like our common docks, except the advantage, in this caſe, of having only an annual root. The *cluſters* are accompanied, at each whorl, with a ſtalked leaf, rather ſmaller than thoſe on other parts of the branched *ſtem.* *Flowers* ſmall, erect. *Valves* narrow, with long ſlender points, and each bearing a large, oblong, ſlightly kidney-ſhaped, ſmooth, tawny grain.

8. R. *criſpatulus.* Criſped Dock. Michaux Boreali-Amer. v. 1. 217. Purſh n. 6.—Flowers united. Valves heart-ſhaped, obtuſe, three-toothed at each ſide; two of them granular. Cluſters leafleſs. Leaves criſped and wavy at the margin; the lower ones oval; upper lanceolate.—Native of Kentucky. *Michaux.* Akin to the laſt. Its habit is ſaid to be like *R. acutus*, but the *valves* inveſting the *ſeed* are much larger. One of them bears no granular tubercle, and the grains of the two others are unequal in ſize. The upper *leaves* are minutely crenulated.

9. R. *ægyptiacus.* Egyptian Dock. Linn. Sp. Pl. 477. Willd. n. 10. Ait. n. 5. (Lapathum ægyptium annuum, parietariæ folio, capſulâ ſeminis longiùs barbatâ; Till. Piſ. 93. t. 37. f. 1.)—Flowers united. Valves with three very long capillary points at each ſide; one only bearing an ovate grain. Gathered near Memphis, by J. B. de Georgis, ſurgeon to the grand duke of Tuſcany, whence it was introduced into the garden at Piſa, and ſoon after, as it appears, ſent to Miller at Chelſea. The *root* is annual. This ſpecies is readily known by the fine capillary teeth of its *valves*, ſpreading in every direction, and giving the *cluſters*, which are long, denſe, and leafy, a hairy appearance. Each *valve* is ſmall, reticulated with ſtrong veins.

10. R. *dentatus.* Sharp-toothed Dock. Linn. Mant. 226. Syſt. Veg. ed. 13. 284. Willd. n. 11. Ait. n. 6. (Lapathum ægyptium, capſulâ ſeminis albâ et crenatâ; Boerh. Ind. Alt. v. 2. 85. Dill. Elth. 191. t. 158. f. 191.)—Flowers united. Valves with awl-ſhaped teeth; all granular. Cluſters denſe, leafy. Leaves lanceolate.—Gathered in Egypt, by the unfortunate Auguſtin Lippi, afterwards murdered by the barbarians of Nubia. This plant was originally confounded, by Linnæus, with the laſt, from which it differs eſſentially, having *valves* thrice as large, bordered with awl-ſhaped teeth, ſcarcely exceeding their own length, each valve bearing a large, pale, ovate grain.—The plant is annual, a ſpan high, branched from the bottom.

11. R. *maritimus.* Golden Dock. Linn. Sp. Pl. 478. Willd. n. 12. Ait. n. 7. Fl. Brit. n. 6. Engl. Bot. t. 725. (Lapathum anthoxanthum; Bauh. Hiſt. v. 2. 987.)—Flowers united. Valves deltoid, with ſetaceous teeth; each bearing a nearly cylindrical grain. Cluſters denſe. Leaves linear.—Native of marſhes in various parts of Europe, chiefly near the ſea. It is perennial, flowering in July and Auguſt. This is moſt akin to *R. ægyptiacus*, with which its denſe leafy *cluſters*, and tawny or golden hue, agree. But the *foliage* is more linear, and the teeth of the *valves*, though almoſt capillary, not one-third ſo long, while the valves themſelves are larger, and every one of them marked with a *grain*, which is oblong, and nearly cylindrical, not ovate. The *ſtem* is ſtrongly angular and furrowed, roughiſh, reddiſh, a little zigzag. *Leaves* ſtalked, bluntiſh, flat. *Whorls* very denſe, and crowded into cylindrical leafy cluſters, often of a rich golden hue. *Seed* very ſmall, compared with our common docks.

12. R. *paluſtris.* Yellow Marſh Dock. Fl. Brit. n. 7. Engl. Bot. t. 1932. Ait. n. 8. (R. maritimus; Ehrh. Herb. n. 74. Curt. Lond. faſc. 3. t. 23. Lapathum aquaticum, luteolæ folio; Bocc. Muſ. v. 2. 143. t. 104. Hydrolapathum minus; Lob. Ic. 286. Ger. Em. 309.)—Flowers united. Valves lanceolate, toothed at the baſe; each bearing an oblong grain. Leaves linear-lanceolate. Whorls diſtant.—Native of marſhes, ditches, and wet waſte places in Germany, Italy, and England. Found in ſeveral ſituations near London; alſo at Acle and Saham in Norfolk. It is perennial, flowering in July and Auguſt. Many botaniſts have confounded this with the laſt, from which it differs in having diſtant leafy *whorls*, and lanceolate *valves*, each furniſhed at the baſe, on each ſide, with three ſlender teeth, much ſhorter than the foregoing. The *leaves* are linear-lanceolate and acute; the radical ones very large. *Stem* furrowed, reddiſh, rough to the touch. The *root*, as Curtis obſerved, is red internally.

13. R. *divaricatus.* Spreading Italian Dock. Linn. Sp. Pl. 478. Willd. n. 13. Ait. n. 10. (Lapathum arvenſe ſubhirſutum, folio retuſo, caule longiùs brachiato, capſulâ ſeminis crenatâ; Till. Piſ. 93. t. 37. f. 2.)—Flowers united. Valves heart-ſhaped, toothed, granular. Leaves heart-ſhaped-oblong, obtuſe, downy.—Native of fields in Italy. *Root* annual. Linnæus truly ſays, that Haller conſidered this as the ſame with *R. pulcher* hereafter deſcribed. We have ſeen no ſpecimen; but though in Tilli's figure the *valves* inveſting the *ſeed* are not very unlike thoſe of *pulcher*, the large oblong *leaf*, not at all contracted in the middle, and hairy as well as its *footſtalk*, has

has a very different appearance. Moreover, this ſpecies is cultivated at Kew, where it was introduced in 1793, by Mr. Hunnemann, and is publiſhed by Mr. Aiton as diſtinct. It flowers in July and Auguſt. See *R. auratus*, n. 30.

14. R. *acutus*. Sharp Dock. Linn. Sp. Pl. 478. Willd. n. 14? Ait. n. 11. Fl. Brit. n. 3. Engl. Bot. t. 724.

β. Lapathum acutum minimum; Dill. in Raii Syn. 141. Bauh. Hiſt. v. 2. 985. (Small Sharp Dock; Petiv. H. Brit. t. 2. f. 4.)—Flowers united. Valves oblong, obſcurely toothed, each bearing a roundiſh prominent grain. Leaves oblong, pointed; ſomewhat heart-ſhaped at the baſe. Cluſters leafy.—Native of marſhy meadows in England, and other parts of Europe, perennial, flowering in July. The *ſtem* is erect, or ſomewhat zigzag, angular, furrowed, ſmooth to the touch. *Leaves* narrow; the lower ones only ſlightly heart-ſhaped; all ſmooth and flat. *Branches* elongated into long ſpreading *cluſters*, conſiſting of numerous, diſtinct, and rather diſtant, *whorls*, each of which is accompanied by a ſmall, lanceolate, ſtalked leaf. The *flowers* are occaſionally polygamous, and ſome of the males have been obſerved by Mr. Sowerby to be furniſhed with twelve *ſtamens*; the greater part of the flowers however have uſually ſix only, in the ſame calyx with the piſtil. The *ſeed* is ſmall. *Valves* oblong and bluntiſh, moſtly entire, though ſometimes toothed at the baſe, each of them bearing a large, red, almoſt globular, *grain*, of the ſame ſize in all.

This is a ſpecies about which there has been more doubt and controverſy than any other. Moſt botaniſts have miſtaken for it our green variety of *R. ſanguineus*, n. 2, and we can by no means be certain how far Mr. Curtis has committed the ſame error. The two plants however are perfectly diſtinct, nor is there any uncertainty in the characters by which we have defined them. The preſent has a large grain on each *valve*, and the whorls are moſt of them, if not all, accompanied by a leaf. The other has two of the *valves* without grains, the third bearing a very large one, and there is only a leaf or two, here and there, at the lower whorls; the long ſeries of them above being leafleſs. By an attention to this laſt character, the figures of old authors, bad as they are, may be determined. With reſpect to Mr. Curtis's fine plate, we confeſs we remain in uncertainty. His *cluſters* are almoſt leafleſs, like the *ſanguineus β*, but his ſeparate *flowers* unqueſtionably belong to the *acutus*. We have no doubt that he confounded theſe ſpecies, and that his expreſſion of two of the *valves* being "generally naked," is calculated to ſquare with both. Two of them are really in *ſanguineus* always naked, nor do we find any uncertainty in this character.

15. R. *obtuſifolius*. Broad-leaved Dock. Linn. Sp. Pl. 478. Willd. n. 15. Ait. n. 12. Purſh n. 7. Fl. Brit. n. 4. Engl. Bot. t. 1999. Curt. Lond. faſc. 3. t. 22. (L. ſylveſtre, folio minùs acuto; Ger. Em. 388. Lob. Ic. 285.)—Flowers united. Valves toothed; one principally grained. Radical leaves heart-ſhaped, obtuſe. Stem roughiſh.—A common and troubleſome weed throughout Europe, flowering in July and Auguſt. The long, perennial tap *root* runs deep into the ground, and is yellowiſh, not red, within. *Stems* numerous, two or three feet high, furrowed; roughest in the upper part. Radical *leaves* very large and ſpreading; wavy, more or leſs blunt, not unlike thoſe of horſe-radiſh, but hardly ſo big; their *footſtalks* long and channelled. Stem *leaves* much narrower and more pointed, on ſhorter ſtalks, ſomewhat criſped and crenate. *Cluſters* generally bearing a few leaves, though often deſtitute of any. *Seed* large. *Valves* rather large, oblong-heart-ſhaped, entire at the extremity, but having three ſharp prominent teeth near the baſe. The outermoſt bears an oblong *grain*, ſmaller in proportion to the valve than in moſt of the foregoing, and the grains of the two other valves are hardly diſcernible.

Mr. Curtis recommends frequent mowing as a ſure means of deſtroying this dock. Mr. Purſh ſpeaks of it as a common weed in old paſtures and gardens in North America, though probably introduced from Europe.

16. R. *pulcher*. Fiddle Dock. Linn. Sp. Pl. 477. Willd. n. 16. Ait. n. 13. Fl. Brit. n. 5. Engl. Bot. t. 1576. (Lapathum pulchrum bononienſe ſinuatum; Bauh. Hiſt. v. 2. 988. Fiddle Dock; Petiv. H. Brit. t. 2. f. 10.)—Flowers united. Valves many-toothed; one of them bearing a larger grain than the reſt. Radical leaves fiddle-ſhaped. Stem ſmooth, ſtraggling.—Native of dry gravelly paſtures, and waſte ground, in the more temperate parts of Europe, from England to Greece; perennial, flowering in Auguſt. The radical *leaves*, ſo remarkably contracted in one part as to reſemble a fiddle; the widely ſpreading, almoſt horizontal, *ſtems* and *branches*; and the ſharp numerous teeth of the ſtrongly reticulated *valves*, clearly mark this ſpecies. The outer *valve* bears an oblong reddiſh grain, larger than what uſually occurs on the others. *Seed* very ſmooth and poliſhed, with thin acute angles. A ſmall leaf accompanies each *whorl*, though ſometimes ſcarcely longer than the *flower*. The *petals* are larger and more coloured in ſome Swiſs ſpecimens, than we have noticed them in the flowering ſtate of our Engliſh plants. Willdenow repeats under this ſpecies the ſynonym of Tilli, which properly belongs to *R. divaricatus*; apparently on the authority of Willich. See our remarks under n. 13.

17. R. *aquaticus*. Great Water Dock. Linn. Sp. Pl. 479. Willd. n. 18. Ait. n. 9. Purſh n. 8. Fl. Brit. n. 8. Engl. Bot. t. 2104. Ehrh. Pl. Off. n. 114. (R. Hydrolapathum; Hudſ. 154. Willd. n. 6. Woodv. Med. Bot. t. 178. R. acutus; Ehrh. Pl. Off. n. 104. Lapathum, n. 1588; Hall. Hiſt. v. 2. 271. Hydrolapathum magnum; Lob. Ic. 285. Ger. Em. 389.)—Flowers united. Valves ovate, almoſt entire, bearing ſmall or obſolete grains. Leaves lanceolate, acute; the lower ones heart-ſhaped at the baſe.—Native of ditches, pools, and the borders of rivers, throughout Europe; as well as in North America, from Pennſylvania to Virginia, but, according to Mr. Purſh, not common. With us it is very plentiful and conſpicuous, being by far the largeſt of our docks, and flowering in July and Auguſt.—The *root* is large, knobby, and perennial. *Stems* erect, four or five feet high, angular, and ſtrongly furrowed. *Leaves* a foot long, (more or leſs,) coriaceous, ſmooth, with a glaucous hue, entire, ſometimes minutely curled at the edge. *Cluſters* branched, denſe, moſtly leafleſs. *Flowers* numerous, on ſlender drooping ſtalks. *Valves* ovate, veiny, entire, or very ſparingly notched, each bearing an ovate grain, various in ſize, or ſometimes having only a tumid rib. The former is uſually the caſe with our Britiſh plant, and is conſpicuous in Ehrhart's Pl. Off. n. 114, which he gives as *R. aquaticus* of Linnæus from Upſal; while his n. 104, without grains, is marked, certainly erroneouſly, *acutus* of Linnæus, and is likewiſe from Upſal. The authentic Swediſh ſpecimen, in the Linnæan herbarium, preciſely reſembles the firſt of theſe in habit, while its valves, having ſcarcely any indications of grains, agree with thoſe of the latter. We believe the preſence or abſence of grains, in this caſe, does not afford a ſpecific difference. Hence, however, it readily appears

why authors have been led to defcribe the fame plant twice, and to confound its fynonyms.

Sect. 2. *Stamens and piftils in the fame flowers. Valves naked, or without grains.*

18. R. *bucephalophorus.* Bafil-leaved Dock. Linn. Sp. Pl. 479. Willd. n. 17. Ait. n. 14. Cavan. Ic. v. 1. 31. t. 41. f. 1. Sm. Fl. Græc. Sibth. t. 345, unpublifhed. (Acetofa ocimi folio neapolitana βεκεφαληφορα; Column. Ecphr. part 1. 151. t. 150.)—Flowers united. Valves naked, veinlefs, with hooked teeth. Flower-italks ternate, roughifh; dilated and vaulted when in fruit.—Native of Italy, Barbary, and the Levant. Common in fpring in the corn-fields of Greece and the neighbouring iflands, according to Dr. Sibthorp, who judged it to be Λαπαθον το μικρον of Diofcorides. It is annual, and has been occafionally raifed in our gardens for near 150 years paft, for the fake of its curious and fingular ftructure. The *root* is fibrous. *Herb* very variable in luxuriance; fometimes fimple, two or three inches high; fometimes branched from the bafe into feveral afcending, leafy, fimple *ftems*, flowering almoft all the way up. *Leaves* ftalked, ovate, or fpatulate, fmooth, entire. *Stipulas* membranous, white, long, and taper-pointed. *Flowers* always three together, in a feries of whorls, partly axillary, but chiefly leaflefs. *Flower-ftalks* deflexed, red, roughifh with minute granulations, as well as the tawny or reddifh *calyx* and *petals*. The latter are three-lobed, and become ovate pointed *valves*, each befet at the margin, on each fide, with about three awl-fhaped, hooked teeth or fpines. As the *fruit* advances, each *flower-ftalk* becomes lengthened, and dilated towards the *calyx*, being convex above, and vaulted underneath, not properly, as Linnæus fays, "plane," neither is it tumid or club-fhaped. Columna, by a ftretch of fancy, compares the valves in fruit to a bull's head, two fegments of the reflexed *calyx* looking like horns.

19. R. *fimbriatus.* Fringed New Holland Dock. Brown n. 1.—"Flowers united. Valves naked, veiny, fringed with hooked teeth. Flower-ftalks reflexed and thickened when in fruit."—Gathered by Mr. Brown, near Port Jackfon, New South Wales. We have feen no fpecimen. This fpecies feems very nearly akin to the laft.

20. R. *veficarius.* Bladder Dock, or Sorrel. Linn. Sp. Pl. 479. Willd. n. 20. Ait. n. 16. (Acetofa americana, foliis longiffimis pediculis donatis; Bauh. Prodr. 54. Morif. fect. 5. t. 28. f. 7. A. veficaria peregrina; Beff. Hort. Eyft. vern. ord. 6. t. 15. f. 3.)—Flowers united. Stalks moftly in pairs. All the valves very large, membranous, entire, folded back. Leaves undivided.—Native of Africa. A hardy annual in our gardens, where it appears to have been firft cultivated by Tradefcant, in 1656. It flowers in July and Auguft. The *ftem* is branched, from a fpan to 18 inches high, fmooth. *Leaves* on long ftalks, ovate and obtufe, but with two angles at the bafe, fo as to approach a halberd-fhape. The plant is chiefly remarkable for the beauty of its large fhining membranous *valves*, reticulated with veins, and tinged with a light rofe-colour. Thefe inveft the ripe *feed*, hanging on capillary drooping ftalks in great abundance. The figure in the *Hortus Eyftellenfis* is much the beft, were it not fo difficult of accefs, on account of the unweildinefs, and bad arrangement, of that pompous old book.

21. R. *rofeus.* Rofe-coloured Dock. Linn. Sp. Pl. 480. Willd. n. 21. Ait. n. 17. Sm. Fl. Græc. Sibth. t. 346, unpublifhed. (Acetofa ægyptia, rofeo feminis involucro, folio lacero Lippi; Shaw Specim. n. 5. t. 1?)—Flowers united. Valves unequal, membranous, rounded, reticulated, toothed. Leaves undivided.—Native, as it is faid, of Egypt. Dr. Sibthorp found it in the ifle of Cyprus, and his fine figure is the only good one we have met with; for the miferable fketch of Shaw appears certainly to have been taken from the *tingitanus*, with whofe *leaves* it accords, though not with thofe of *rofeus*; yet from this plate it feems Linnæus borrowed a part of his character, "*foliis erofis*," which does not agree even with his own poor fpecimen. The true *rofeus*, from a fimple annual *root*, throws up feveral fpreading, afcending, leafy *ftems*, near a fpan high. *Leaves* on long ftalks, undivided, entire, of an oblong, flightly haftate figure, but much narrower than in the laft fpecies. The whole *herb* is roughifh, with a fort of hoary mealinefs. *Flowers*, as well as their *ftalks*, and the *valves* inveffing the *feed*, of an elegant rofe-colour; the lobes of the *valves* femiorbicular, membranous, ftrongly reticulated with red veins, and bordered with fine fharp teeth.

22. R. *tingitanus.* Tangier Dock. Linn. Sp. Pl. 479. Willd. n. 22. Ait. n. 18. (Acetofa dentata perpetua di Tanger; Zanon. Ift. 14. t. 5. (Lapathum maritimum fœtidum; Bauh. Prodr. 56.)—Flowers united. Valves heart-fhaped, obtufe, membranous, entire. Leaves haftate, ovate, jagged.—Native of Barbary, Spain, and Cyprus. Hardy in our gardens, flowering from June to Auguft.—*Root* perennial, creeping. *Stems* about a foot high, afcending, branched. *Leaves* on long ftalks, roughifh, confifting of a large, ovate, acute, central lobe, with two fmall tranfverfe ones at the bafe; all crifped or jagged at the edges, fometimes pinnatifid. *Flowers* in long clufters, two or three together, with a membranous *bractea* under them. *Valves* not half the fize of the two laft, whitifh and fhining. Shaw's figure, cited under *rofeus*, exactly reprefents this fpecies, and we find Defontaines has removed it hither.

23. R. *fcutatus.* French, or Garden, Sorrel. Linn. Sp. Pl. 480. Willd. n. 23. Ait. n. 19. (Acetofa rotundifolia hortenfis; Morif. fect. 5. t. 28. f. 9. Oxalis franca feu romana; Ger. Em. 397.)—Flowers united. Leaves haftate, fomewhat heart-fhaped. Stem round. Native of Switzerland, the fouth of France, and fome parts of Germany, in ftony places. Cultivated for the ufe of the table, in every kitchen-garden, fince the days of Gerarde. It is a perennial herb, flowering in June and July. The *leaves* are very fmooth and rather glaucous, quite entire, fupported by long ftalks. Their flavour is very gratefully acid, either recent or ftewed. *Flowers* fmall, racemofe, pendulous. *Valves* orbicular, entire.

R. glaucus, Jacq. Ic. Rar. t. 67, is a more glaucous and fmall-leaved variety, whofe *ftem* is faid to be in fome degree woody.

24. R. *nervofus.* Three-ribbed Dock. Vahl. Symb. v. 1. 27. Willd. n. 24. (R. perficarioides; Forfk. Ægypt. Arab. 76.)—Flowers united. Valves orbicular, entire, naked. Leaves oblong, three-ribbed. Gathered by Forfkall, on the mountains of Hadi, in Arabia. The *ftem* is rather fhrubby, with round ftriated *branches*. *Leaves* ftalked, oblong; the uppermoft lanceolate; all of them acute, entire, fleffy, very fmooth, glaucous, an inch or more in length, with three ribs, but no veins. *Stipulas* membranous, fheathing, abrupt. *Panicle* terminal. *Flower-ftalks* capillary, thickened under the *flower*, longer than the *fruit*. *Calyx* reflexed. *Valves* orbicular, fmooth, without grains. *Vahl.*

25. R. *digynus.* Mountain Sorrel. Linn. Sp. Pl. 480. Willd. n. 25. Ait. n. 20. Purfh n. 9. Fl. Brit. n. 9. Engl. Bot. t. 910. Fl. Dan. t. 14. (Welfh Sorrel; Petiv. H. Brit. t. 3. f. 4.)—Flowers united. Styles two. Valves ovate, entire, naked. Leaves broadly emarginate. —Native of Alpine rivulets, on the mountains of Lapland, Labradore,

Labradore, Siberia, Switzerland, Wales, Scotland, and the north of England, always in very elevated ſpots, at leaſt in our iſland, flowering in June. The *leaves* are nearly all radical, on long ſtalks, kidney-ſhaped, an inch wide, wavy, veiny, pale green, acid, each terminating in a broad ſhallow notch. *Stem* a ſpan high, panicled. *Flower-ſtalks* in ſmall groups or tufts, capillary. *Valves* ovate, emarginate, entire, reddiſh, with no traces of *grains*. The *flowers*, having but two *ſtyles*, afford a deciſive ſpecific character of themſelves, as well as an excellent name. The ſegments of the *calyx* are but two, as well as the *petals*, or *valves*. The *ſeed* is orbicular and flattiſh, having a broad border.

26. R. *lanceolatus*. Lanceolate Cape Dock. Thunb. Prodr. 67. Willd. n. 26.—"Leaves lanceolate, with a reflexed border. Stem angular."—Found by Thunberg at the Cape of Good Hope. We have never ſeen it.

27. R. *graminifolius*. Graſs-leaved Sorrel.—Leaves linear, entire, very narrow. Stipulas ſheathing, imbricated. Panicle angular.—Native of Siberia. Communicated by profeſſor Rudolph to A. B. Lambert, eſq. under the above name, which very aptly deſcribes the numerous, long, graſſy *leaves*. The *ſtem* ſeems ſhrubby. *Flowers* ſmall, in a forked racemoſe *panicle*. Our ſpecimen is not perfect enough to ſhew whether the *ſtamens* and *piſtils* are in the ſame *flower* or not, neither are the *valves* diſcernible. We therefore merely mention here, for further enquiry, this very curious and diſtinct ſpecies, of which we find no publiſhed account.

Sect. 3. *Perfect ſtamens and piſtils in ſeparate flowers.*

28. R. *Lunaria*. Tree Sorrel. Linn. Sp. Pl. 479. Willd. n. 19. Ait. n. 15. (R. polygamus; Cavan. Ic. v. 1. 14. t. 22. Acetoſa arboreſcens, ſubrotundo folio; Pluk. Almag. 8. Phyt. t. 252. f. 3.)—Flowers monoecious. Males with twelve ſtamens. Anthers oblong. Females with ſix abortive ones. Valves rounded, granular. Stem ſhrubby. Leaves ſlightly heart-ſhaped.—Native of the Canary iſlands, from whence it was brought into the Engliſh green-houſes, as ſoon as tender exotics became much cultivated. It flowers in June and July. The *ſtem* is ſhrubby, branched, ſpreading, often reddiſh. *Leaves* alternate, on longiſh ſtalks, fleſhy, entire, ſmooth, of a pale glaucous hue and acid taſte. *Stipulas* ſheathing, broad, membranous, whitiſh. *Flowers* in a large, terminal, branched, racemoſe *panicle*; their particular ſtructure Cavanilles firſt explained, and we have nearly verified his deſcription. He knew not that his was a Linnæan plant, nor did the editors of Hort. Kew. diſcover his ſynonym. Some *flowers* are entirely male, with a three-cleft *calyx*, three very minute unchangeable *petals*, and twelve *ſtamens*, whoſe *anthers* are divided half way down. Other *flowers*, in the ſame panicle, have a ſimilar *calyx* and *petals*, but the latter are ſubſequently enlarged into three orbicular, emarginate, veiny *valves*, each bearing a ſmall *grain*. Theſe flowers have moſtly the rudiments of ſix *ſtamens*, but entirely ineffectual, hardly viſible to the naked eye. We preſume the large capillary tufts, deſcribed by Cavanilles, are the real *ſtigmas*, the *ſtyles* being bent down to the bottom of the flower, as in many other ſpecies, with whoſe *ſtigmas* theſe plumoſe tufts exactly accord. But this we have not aſcertained, as yet, in the living plant. Conſidering the preſent ſpecies as in fact monoecious, not polygamous, we have removed it to this ſection.

29. R. *haſtulatus*. Little-halberd-leaved Sorrel.—Flowers ſeparated, dioecious? Anthers orbicular. Stem ſhrubby, angular. Leaves halberd-ſhaped, revolute. Gathered by Mr. Menzies in Chili. The *ſtem* is woody, with numerous, long, lax, zigzag, angular *branches*. *Leaves* half an inch long, or rather more, entire, minutely roughiſh, obtuſe, tapering at the baſe into a *footſtalk*, about half their own length. *Stipulas* ſhort, membranous, obtuſe. *Flowers* in ſolitary, terminal *cluſters*, with a concave, thick, permanent *bractea*, and ſeveral minute membranous ones, under each little aſſemblage of three partial ſtalks. Segments of the *calyx*, as well as the *petals*, concave, reflexed. *Stamens* ſix, ſhorter than the calyx. *Anthers* of two round lobes, opening externally. We can diſcover no other than male flowers.

30. R. *auratus*. Golden-flowered Dock. (Favrodine dorée: Reynier Mém. de la Société de Lauſanne, v. 2.)—Flowers ſeparated, dioecious? Stamens nine or twelve. Anthers oblong. Petals none in the male. Stem herbaceous, angular. Leaves ovato-lanceolate, ſomewhat crenate, with hairy ribs.—Native of Switzerland. *Reynier, Davall.* Firſt found by M. Favrod, in a meadow not far from the village of Caſtrod. M. Reynier, who conceived this plant to form a diſtinct genus from *Rumex*, on account of the want of *petals*, and the ſuper-abundance of *ſtamens*, named it as above. His own ſpecimen, now in our hands, and thoſe of Mr. Davall, are entirely male. We have never ſeen either female flowers, or *fruit*; nor can we find any indication of this *Rumex* in Haller, or elſewhere. The *habit* of the herb bears a general reſemblance to our common Docks, *acutus*, *criſpus*, &c. The *ſtem* is angular, and ſtrongly furrowed, panicled above, with long leafleſs *cluſters* of innumerable ſmall male *flowers*, of a green and tawny hue, on drooping capillary *ſtalks*. The *leaves* are lanceolate, ovate, or ſomewhat heart-ſhaped; their ribs, veins, and long *footſtalks*, hairy. This laſt character induces a ſuſpicion that the plant before us may poſſibly be the male of *R. divaricatus*, n. 13, a ſpecies concerning which very little is known, and which Haller, on the authority of Willich, reports to have, on cultivation, become the ſame as *pulcher*. Our *auratus* indeed is diſtinct from *pulcher*, but may be a variety of *divaricatus*, become occaſionally dioecious, if it be not always ſo. The three ſegments of the *calyx* are ſpreading, linear, keeled and channelled, rather ſhorter than the *anthers*, which are cloven at the top.

31. R. *alpinus*. Alpine Dock, or Monk's Rhubarb. Linn. Sp. Pl. 480. Willd. n. 27. Ait. n. 21. (Lapathum folio rotundo, alpinum; Bauh. Hiſt. v. 2. 987. Hippolapathum rotundifolium; Ger. Em. 389.)—Flowers monoecious, or polygamous. Valves entire, naked. Leaves heart-ſhaped, obtuſe, rugoſe.—Native of the alps of Switzerland, France, and Savoy, as well as of Greece and the Bithynian Olympus, flowering in July. Cultivated ever ſince Gerarde's time in our gardens, where it thrives, even in the ſmoke of London, and makes a very handſome appearance with its ample rich-green foliage. The *root* is thick, certainly perennial, though Linnæus and Willdenow mark it as biennial, and is ſaid to poſſeſs the medical virtues of Rhubarb; in a weaker degree. *Footſtalks* very long. *Stipulas* membranous, ſheathing. *Stem* two feet high, erect, leafy, round, furrowed, ſmooth. *Cluſters* forming an oblong, denſe, leafy *panicle*, of innumerable green *flowers*, ſome of which have *ſtamens* with a, uſually imperfect, *germen*; others are entirely female. *Valves* heart-ſhaped, ſtrongly reticulated with veins; their midrib a little tumid, but not granular. *Seed* ſmall.

32. R. *ſpinoſus*. Prickly-ſeeded Dock. Linn. Sp. Pl. 481. Willd. n. 28. Ait. n. 22. Sm. Fl. Græc. Sibth. t. 347, unpubliſhed. (Beta cretica, ſemine aculeato; Bauh. Prodr. 57. B. cretica, ſemine ſpinoſo; Bauh. Hiſt. v. 2. 963.)—Flowers monoecious. Calyx of the females of one

leaf

leaf, pitcher-ſhaped, with three ſpreading ſpinous points. Stem decumbent. Leaves ſlightly haſtate. — Native of Gibraltar, Zante, Crete, and the neighbourhood of Athens; alſo of the Cape of Good Hope; cultivated here in 1656, by Tradeſcant. This is a proſtrate, annual, widely ſpreading, and rank-growing herb, with the aſpect and green hue of ſome kind of Beet. The *branches* are zigzag, round, ſtriated. *Leaves* ſtalked, ſpreading, about two inches long and one broad, entire and ſmooth. Tufts of female *flowers* ſeſſile, axillary; thoſe of the males much fewer, leafleſs, about the ends of the branches, ſtalked and drooping. *Calyx* and *petals* of the latter alike, concave, obtuſe, equal. *Stamens* ſix. *Calyx* of the former triangular, with ſix ribs, and curious depreſſions between; the three ſegments ſpreading, heart-ſhaped, folded, ſpinous-pointed, finally very hard and rigid. *Petals* ſmall, oblong, triangular, erect, permanent, but ſcarcely enlarged, the body of the *calyx* encloſing the *ſeed*. This ſingular ſpecies, in its *fruit*, as well as habit, approaches the nature of *Beta* and *Spinacia*.

33. R. *giganteus*. Tall Dock. Ait. n. 23.—"Flowers monoecious. Valves naked. Leaves oblong-ovate."—Native of the Sandwich iſlands, from whence it was brought by Mr. Menzies, in 1796. It is a perennial green-houſe plant, flowering from June to Auguſt. *Aiton*.

34. R. *tuberoſus*. Tuberous-rooted Dock. Linn. Sp. Pl. 481. Willd. n. 29. Ait. n. 24. Sm. Fl. Græc. Sibth. t. 348, unpubliſhed. (Oxalis tuberoſa radice; Bauh. Hiſt. v. 2. 991. Ger. Em. 396.)—Flowers dioecious. Valves naked. Leaves oblong-arrow-ſhaped; their lobes ſpreading. Root with oval knobs.—Native of Italy, Aſia minor, and the iſlands of Cyprus and Lemnos. Miller is ſaid to have cultivated this ſpecies, but it ſeems now loſt. The *root* is perennial, with oval or oblong knobs, like thoſe of *Spiræa Filipendula*. *Stems* a foot high. *Leaves* entire, with two divaricated lobes or points at the baſe, ſmooth. *Cluſters* panicled, of an elegant roſe-colour, eſpecially when ripening *ſeed*. *Anthers* orange. *Stigmas* pink. *Valves* orbicular, obtuſe; heart-ſhaped at the baſe, without *grains*.

35. R. *Acetoſa*. Common Sorrel. Linn. Sp. Pl. 481. Willd. n. 31, excluding the laſt variety. Ait. n. 25. Fl. Brit. n. 10. Engl. Bot. t. 127. Woodv. Med. Bot. t. 69. (Oxalis, ſive Acetoſa; Ger. Em. 396.)—Flowers dioecious. Valves granular. Leaves oblong-awl-ſhaped; their lobes converging, often notched.—Native of graſſy paſtures throughout Europe, from the alps of Lapland to Greece, flowering early in June. The *root* is perennial, tapering, running deep into the ground, tufted at the top, and throwing up ſeveral *ſtems*, one to two feet high, round, ſimple, leafy, ſtriated. *Leaves* deep green, paler beneath; the lower and radical ones ſtalked; the upper ſeſſile, ſomewhat revolute, claſping the ſtem; the points at the baſe of all rather directed inward than otherwiſe, and not in any degree divaricated; their edges nearly entire, or ſlightly criſped. *Stipulas* long, tubular, jagged at the ſummit. *Cluſters* compound or aggregate, whorled, reddiſh. *Flowers* drooping, completely dioecious. *Petals* in both oblong-ovate, larger than the *calyx*, which latter is reflexed when in fruit. *Valves* ovate, obtuſe, entire, each bearing an ovate *grain*. Linnæus in Fl. Lapp. ed. 2. 99, and Dillenius in Raii Syn. ed. 3. 143, mention a large alpine variety, for which the former cites Muntingius, (*de vera herba Britannica*,) Acetoſa Hiſpanica maxima, 225. t. 213. This author's plant ſeems rather the *arifolius* hereafter deſcribed, which we can ſcarcely believe to have been found either in Lapland or Merionethſhire. *R. Acetoſa* taſtes gratefully acid, with a pleaſant and wholeſome aſtringency. It is, according to Linnæus, much uſed by the Laplanders for preparing a kind of whey from rein-deer's milk, which will keep a long time, and is in great requeſt among people of all ages.

36. R. *Acetoſella*. Sheep's Sorrel. Linn. Sp. Pl. 481. Willd. n. 32. Ait. n. 26. Purſh n. 10. Fl. Brit. n. 11. Engl. Bot. t. 1674. Curt. Lond. faſc. 5. t. 29. (Oxalis tenuifolia; Ger. Em. 397. O. ſive Acetoſa, minor; Matth. Valgr. v. 1. 406.)—Flowers dioecious. Valves naked. Leaves lanceolate-haſtate.—Native of barren ſandy or gravelly paſtures and fields, throughout Europe, flowering in June and July. This is but half the ſize of the laſt, more ſlender in every part, and more of a red or tawny colour. The *root* is perennial and creeping. *Leaves* numerous; the radical ones haſtate, their tranſverſe lobes ſpreading at right angles with the central lobe, narrow and entire; ſtem-leaves often undivided. *Cluſters* panicled, numerous. *Valves* ovate, nearly entire, all deſtitute of *grains*. The herb is acid.

37. R. *multifidus*. Many-cleft Sorrel. Linn. Sp. Pl. 482. Willd. n. 30. Sm. Fl. Græc. Sibth. t. 349, unpubliſhed. (R. Acetoſella ♂; Linn. Sp. Pl. 482. Acetoſa minor erecta, lobis multifidis; Bocc. Muſ. v. 2. 164. t. 126. Tourn. Inſt. 503.)—Flowers dioecious. Leaves lanceolate-haſtate; their ſide lobes palmate.—Native of Italy, Sicily, and the Levant. Dr. Sibthorp gathered it on the hills of Greece, as well as near Conſtantinople. Linnæus ſeems never to have ſeen it, and has fallen into a ſtrange error, in quoting Boccone's ſynonym for two different things, within four or five lines. This Willdenow did not preſume to correct, but aggravated the error by one figure. He reminds us of the very ſubmiſſive young man, who ſaw Rouſſeau eat the berries of *Hippophäe*, without daring to tell him they were reputed poiſonous. The preſent ſpecies differs from the laſt merely in the diviſions of its ſide lobes. We have never ſeen its *valves*, but the *flowers* are exactly like *Acetoſella*, of which it may poſſibly be a variety.

38. R. *bidens*. Toothed-valved Sorrel. Brown n. 2.—"Flowers ſeparated. Valves naked, haſtate. Leaves linear-lanceolate, tapering at the baſe."—Gathered by Mr. Brown, in Van Diemen's iſland. Whether this be dioecious or monoecious is not expreſſed.

39. R. *aculeatus*. Prickly-valved Sorrel. Linn. Sp. Pl. 482. Willd. n. 33. Sm. Prodr. Fl. Græc. Sibth. v. 1. 249. (Acetoſa cretica, ſemine aculeato; Bauh. Prodr. 55. Oxalis minor aculeata Candiæ; Bauh. Hiſt. v. 2. 991.)—Flowers monoecious. Leaves lanceolate, ſtalked. Fruit reflexed. Valves fringed with hooked prickles.—Native of Spain, Crete, Greece, and the neighbourhood of Conſtantinople. A very curious little perennial ſpecies, ſomewhat like *Acetoſella* in herbage, except that the *leaves* are more glaucous, and ſimply lanceolate, not haſtate. The *cluſters*, or *ſpikes*, are ſolitary at the top of each branch, and look at firſt ſight like thoſe of ſome *Reſedæ*. *Flowers* ſmall, monoecious in both the Linnæan ſpecimens, though on one there are more males, on the other more females. The latter are ſtrongly curved downwards. *Valves* ovate, curiouſly fringed with rigid, hooked, or forked, prickles; ſome are furniſhed with a ſmall *grain*.

40. R. *luxurians*. Spreading Cape Sorrel. Linn. Mant. 64. Suppl. 212. Willd. n. 34. (R. ſagittatus; Thunb. Prodr. 67. Acetoſa montana pumila, ſegopiri folio; Bocc. Muſ. v. 1. 165. t. 126?)—Flowers monoecious. Leaves haſtate, taper-pointed; ſomewhat heart-ſhaped. Stem much branched, angular, diffuſe. Valves orbicular, naked. —Native of the Cape of Good Hope, according to a ſpecimen

men from Dr. Bladh, in the Linnæan herbarium. The ſynonym of Boccone, which ſurely can have nothing to do with this plant, cauſed it to be thought of Italian origin. Linnæus cultivated it at Upſal, and we have a ſpecimen from the Paris garden, but our Engliſh cultivators ſeem to know nothing of this *Rumex*. The *root* is tuberous like *Spiræa Filipendula*, or *R. tuberoſus*, n. 34, and, of courſe, perennial. *Stems* many, twelve or eighteen inches long, proſtrate, branched, zigzag, leafy, marked with five angles, and ſtriated. *Leaves* on long ſtalks, very acid, purpliſh at the margin, waved, but ſcarcely crenate; their form triangular, with taper ſpreading points; their length an inch and a half or two inches; and they are cut away at the baſe, up to the ſide ribs. *Cluſters* terminal, numerous, compoſing a large ſpreading *panicle*, with fine, capillary, ſingle-jointed *partial ſtalks*. *Flowers* certainly monoecious in the abovementioned ſpecimen, the only one we have ſeen; the males towards the extremity of the cluſters. *Calyx* in both ſexes oblong, incurved, concave, obtuſe. *Petals* larger, orbicular, reddiſh. *Stamens* fix, with oblong cloven *anthers*. *Valves* twice as large as the permanent inflexed calyx, orbicular, finely reticulated, and, as far as we can diſcover, deſtitute of *grains*. It might puzzle any reader to determine what the younger Linnæus meant, in the *Supplementum*, by the inner and outer *valves*. The latter are the *calyx*, but there is no authority, nor analogy, to juſtify his phraſeology, nor is the *calyx* awl-ſhaped. We are enabled to ſolve Willdenow's difficulty concerning *R. ſpinoſus* of Thunberg, as we have the real *ſpinoſus* from the Cape, and the preſent plant anſwers ſo exactly to his *ſagittatus*, a ſpecies apparently overlooked by Willdenow.

41. R. *arifolius*. Great Arum-leaved Sorrel. Linn. Suppl. 212. Willd. n. 35. Ait. n. 27. Allion. Pedem. v. 2. 204? (R. abyſſinicus; Jacq. Hort. Vind. v. 3. 48. t. 98. Acetoſa montana lato ari rotundo folio; Bocc. Muſ. v. 1. 165. t. 125? ſee alſo t. 126.)—Flowers dioecious. Leaves all ſtalked, haſtate, with ſimple divaricated lobes. Valves heart-ſhaped, rounded, naked, entire.—This ſpecies is reported to have been brought from Abyſſinia by Mr. Bruce, as every thing communicated by that celebrated traveller was, at one time, ſuppoſed to have been; juſt as the gardeners have ſince attributed every new plant, even the Great Barbary Oat, to Botany Bay. We can ſcarcely doubt that Allioni's is the ſame ſpecies, for few plants vary more ſurprizingly in luxuriance than we have ſeen this; and if ſo, *R. arifolius* is a native of the Alps. We gathered it by the great high road over Mount Cenis, in 1787. To prevent miſtakes, we ſhall deſcribe our ſpecimens, and leave our readers to obſerve how nearly they agree with Jacquin's luxuriant garden ones, which he ſays were from ſix to nine feet high. *Root* perennial. *Stems* from three to five feet high, erect, ſimple, leafy, ſomewhat angular, ſtrongly furrowed, ſmooth, light green, often reddiſh. *Leaves* of a light bright green, not of the deep hue of *R. Acetoſa*, from two to four inches long, ſometimes more, oblong inclining to ovate, with two ſpreading, acute, entire lobes at the baſe, very variable in ſize. *Footſtalks* very long in the lower and radical leaves, and ſcarcely entirely wanting in the uppermoſt. *Cluſters* numerous, forming a large, terminal, compound, leafleſs *panicle* of innumerable, very ſmall, green *flowers*, male on one plant, female on another. *Calyx* of the latter reflexed, permanent. *Valves* thrice as large, pale brown, tinged with pink, membranous, without *grains*, finely reticulated, nearly orbicular, wavy, but not crenate. *Seed* pale brown, above half the length of the valves, its angles ſharp and greatly compreſſed. It muſt be obſerved that though Jacquin's figure, which is far from exquiſitely finiſhed, ſeems to indicate *grains* on the *valves*, his deſcription ſays there are none. We are not very doubtful of Boccone's ſynonym, as his figures are generally diminiſhed, and our plant is ſo variable in ſize.

42. R. *bipinnatus*. Cut-leaved Sorrel. Linn. Suppl. 211. Willd. n. 36.—Flowers dioecious. Leaves doubly pinnatifid.—Native of Morocco, in ſandy ground, according to a ſpecimen in the Linnæan herbarium, the only one we have ſeen, which is juſt about flowering, and ſeems entirely male. *Stem* aſcending, about a ſpan long, ſimple, leafy, angular, ſtriated, ſmooth. *Leaves* an inch or more in length, apparently very fleſhy, heart-ſhaped, deeply pinnatifid almoſt to the mid-rib; their ſegments deeply, irregularly and obtuſely ſubdivided, ſo that the whole leaf bears ſome reſemblance to various ſpecies of PELARGONIUM; ſee that article. *Footſtalks* about equal to the leaves, or longer. *Stipulas* large, membranous, pale, ovate, acute, ſheathing at the baſe. *Cluſters* compoſing a terminal panicle, with large ſhining *bracteas*, reſembling the *ſtipulas*. *Calyx* of three roundiſh, concave, membranous-edged leaves. We can ſcarcely diſcern even the rudiments of *petals*. *Stamens* fix, with oblong, reddiſh, cloven *anthers*.

43. R. *hoſtilis*. Armed, or Prickly Dock. Loureir. Cochinch. 217.—Flowers dioecious. Leaves lanceolate, entire. Stem prickly. Valves naked.—Native of Cochinchina, where it is called *Cây dieò gai*. The *ſtem* is three feet high, erect, round, prickly. *Leaves* flat, ſpreading. *Flowers* ſpiked. *Valves* all without grains, entire, ſmooth, unarmed. *Seed* triangular. *Petals* three, greeniſh. *Loureiro*.

The author laſt named has a *R. criſpus*, found near rivers in Cochinchina, which he mentions as eatable. This is very unlikely to be our Linnæan *criſpus*, eſpecially as he ſays each *valve* bears three briſtles, nor was he at all acquainted with European plants, except from deſcription. Still we dare not, without ſpecimens, adopt the ſpecies in queſtion as a new one.

RUMEX, in *Gardening*, contains plants of the herbaceous, perennial, and woody evergreen kinds, of which the ſpecies cultivated are, the common ſorrel (R. acetoſa); the French ſorrel (R. ſcutatus); the patience dock, or rhubarb (R. patientia); the bloody-veined dock, or bloodwort (R. ſanguineus); and the tree ſorrel (R. lunaria).

In the firſt ſpecies the whole herb is acid, with a degree of aſtringency not unpleaſant or unwholeſome. It is often cultivated as a culinary herb. And there is a variety of it with broad leaves, termed great mountain ſorrel.

The ſecond ſort, which is called round-leaved ſorrel, is a more grateful acid than the firſt kind, and of courſe preferred for kitchen uſe, in ſoups, &c.

Method of Culture.—The firſt and ſecond ſorts and varieties of theſe plants may be increaſed by ſeed and parting the roots, but more particularly the firſt, as the latter may be very readily increaſed by the roots. The ſeeds ſhould be ſown in a bed or border in the early ſpring, as March, raking them in evenly. When the plants come up, they ſhould be regularly thinned, and when of ſome growth, in the ſummer, be planted out in rows on a bed or border, about eight or nine inches apart in the common ſort, and, in the other a foot or more, watering them well; when they will be proper to cut the latter end of the ſame ſummer and in the autumn, continuing for ſeveral years; but as the ſeedling plants in the firſt kind moſtly produce larger leaves than the older plants, freſh ſupplies ſhould be raiſed annually, or every other year. And the parted roots may be planted out in the ſame ſeaſon, or in autumn, in rows a foot apart, giving them a good watering when they grow readily and

and furnish leaves in the latter end of summer and in the autumn. The second sort is readily raised in this way. They afterwards only require to be kept clean, and to have the seed-stems cut down in the summer, as well as the rank leaves in the autumn, that more full supplies of fresh leaves may be afforded.

And the third and fourth sorts may be raised also from seeds in the same way, and the former from offsets of the root planted out in the autumnal season; when they grow very readily.

The last sort is easily increased by cuttings of the young shoots in the spring and summer months, being planted in pots at the former season, plunging them in a hot-bed; but in the latter they succeed without artificial heat, either in pots or the natural ground, being occasionally shaded and watered; when they become well rooted by the autumn. The third and fourth sorts afford variety in the clumps and borders, and the last among the green-house collections of plants.

Rumex, in the *Materia Medica*. The root of the R. aquaticus, or water-dock, has scarcely any smell; it has a strong austere taste, strikes a black colour in a solution of ferrum vitriolatum, or ferri sulphas, and yields its active matter both to water and to rectified spirit. All the lapatha were formerly officinal herbs. Their name is derived from λαπαζω, *evacuo*, and they are alluded to by Horace in the following lines:

> " —— Si dura moralitur alvus,
> Mitulus et viles pellent obstacula conchæ
> Et lapathi brevis herba." Sat. 4. l. 2. v. 27.

The water-dock has been esteemed to be the most efficacious. The leaves, which manifest considerable acidity, are said to possess a laxative quality, and have therefore been used to relieve costiveness; the roots are strongly astringent, and have been much employed, both externally and internally, for the cure of scurvy, especially when the gums are spongy, and frequent hemorrhages supervene. It is also recommended in various other cutaneous defœdations, and in visceral obstructions: and in order to give it additional importance, Muntingius has laboured to prove that this hydrolapathum is the "Herba Britannica" of the ancients; but many medical men still think that this root does not peculiarly differ from other astringents, and are so sceptical, as not to place any faith in the great virtues ascribed to it by Muntingius and sir John Hill; so that it is now scarcely ever employed. The powdered root is said by Murray to be an excellent dentifrice. The leaves of the R. acetosa, or common sorrel, have an agreeable acid taste, like that of oxalis acetosella, or wood-sorrel, which this plant resembles in its medical properties; and as it is easily procured in great abundance, may be substituted for it. (See Oxalis.) Sorrel, taken in considerable quantity, or used variously prepared as food, will undoubtedly be found beneficial, where a refrigerant and antiscorbutic regimen is required; and Linnæus informs us, that the Laplanders experience "serum acetosatum" to be in this respect an useful and pleasant diet. The acidulous taste of sorrel-leaves is said to depend on the presence of superoxalate of potass, which they contain. The leaves are diuretic as well as refrigerant. Their expressed juice diluted with water, or a decoction of them in whey, affords an useful drink in cases of inflammatory fever; and eating them in large quantities daily as a salad, may prove serviceable in some cutaneous affections. In France the plant is cultivated for the use of the table. Woodville. Thomson.

RUMFORD, in *Geography*. See Romford.

Rumford, a town of America, in Cumberland county, Maine, on the N. bank of Androscoggin river, about 80 miles N.W. of Portland. The township is about eight miles square, seven of which lie N. of Androscoggin river, which meanders through it about twelve miles; about a mile from its E. line there is a large fall. Ellis's river runs through it on the west side.

Rumford. See Concord.

RUMI, in the *Materia Medica*, a name given by Avicenna and Serapio to mastic of the finer kind. They distinguish this drug into two sorts; the one called by this name *rumi*, which was white and pure; the other called *cupti*, which was foul and blackish; the former came from the island of Chios, the latter from some parts of Ægypt.

Rumi *Ramba*, in *Geography*, a plain near Quito, in Peru, full of large fragments of rocks, thrown thither from a volcano, formerly in the famous mountain of Pichincha.

RUMIGNY, a town of France, in the department of the Ardennes, and chief place of a canton, in the district of Rocroy; 12 miles S.W. of Rocroy. The place contains 779, and the canton 8944 inhabitants, on a territory of 230 kiliometres, in 27 communes.

RUMILLY, a town of France, in the department of Mont-Blanc, and chief place of a canton, in the district of Annecy; 7 miles W.S.W. of Annecy. The place contains 2757, and the canton 13,585 inhabitants, on a territory of 197½ kiliometres, in 26 communes.

RUMINANT, Ruminans, in *Natural History*, an animal which chews over again what it has eat before: this is popularly called "chewing the cud."

Joah. Con. Peyer has an express treatise "De Ruminantibus et Ruminatione," where he shews, that there are some animals which do really ruminate, such as oxen, sheep, deers, goats, camels, hares, and squirrels; whereas others only appear to ruminate, which he calls *ruminantia spuria*; of which number are moles, crickets, bees, beetles, crabs, mullets, and several other fishes.

This latter class, he adds, have the stomachs composed of muscular fibres; by means of which the food is ground up and down, much as in real ruminants.

Ruminants, Mr. Ray observes, are all quadrupedal, hairy, and viviparous; some with hollow and perpetual horns, others with deciduous ones. See Quadrupeds.

The horned ruminants have all four stomachs appropriated to the office; *viz.* 1. The κοιλια μεγαλη of Aristotle, the *rumen*, *venter magnus*, or what we call the *paunch*, or *inward*, which receives the meat slightly chewed, retains it awhile, and then delivers it back again into the mouth, which is what we call the *cud*, to be re-chewed. 2. The κεκρυβαλος, or *reticulum*, which we call the *honeycomb*, from its internal coat being divided into cells like honeycombs. 3. The εχινος, which Mr. Ray thinks has been wrongly translated *omasus*, and which he chooses to call the *echinus*: this being difficult to clear, our people throw it away, and call it the *manifold*. 4. The συστρον of Aristotle, by Gaza called the *abomasus*; and, among us, the *maw*.

Again, all the horned ruminant animals want the dentes primores, or broad teeth in the upper jaw; and they afford that hard kind of fat called *suet*, *sebum*, στεαρ, which is firmer and less liquefiable in them than the adeps of other animals. See *Anatomy of* Mammalia.

It is remarked by Mr. Feron, that the retrograde motion of the œsophagus in ruminating cattle, such as cows, sheep, goats, &c. renders them capable of bringing up the softened grass from their first stomach. But when these animals fill themselves too full of clover, or of wet grass, or of some other young vegetables, which are liable to run into fermentation,

tation, the ſtomach becomes diſtended with air, and death frequently enſues. See CUD and HOVEN.

Great care is therefore to be taken with all theſe ſorts of animals when they are firſt turned into rich full graſſed paſtures, to ſee that they do not ſtay in them too long at a time, or fill themſelves too full of ſuch rich food. They are beſt and ſafeſt when only put into them for a ſhort period at any one time, on being firſt turned upon them. And the propereſt ſeaſon for them, as well as the graſs, is probably to conſume it when it is in the dry ſtate, as when eaten while very wet, there may be injurious conſequences in both ways.

RUMINATIO, in *Medicine*, which literally ſignifies *chewing the cud*, is applied by analogy to expreſs one of the ſymptoms of indigeſtion, nearly allied to *ructation*, when the ſtomach, by repeated ſpaſmodic efforts, throws up into the mouth, not only flatus and ſome of its ſecretions, but portions of the undigeſted food. Dr. Cullen defines *dyſpepſia*, or indigeſtion, by enumerating this among other ſymptoms by which it is, in different inſtances, characterized. "Anorexia, nauſea, vomitus, inflatio, ructus, *ruminatio*, &c." See his Synopſ. Noſolog. Method, Gen. 45. See RUCTATION, INDIGESTION, &c.

RUMINATION, in *Comparative Phyſiology*, a technical term equivalent to the common phraſe of "chewing the cud." It denotes the aſcent of the food from the paunch, or firſt ſtomach, into the mouth, and the ſecond maſtication which it there undergoes; a proceſs confined to thoſe mammalia which have complicated ſtomachs. When this ſecond maſtication has been accompliſhed, the food deſcends, not into the paunch, which receives it when it is firſt ſwallowed, but into the ſecond ſtomach; and thence ſucceſſively into the third and fourth. The mechaniſm, by which the animal has the power of conveying its food either into the paunch or the ſecond ſtomach at will, as well as the ſtructure of the ſtomach of ruminating animals altogether, is deſcribed in the article MAMMALIA. It is a ſingular example of voluntary power over the motions of an organ, which in other reſpects and in other animals are completely involuntary. "The influence of the will," ſays Blumenbach, "in the whole affair of rumination, is inconteſtible. It is not confined to any particular time, ſince the animal can delay it according to circumſtances, when the paunch is quite full. It has been expreſsly ſtated of ſome men, who have had the power of ruminating (inſtances of which are not very rare), that it was quite voluntary with them. I have known two men who have ruminated their vegetable food: both aſſured me that they had a real enjoyment in doing this, which has alſo been obſerved of others: and one of them had the power of doing it or leaving it alone, according to circumſtances." Comparative Anatomy, p. 138, note.

The final purpoſe of rumination, ſays the ſame author, as applicable to all the animals in which it takes place, and the chief utility of this wonderfully complicated function in the animal economy, are ſtill completely unknown: what has been already ſuggeſted on theſe points is quite unſatisfactory. Fabricius ab Aquapendente has ſufficiently refuted the old dream of Ariſtotle and Galen, that rumination ſupplied the place of inciſor teeth, the materials of which are applied in theſe animals to the formation of horns. Perrault and others ſuppoſed that it contributed to their ſecurity; as they eat much, and are timid, they ſuppoſed it removed the neceſſity of their remaining long employed in chewing in an open paſture. But the Indian buffalo ruminates, although it does not fly even from a lion, but rather attacks, and often vanquiſhes that animal. And the wild goat dwells in alpine countries, which are inacceſſible to beaſts of prey. Comparat. Anat. loc. cit.

RUMMAGE, probably derived from the Saxon *raum*, *room*, or *ſpace*, in the *Sea Language*, ſignifies to clear a ſhip's hold, or to remove goods or luggage from one place to another.

RUMMEL, in *Geography*, a river of Algiers, which paſſes by Conſtantina, and afterwards joins the Wed el Kibbeer, 18 miles N.W. of Conſtantina.

RUMMELSBURG, a town of Farther Pomerania, ſituated on the Wipper; 25 miles S. of Rugenwalde. N. lat. 53° 55′. E. long. 65° 53′.

RUMNEY. See ROMNEY.

RUMNEY, or *Romney Marſh*, a tract of land in the county of Kent, (ſee ROMNEY,) governed by certain ancient and equitable laws of ſewers, compoſed by Henry de Bathe, a venerable judge in the reign of king Henry III. who granted a charter to this diſtrict, impowering twenty-four men, thereunto choſen, to make diſtreſſes equally upon all thoſe which have lands and tenements in the ſaid marſh, to repair the walls and water-gates of the ſame, againſt the dangers of the ſea. The commiſſioners of ſewers, in other parts of England, may act according to the laws and cuſtoms of Rumney Marſh, or otherwiſe, at their own diſcretion; ſubject to the diſcretionary reviſion of the court of king's bench.

RUMNEY, or *Romney*, a townſhip of New Hampſhire, America, in Grafton county, on a north branch of Baker's river, about 7 or 8 miles N.W. of Plymouth, on the W. ſide of the Pemigewaſſet, incorporated in 1767, and containing 765 inhabitants.

RUMOUR, in *Law*. Spreading falſe rumours is criminal, and puniſhable at common law.

RUMP *of a Bird*. See UROPIGIUM, and *Anatomy of* BIRDS.

RUMPHIA, in *Botany*, was inſcribed by Linnæus to the memory of George Everard Rumph, M.D. counſellor to the Dutch Eaſt India Company, whoſe remembrance muſt ever be dear to all ſtudents of tropical botany, for the ſake of his *Herbarium Amboinenſe*. This work, of ſeven volumes folio, was the fruit of his long reſidence, and great authority, in Amboyna, nor does it, as a ſtore of faithful practical information, fall ſhort of any performance of the kind. It has indeed ſome of the faults, or rather misfortunes, of a poſthumous publication; and the reader muſt always keep in mind that the figures, far inferior to thoſe of the *Hortus Malabaricus*, are generally not more than half the ſize of nature. The original drawings, ſtill in exiſtence, are ſaid to be very fine. The author was born at Hanau in 1637, and died in 1706. His ardour for natural ſcience roſe above the moſt formidable obſtacles, ſuch as the loſs of ſight, at forty-three years of age, and the deſtruction by fire of all his papers and collections, ſeven years afterwards. He publiſhed at Amſterdam, in 1706, a ſplendid and excellent work on ſhells in Dutch, and is ſaid to have left behind him, in manuſcript, a political hiſtory of Amboyna. Happy were it if his gentle and benevolent ſpirit tended, in any way, to meliorate the cruel and ſordid policy of his countrymen there, or any where elſe! He was a member of the Imperial Academy *Naturæ Curioſorum*, and well deſignated by that body, according to their cuſtomary mode, as the Indian Pliny.—Linn. Gen. Pl. 23. Schreb. 31. Willd. Sp. Pl. v. 1. 187. Mart. Mill. Dict. v. 4. Vahl. Enum. v. 2. 36. Juſſ. 370. Lamarck Illuſtr. t. 25.—Claſs and order, *Triandria Monogynia*. Nat. Ord. *Tricoccæ*, Linn. *Terebintaceæ*? Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, three-cleft, erect, flat. *Cor.* Petals three, oblong, obtuſe, equal, much exceeding the calyx. *Stam.* Filaments three, awl-ſhaped, the

the length of the corolla; anthers ſmall. *Piſt.* Germen ſuperior, roundiſh; ſtyle awl-ſhaped, the length of the ſtamens; ſtigma triangular. *Peric.* Drupa coriaceous, turbinate, with three furrows. *Seed.* Nut ovate, undivided, of three cells.

Eſſ. Ch. Calyx three-cleft. Petals three. Drupa coriaceous. Nut of three cells.

1. R. *amboinenſis.* Linn. Sp. Pl. 49. (Tsjem-tani; Rheede Hort. Malab. v. 4. 25. t. 11. Myxa pyriformis, officulo triſpermo; Raii Hiſt. v. 2. 1556.)—Native of wild ſtony ſandy places, in the hills of Parakaroo, and other parts of the country of Malabar, flowering in December, and bearing fruit in January, which remains long on the branches. This is a tree of vaſt ſize, with a thick *trunk*, and rough *bark*. *Leaves* evergreen, ſcattered, ſtalked, heart-ſhaped, pointed, ſharply crenate, with five radiating branched ribs, roughiſh and hairy; dark green on the upper ſide; paler beneath. *Flowers* white, in axillary cluſters. They are repreſented with a hairy tubular *calyx*, and three ſeeming *bracteas* at the baſe; but the latter appear to be what Linnæus deſcribes as the *calyx*. We have ſeen no ſpecimen, nor do we know whence he formed his generic deſcription, which certainly does not accord, in the laſt-mentioned reſpect, with Rheede's plate. The aromatic, aceſcent, or ſomewhat acrid, qualities attributed to the plant by this writer, juſtify Juſſieu's opinion of its natural affinities. The ſpecific name, *amboinenſis*, is either incorrect, or muſt have been founded on the authority of a ſpecimen from Amboyna, ſeen perhaps by Linnæus, but of which no record remains.

RUMPNEY, in *Geography*. See REMNEY.

RUMSEY. See ROMSEY.

RUMZE, a river of Moravia, which runs into the Marſch, 15 miles S. of Olmutz.

RUN *of a Ship*, ſo much of her hull as is always under water; growing thinner and lanker by degrees, from the floor-timber to the ſtern-poſts.

This is alſo called the *ſhip's way aftward.*

A ſhip is ſaid to have a *good* run, when it is long, and the water paſſes eaſily to her rudder, her tuck not lying too low, which is of great importance to her ſailing. If the water do not come ſtrongly to her rudder, by reaſon of her being built too broad below, ſhe cannot ſteer well; and a ſhip that cannot ſteer well, cannot keep a good wind, nor will have any freſh way through the ſea, but will always be falling to leeward.

And yet a ſhip with a large and good run loſes much ſtowage, becauſe it is made narrow below.

RUN, in the *Manege*. To run a horſe is to put him to his utmoſt ſpeed. Some uſe the word *running* for any kind of gallop.

RUN *Out*, in *Agriculture*, a provincial term applied to land that is exhauſted. It alſo ſignifies to *ſprout* as corn in a wet harveſt; and likewiſe to *ſcour*, as in the caſes of cattle.

It is a very bad and miſchievous practice, though one which is too much indulged in by farmers in many places, to ſuffer lands to be quite run out, as they are very difficult, troubleſome, and expenſive to bring into order again; and in a great many caſes, it is almoſt impoſſible ever to reſtore them to the ſame ſtate of cultivation they were in before ſuch injuries happened to them. As ſuch ill conſequences are, therefore, not unfrequently cauſed in an intentional manner, it may be neceſſary to provide againſt them by the inſertion of ſuitable clauſes in leaſes.

RUNS, a term uſed for the lines of planks on which the navigators wheel their barrows, when employed in the excavation of a canal. In ſome inſtances the ſame term has been applied to inclined planes.

RUNACHUSAN, in *Geography*, a ſmall iſland near the W. coaſt of Scotland. N. lat. 58° 13′. W. long. 5° 4′.

RUNAN, a town of Pruſſia, in Ermeland; 4 miles N.W. of Heilſberg.

RUNAWAY BAY, a bay on the N.W. coaſt of the iſland of Antigua, between the fort on Corbizon's point N., and fort Hamilton S.—Alſo, a bay on the N. coaſt of Jamaica, W. of Great Laughlands river and Mumby bay, and 9 or 10 miles E. of Rio Bueno. N. lat. 18° 30′. W. long. 77° 11′.

RUNAWAY, *Cape*, a cape on the E. coaſt of New Zealand; ſo called by Cook in 1769, from the haſty retreat of the enemy, after having threatened hoſtilities. S. lat. 37° 32′. W. long. 181° 48′.

RUNCARIA, in our *Old Writers*, ſignifies land full of brambles and briars. (1 Inſt. 5.) The word comes from the Latin *runca, a weed.*

RUNCATION, a term uſed in the *Ancient Huſbandry* to expreſs the clearing away the weeds from among the corn, and other ſown plants.

They uſed, when the corn or other plants were an inch or two high, to draw a ſort of rake or harrow over the ground indiſcriminately over the corn and weeds, and when this was done, a perſon followed over all the field, and picked up all the weeds with the hand: the treading down the young corn, however, by this perſon's feet, and the injury done to it by the rake, were ſo great, that the crop always ſuffered greatly by it; and many of the Romans choſe to omit the uſe of the rake or harrow, as a thing that did as much injury to the corn as to the weeds, and contented themſelves with the ſending a perſon to pick up the weeds without it.

This was a ſort of firſt hint to the horſehoeing huſbandry of the moderns, though ſo injudiciouſly managed, that it was of very little, if any uſe, in this its infancy. But had theſe farmers been inſtructed to ſow their corn in rows, and then to uſe the rake or harrow, as we do the hoe, only between thoſe rows, they would then have had all the advantage of deſtroying weeds by it, and of ſtirring the earth, and no injury would have been done to the crop. See HUSBANDRY.

RUNCHES, in *Agriculture*, a term applied to charlock when dry and withered.

RUNCINATUM, FOLIUM, in *Botany*. See LEAF.

RUNCOL, in *Geography*, a town of Walachia; 15 miles N.W. of Tergofyl.

RUNCORN, a large townſhip, royalty, and pariſh, in the weſtern diviſion of the hundred of Bucklow, county palatine of Cheſter, England, is ſituated on the S. bank of the river Merſey, at the diſtance of about 14 miles N.E. from the city of Cheſter. The royalty belongs to the earl of Cholmondeley, as annexed to the honour of Halton. Runcorn appears to have been anciently a town of conſiderable conſequence. Ethelfleda, the celebrated ſiſter of king Edward the Elder, built a caſtle here, ſome traces of which can ſtill be diſcovered on an eminence called the Caſtle Rock, ſituated about a quarter of a mile from the pariſh church. This fortreſs muſt have been important, as it commanded the paſſage from the kingdom of Mercia to that of Northumberland. In the year 1133, a priory for regular canons of the Auguſtine order was founded at Runcorn by William Fitz-Nigel, but they were ſhortly afterwards removed to Norton. The church, which belonged to this monaſtery, contains monuments in memory of

of ſir John Cheſhyre, prime ſerjeant to queen Anne and king George I. who died in 1738, and alſo of three baronets of the Brooke family. Thoſe of ſir Richard Brooke, who deceaſed in 1781, and the late ſir Richard, who died in 1795, were executed in marble by John Bacon, ſculptor. Since the formation of the duke of Bridgewater's canal, which joins the Merſey cloſe to Runcorn, this place has greatly increaſed in population and wealth, and has been improved by the erection of many handſome buildings. For ſome years paſt it has likewiſe been a faſhionable reſort for change of air and ſalt-water bathing.

The pariſh of Runcorn is extenſive, and compriſes nineteen townſhips. According to the population returns of 1811, the pariſh contained 1171 houſes, and 6317 inhabitants, of whom 2060 reſided in the townſhip of Runcorn. Here are many fine quarries of free-ſtone, large quantities of which are ſent by water-carriage to Cheſter, Liverpool, Mancheſter, and various other places. Lyſons's Magna Britannia, vol. ii. Cheſhire, 4to. Lond. 1810. Beauties of England, &c. vol. ii.

RUNDAL, a river of Norway, which runs into the ſea, near Bergen.

RUNDENDORF, a town of Bavaria, in the biſhopric of Bamberg; 7 miles N.N.W. of Bamberg.

RUNDLES, or ROUNDLES, in *Heraldry*, the ſame as balls or pellets.

RUNDLET, RONLET, or *Roundlet*, a ſmall veſſel, containing an uncertain quantity of any liquor, from three to twenty gallons.

RUNDULLA, in *Geography*, a town of Hindooſtan, in Baglana; 10 miles E. of Naderbar.

RUNEHOLM. See RUUN.

RUNEKA, in *Hindoo Mythology*, is fabled as the mortal mother of Paraſu Rama, an incarnation of Viſhnu. Her huſband was Jamadagni, one of the ſeven Riſhis, or patriarchal ſages. Under theſe ſeveral names or words explanations will be reſpectively found. On the death of Jamadagni, as related in that article, Runeka declared her intention of becoming Sati, that is *pure*, by the act of ſelf-immolation on her huſband's funeral pile. (See SATI.) The avaricious Raja, who had cauſed her huſband's death, became thus charged with this double murder, and the vindictive Sati imprecated curſes on him and his tribe, enjoining their valorous ſon Rama to avenge the death of his parents by the condign puniſhment of the impious Raja and the military tribe of Kſhetria, (ſee SECTS *of Hindoos*,) whoſe meaſure of iniquity and oppreſſion was completed by this final atrocity.

The prayers or imprecations of a Sati are never inefficiently uttered; the great gods themſelves cannot liſten to them unmoved. Viſhnu accordingly inſpired Rama with a portion of his divinity, and ſent him forth to combat the Raja; who, after twenty battles, was ſlain, the military race of Kſhetria annihilated, and his uſurped kingdoms relieved from oppreſſion.

On the occaſion of this ſelf-immolation of Runeka, it is related, that to ſtrengthen the potency of her maledictions on the head of the murderous Raja, ſhe, in addition to her own ſelf-ſacrifice, performed alſo the ceremony of Naramedha, or the ſacrifice of a man, thereby rendering her ſolicitations to the avenging deities abſolutely irreſiſtible. And ſo laſting is ſaid to be the effect of the wrath felt and tranſmitted by the vindictive Sati, and its attendant ſacrifice and incantations, (ſee MANTRA and NARAMEDHA,) that nothing can avert its ſeverity, continued even to the preſent day, but a counteracting Naramedha; and that with the permiſſion of Paraſu Rama (who is conſidered as ſtill living in the Kokan or Concan): a man is accordingly ſacrificed to appeaſe the wrath of Runeka Devi, in every generation, by the tribe called Karhara, a military ſect, many of whom are ſettled in the Kokan, Guzerat, and other weſtern provinces of India.

Mr. Wilford, diſcuſſing ſome of theſe topics in the third volume of the Aſiatic Reſearches, obſerves, that although human victims, Naramedha, allowed by ancient authorities, are now prohibited under pain of the ſevereſt torments in the next world, the prohibition is ſaid to be diſregarded by the Pamaras, or Pariar races, in different parts of India. But he cannot imagine that any Brahman would now officiate at ſo horrid a ceremony, denounced as it is in the Brahma and Aditya Puranas, and in the Sri Bhagavat itſelf.

Notwithſtanding, however, the general incredibility of the fact, reſearches have ſince brought to light that a tribe of Brahmans, called, from officiating for that tribe, Karhara Brahmans, do ſtill actually countenance and practiſe the horrible ceremony in queſtion. They bear, at all events, the odium of it, and are conſequently ſhunned by their holy brethren of more humane practices and tribes. They are themſelves very reſerved on the ſubject; and deny the preſent practice, but admit of its former exiſtence. On this curious point many particulars, for which we have not room, are collected in Moor's Treatiſe on Hindoo Infanticide; to which, p. 195, we refer thoſe deſirous of farther information. Inſtances of recent ſacrifices, and the names of the ſuppoſed victims, are there given.

The name of this maleficent lady is ſometimes written Renuci, and Renuka. In the eleventh volume of the Aſiatic Reſearches the following paſſage occurs, deſcriptive of her perſon and family. "In the white Iſland," which in paſſing we will obſerve Mr. Wilford endeavours to prove to be Albion, "lived Jamadagni, a great Muni (ſee MUNI), who can at his will deſtroy the world, who beſtows rewards and inflicts puniſhments, knows the paſt and the future, and of whom the gods ſtand in awe. His wife was Renuka; in her manners and gait ſhe is like Reti, the mother of Kama. (See thoſe articles.) The whole world gazed at her with aſtoniſhment: her eyes are more beautiful than thoſe of the antelope of the foreſt; her face is like the moon; ſhe is a goddeſs, incapable of decay, immediately born of the ſupreme being. She is Iſwari, the ſovereign queen (ſee ISWARA); from her was born Rama, ever victorious," &c.

RUNGA, in *Geography*, a town of Hindooſtan, in the circar of Cicacole; 25 miles S.W. of Cicacole.

RUNGIS, a town of France; 6 miles S. of Paris.

RUNGPOUR, a circar of Hindooſtan, bounded on the N. by Coos Beyhar, on the E. by the Burhampooter, on the S. by Goragot, and on the W. by Dinagepour and Surroopour. The capital is Rungpour.

RUNGPOUR, a town of Bengal; 72 miles N.E. of Mauldah. N. lat. 24° 43′. E. long. 89° 23′.

RUNGS, in a *Ship*, the ſame with the floor or ground-timbers, being the timbers which conſtitute her floor, and are bolted to the keel, whoſe ends are called *rung-heads*; and more properly floor-heads.

RUNG-*Heads* are made a little bending to direct the ſweep or mold of the futtocks, and naval timbers; for here the lines, which make the compaſs and bearing of a ſhip, do begin.

RUNIC, a term applied to the language and letters of the ancient Goths, Danes, and other northern nations.

The word *rune*, according to Mallet, is derived from a word in the ancient Gothic language, ſignifying *to cut*: but Wormius, with greater probability, derives *rune* from either *ryn*, *a furrow*, or *ren*, *a gutter* or *channel*. As theſe characters were firſt cut in wood or ſtone, the reſemblance

to a furrow, or channel, would eafily fuggeft the appellation. Others, however, derive the term from *ryne*, fignifying art, efpecially that of magic.

Some have been of opinion that Gulphilas, or Ulphilas, a Gothic bifhop, about the year 370, was the firft inventor of the Runic character: but Olaus Wormius fhews at large, that Ulphilas could only be the firft who taught it to foreigners; for that the Runæ, or characters themfelves, were older than he.

In reality, Ulphilas, according to other authors, was fo far even from teaching the character, that he invented an alphabet of his own, on purpofe to put the Runic characters, which had been made fubfervient to the fuperftitions of heathenifm, out of ufe. See GOTHIC *Character*.

Many learned writers have adopted the opinion, firft fuggefted by Dr. Hickes, that the Runic character was borrowed from the Roman, and they farther maintain, that it was not known in the North before the introduction of Chriftianity. If it were allowed, that the Runic characters are borrowed from the Roman alphabet, it by no means follows, that the Scandinavians had waited for the fecret till the introduction of Chriftianity among them: but it is juftly obferved by Wormius, that they are as eafily reducible to the Greek and Hebrew alphabets as to the Roman. An evident proof that the Runic were not derived from the Roman letters, refults not only from their form, which has fcarcely any refemblance to thefe, but from their number (being but 16), and their order and names, which have nothing in common with the Roman, Greek, or Gothic characters of Ulphilas. A comparative view of the Runic and Gothic in thefe refpects may be feen in the Englifh tranflation of Mallet's Northern Antiquities, vol. i. p. 370. M. Mallet has fufficiently fhewn, that all the old chronicles and poems of the North univerfally agree in affigning to the Runic characters a very remote antiquity, and in attributing the invention of them to Odin or Woden himfelf, whom their poets expreifly call the inventor of the Runes. Befides, inftances occur of princes and pagan heroes, who made ufe of this character in an age long before Chriftianity had penetrated into the North.

In Blekingia, a province of Sweden, there is a road cut through a rock, on which are various Runic characters, faid to have been engraved there by king Harold Hyldetand, in honour of his father; and king Harold is faid to have afcended the throne about the beginning of the feventh century. It is, therefore, extremely probable that Odin introduced the Runic characters into the North, intending by the introduction of letters and writing to acquire refpect from the rude uncivilized inhabitants of Scandinavia; who would be ready enough to conceive that there was fomething divine or magical in them. Accordingly we find, that they were actually employed, in fpells and enchantments, for the pretended purpofe of working prodigies.

A few years before the birth of Chrift, as it has been faid, foon after Mithridates had been overthrown by Pompey, a nation of Afiatic Goths, who poffeffed that region of Afia which is now called Georgia, and is connected on the fouth with Perfia, alarmed at the progreffive encroachments of the Roman armies, retired in vaft multitudes under the conduct of their leader Odin, or Woden, into the northern parts of Europe, not fubject to the Roman government, and fettled in Denmark, Norway, Sweden, and other diftricts of the Scandinavian territory. As they brought with them many ufeful arts, particularly the knowledge of letters, which Odin is faid to have invented, they were hofpitably received by the natives, and by degrees acquired a fafe and peaceable eftablifhment in the new country, which feems to have adopted their language, laws, and religion. Odin is faid to have been ftyled a god by the Scandinavians; an appellation which the fuperior addrefs and fpecious abilities of this Afiatic chief eafily extorted from a more favage and uncivilized people.

This migration is confirmed by the concurrent teftimonies of various hiftorians: but there is no better evidence of it, than that confpicuous fimilarity fubfifting at this day between feveral cuftoms of the Georgians, as defcribed by Chardin, and thofe of certain cantons of Norway and Sweden, which have preferved their ancient manners in the pureft degree. Not that other ftriking implicit and internal proofs, which often carry more conviction than direct hiftorical affertions, are wanting to point out this migration. The ancient inhabitants of Denmark and Norway infcribed the exploits of their kings and heroes on rocks, in characters called Runic; and of this practice many marks are faid ftill to remain in thofe countries. This art or cuftom of writing on rocks is Afiatic. Modern travellers report, that there are Runic infcriptions now exifting in the deferts of Tartary. (See Voyage par Strahlemberg, &c. A Defcription of the northern and eaftern parts of Europe and Afia.) Schroder fays, from Olaus Rudbeckius, that Runes, or letters, were invented by Magog the Scythian, and communicated to Tuifco, the celebrated German chieftain, in the year of the world 1799. (Præf. ad Lexicon Latino-Scandic.) The *written mountains* of the Jews are an inftance that this fafhion was oriental. On the fubject of this migration, allowed by fome writers and contefted by others, fee the articles GOTHS and ODIN.

The Runic characters were diftinguifhed into various kinds. The *noxious*, or *bitter Runes* were employed to bring various evils on their enemies; the *favourable* averted misfortunes; the *victorious* produced conqueft to thofe who ufed them; the *medicinal* were infcribed on the leaves of trees for healing; others ferved to difpel melancholy thoughts, to prevent fhipwreck, as antidotes againft poifon, as prefervatives againft the refentment of their enemies, and in order to render a miftrefs favourable. Thefe various kinds differed only in the ceremonies obferved in writing them, in the materials on which they were written, in the place where they were expofed, in the manner in which the lines were drawn, whether in the form of a circle, a ferpent, or a triangle, &c.

The Runic characters were alfo employed for more rational purpofes: for writing epiftles and epitaphs, and for various kinds of infcriptions, which, the older they are, fo much the better are they engraven. They are rarely written from the right hand to the left; but it is not uncommon to meet with the line running from the top to the bottom, after the manner of the Chinefe and other Indian nations; or from the top to the bottom, and then turning round to the left, and fo up again to the place it begins at; or elfe from the left to the right, and fo back to the left again, which was the manner of the early Greeks. The greater part of the ancient monuments written in the Runic character, which are ftill preferved, confifts of infcriptions difperfed here and there in the fields, and cut out on large ftones or pieces of rock. They are alfo found in churches, and fometimes in other buildings.

The Saxons, who were fond of tracing the defcent of their princes from Odin, and who became poffeffors of England in the fixth century, imported into this country the old Runic language and letters. This appears from infcriptions on coins, ftones, and other monuments, and from fome of their MSS.

There are fome Runic medals in the clofets of the curious; and fome modern Danifh and Englifh medals, the infcriptions of which are Latin, and the character Runic.

There

There is extant a coin of king Offa with a Runic inſcription, which ſhews, that this character had been uſed by the Saxons as well as their Scandinavian brethren.

There are alſo Runic inſcriptions in this iſland; one in Cumberland, and another in Scotland. See Hickes' Theſ. Ling. Sept.

But the converſion of the Saxons to Chriſtianity, which happened before the ſeventh century, entirely baniſhed the common uſe of thoſe characters, which were eſteemed unhallowed and necromantic; and with their ancient ſuperſtitions, which yet prevailed for ſome time in the popular belief, aboliſhed in ſome meaſure their native and original vein of poetical fabling. They ſuddenly became a mild and poliſhed people, addicted to the arts of peace and the exercise of devotion; and the poems they have left us are chiefly moral rhapſodies, ſcriptural hiſtories, and religious invocations, intermixed even with frequent alluſions to the old Scaldic fables and heroes. See SCALDS.

We may here obſerve, that the enchantments of the Runic poetry are very different from thoſe in our romances of chivalry. The former chiefly deal in ſpells and charms, ſuch as would preſerve from poiſon, blunt the weapons of an enemy, procure victory, allay a tempeſt, cure bodily diſeaſes, or call the dead from their tombs; in uttering a form of words, or inſcribing Runic characters; whereas the magicians of romance are chiefly employed in forming and conducting a train of deceptions. In the incantations of the former there is an air of barbaric horror: the latter often preſent viſions of pleaſure and delight; and although not without their alarming terrors, ſometimes lead us through flowery foreſts, and raiſe up palaces glittering with gold and precious ſtones. The Runic magic is more like that of Canidia, in Horace; the romantic reſembles that of Armida, in Taſſo. The operations of the one are frequently but mere tricks, in compariſon of that ſublime ſolemnity of necromantic machinery, which the other ſo awfully diſplays.

In the tenth and eleventh centuries the Runic gave way to the Roman character; till at length the miſſionaries ſucceeded in totally aboliſhing them, as tending to retain the people in their ancient ſuperſtitions. It is ſaid that the Goths, when they became Chriſtians, manifeſted a blind and indiſcreet zeal in deſtroying ſeveral ancient monuments, and burning a great number of books, becauſe they were written with thoſe characters; and that about the year 1001, the Runic characters were quite laid aſide in Sweden, and the Roman letters taken in their room, the Swedes being perſuaded to adopt this meaſure by the pope, and by Sigfrid, a Britiſh biſhop. In Spain they were forbidden in 1136 by Alphonſo, king of Caſtille and Navarre, and condemned by the council of Toledo in 1115. They are, however, ſtill retained among the mountaineers of one province in Sweden. Mallet's Northern Ant. vol. i. p. 359, &c.

It is ſuppoſed they were called Runic, as being myſterious and ſcientifical, like the Egyptian hieroglyphics. See Wormius de Literatura Runica; and Hickes's Theſaurus of the ancient Northern Languages.

In ſeveral parts of Sweden, ſtones may be met with, which were formerly ſet up as obeliſks in memory of the dead; and theſe monuments are marked with the ancient northern letters called *Runor*, or the Runic characters. In ſome places the characters vary from the Runic, particularly in free-ſtones found in Helſingland, of which Mr. Celſius has given us a deſcription, with an explanation. See Philoſ. Tranſ. N° 445. ſect. 3.

From theſe Helſingland inſcriptions an alphabet of ſixteen letters may be derived, which is very ſingular. In other alphabets different ſounds are generally denoted by different figures; but here the ſame character, according to the diverſity of its place and altitude between two parallels, denotes different ſounds.

But theſe characters, however different they may appear at the firſt ſight from the Runic, may eaſily be derived from them; or, *vice verſâ*, the Runic may be derived from the Helſingic, if theſe be ſuppoſed the moſt ancient. The ſubtraction of a perpendicular line in the firſt caſe, or its addition in the latter, brings the two characters to a near reſemblance.

The inſcription, which Mr. Celſius conſiders, was publiſhed in Monſ. de la Motraye's Travels, but erroneouſly.

RUNIC *Staffs* were a kind of calendars or compendious almanacs uſed in the North, marked out by lines upon ſhort pieces of board or ſmooth ſticks; ſome of which bear the appearance of great antiquity. They were called, in the North, *rim-ſtocks* and *prim-ſtaffs*; and exhibited, by different lines or marks, the faſts and feſtivals, the golden number, Dominical letter, epact, &c. Dr. Plot, in his Hiſtory of Staffordſhire, p. 418, &c. deſcribes one of theſe inſtruments under the name of a *clog*, and illuſtrates the conſtruction of it by a figure. He obſerves, that this kind of almanac is a remain of the Daniſh government, and that it was ſtill in uſe amongſt the meaner ſort of people. Thoſe which he met with in Staffordſhire had only the prime and immoveable feaſts upon them; whereas others of a more perfect kind, preſerved in the cabinets of the curious, have likewiſe the Dominical letters. And of thoſe imperfect ones there are two kinds; ſome public, of a larger ſize, which were commonly hung at one end of the mantle-tree of the chimney, for the uſe of the whole family, as Wormius informs us they diſpoſed of them in Denmark; and others private, of a ſmaller ſize, which they carried in their pockets. This chronological inſtrument is ſometimes, by an evident corruption, called *runſtock*.

RUNJETZ, in *Geography*, a town of Bohemia, in the circle of Chrudim; nine miles N. of Chrudim.

RUNIUS, JOHN, in *Biography*, one of the moſt celebrated of the Swediſh poets, was born at Weſt Gothland in 1679. Having received the early parts of his education at Skara, he went, in 1700, to Upſal, and after completing his ſtudies, was appointed by count Stromberg to be his ſecretary. He died at Stockholm of a conſumption in 1713, in the 35th year of his age. He is ſaid to have written Swediſh poetry at the age of 18, which diſplayed great beauty, and afterwards produced a variety of pieces on different ſubjects, which added very greatly to his poetical fame. He wrote with ſo much care, and his verſification is ſo ſmooth and pleaſing to the ear, that he is accounted by the Swedes one of the moſt ſucceſsful of their poets. "Some of his poems are ſaid to be very excellent, but many of them bear evident marks of careleſſneſs and haſte, for he experienced the common lot of genius, having been doomed, throughout life, to ſtruggle with all the ills of poverty; and his diſtreſſes would have preſſed upon him much heavier, had he not been frequently relieved by count Stromberg." His poems, which he began to collect in his life-time, when he found that they were in general requeſt, were publiſhed, after his deceaſe, under the title of "Dudaim," Stockholm, 1714, in two parts; the firſt contains ſacred poems, and the ſecond epithalamia, epitaphs, and congratulatory odes. In 1733 both parts were reprinted, with the addition of a third, containing pieces on different ſubjects, among which were ſeveral poems written in Greek, French, and German. Gen. Biog.

RUNKEL, in *Geography*, a town of Germany, in the county of Wied-Runkel, ſituated on the Lahn, and conſiſting

ſiſting of about 120 houſes. It has a citadel belonging to it, ſeated on a high hill, which was formerly the reſidence of the counts. The ſubſiſtence of the inhabitants is derived from agriculture, gardening, and the breeding of cattle. In the year 1634, this town was plundered and reduced to aſhes by the Croats; 14 miles E. of Naſſau. N. lat. 50° 23′. E. long. 8° 7′.

RUNN, a lake of Sweden, in the province of Dalecarlia; four miles S. of Fahlun.

RUNNAGAUT, a town of Bengal; 15 miles S. of Kiſhenagur.

RUNNEAH, a town of Hindooſtan, in Candeiſh; four miles N.E. of Peploud.

RUNNEL, in *Rural Economy*, a term ſignifying a ſort of rill.

Runnel is alſo uſed to ſignify pollard wood.

RUNNER, in the *Sea Language*, a rope belonging to the garnet, and to the two bolt-tackles. It is reeved in a ſingle block, ſeized to the end of a pennant, and has at one end a nooſe to hitch into any thing, and at the other end a double block, into which is reeved the fall of the tackle, or the garnet; by which means it purchaſes more than the tackle or garnet could allow.

To *overhale the runner* is to pull down the hooked end, and hitch it into the ſling.

RUNNET. See Rennet.

Ariſtotle will have the runnet to be the proper ſubſtance of the milk; but he is miſtaken when he ſays it is found in all animals which give milk, eſpecially in all ruminants.

RUNNING, in *Antiquity*, made one of the exerciſes performed in the *pentathlon*, (which ſee,) or quinquertium. See Race and Stadium.

This exerciſe was in ſo great eſteem among the ancient Greeks, that ſuch as prepared themſelves for it, thought it worth their while to burn, or parch their ſpleen, becauſe it was believed to be a hindrance to them.

Indeed, all thoſe exerciſes that conduced to fit men for war, were more eſpecially valued; and that ſwiftneſs was eſteemed ſuch in an eminent degree, appears from Homer's giving his hero the epithet of ωοδας ωκυς Αχιλλευς.

Running *of the Eyes*, in infants. See Infant.

Running-*Fights*, at ſea. See Fights.

Running-*Fire*. See Fire.

Running *out a Warp*, in *Sea Language*, the act of carrying the end of a rope out from the ſhip in a boat, and faſtening it to ſome diſtant place, to remove the ſhip towards the ſaid place, or keep her ſteady while her anchors are lifted, &c.

Running-*Rigging* denotes all that part of a ſhip's rigging which paſſes through the blocks, to dilate, contract, or traverſe the ſails. See Rigging.

Running *the Gauntlet*, in *Military Language*. See Gantlope.

Running *of Goods*, a clandeſtine landing of goods, without paying the legal cuſtoms or duties for the ſame. See Smuggling.

Running-*Saddle*. See Saddle.

Running-*Thruſh*, or *Fruſh*, in *Farriery*, denotes an impoſthume, that ſometimes gathers in a horſe's frog; or a ſcabby and ulcerous diſpoſition which ſometimes cauſes it to fall off. When this diſcharge is natural, the feet ſhould be kept merely clean. When an impoſthume appears, the ſafeſt courſe is to pare out the hard part of the frog, or that which appears rotten, and to waſh the bottom of the foot three times a day with old chamber-ley. But if a horſe has been neglected, and there be a ſtrong flux to the part, it will be neceſſary, in order to prevent its degenerating into a canker, to bathe the thruſh with the following lotion, laying over the ulcer a little tow dipped in the ſame, and uſing the purges and diuretics recommended in the greaſe. Take ſpirit of wine and vinegar, of each two ounces; tincture of myrrh and aloes, one ounce; Ægyptiacum, half an ounce; and mix them together. See Bartlet.

Running, in *Rural Economy*, a provincial term ſignifying rennet, or the coagulum made uſe of in cheeſe-making.

Running *Bull*, in *Agriculture*, a term applied to the part of a harrow where the draught is attached in ſome caſes. See Harrow.

RUNNO, in *Geography*, an iſland near the E. coaſt of Sweden, in the Baltic. N. lat. 57° 51′. E. long. 16° 33′.

RUNNODE, a town of Hindooſtan, in the Malwa country; 30 miles N.W. of Chanderee. N. lat. 25° 7′. E. long. 78° 15′.

RUNNYMEAD, or Runnemead, a tract of land on the ſouth bank of the river Thames, in the pariſh of Egham, and county of Surrey, England, is celebrated in hiſtory for the ever memorable conference which occurred here between king John and his barons, in the year 1215. In that conference the articles of Magna Charta, or the Great Charter, as it is called, by way of eminence, were agreed upon; and on the 15th of June the ſame was formally ſigned and ſealed by the monarch, and a copy of it ordered to be depoſited in the record office of each county. A ſmall iſland in the Thames, adjoining the Mead, ſtill retains the appellation of Magna Charta iſland, from a tradition that the charter was actually ſigned on that ſpot. There is at preſent a houſe upon it, and a ferry for foot paſſengers to Ankerwyke. It is ſaid that Runnemead was uſed, in Saxon times, for holding councils. If ſo, obſerves Mr. Bray in "The Hiſtory and Antiquities of the County of Surrey," its name may have been derived from the Saxon word "Rune, ſignifying council, the council mead." It contains about 160 acres of ground, tithe free, and is the property of ten perſons, who have the ſole uſe of it from March to the 12th of Auguſt, when it becomes common to all the pariſhioners of Egham, who turn out upon it an indefinite number of cattle; but in the laſt week of the ſame month it is appropriated as a race courſe, in conjunction with ſome adjoining incloſed lands, which are thrown open for the occaſion. Near Runnymead are two meadows, called Long-mead and Yard-mead, to the ſouthward of which the land riſes to a ridge of hills, one of which, called Cooper's hill, has been immortalized by the ſtrains of the poet Denham. The Roman road from London to Silcheſter paſſed through Runnymead. The Hiſtory and Antiquities of the County of Surrey, by the Rev. Owen Manning, continued by W. Bray, eſq. F.S.A., of Shire, vol. iii. Lond. 1814, fol.

RUNO. See Ruun.

RUNOR. See Runic.

RUNRIG, in *Agriculture*, an ancient inconvenient diſtribution of common field land, by which ſmall portions or ridges of land were let to different individuals in a mixed manner.

The circumſtances of land being diſtributed in alternate ridges as the property or poſſeſſion of different tenants or holders, was unqueſtionably a conſequence of early farming townſhips. It is a ſort of arrangement which muſt have firſt taken place on account of ſome imperfect and confuſed notion or intention of doing juſtice in an equal manner to all the tenants or holders of land in ſuch farming villages, by allotting to, or beſtowing upon, every one of them the ſame number of ridges near their houſes, and an equal number in remote ſituations. And in order to render the abſurdity of ſuch a mode of holding and occupying land ſtill more prepoſterouſly complete, if poſſible, ſuch ridges were,

in many cases, not unfrequently exchanged; so that one tenant possessed, in the succeeding year, the land which was held or occupied by his neighbour the preceding one.

It is remarked, that in many parts of the highlands of Scotland, the land under this distribution has been first ploughed, without leaving any boundaries, except the furrows between the ridges; then the field was divided, by putting small branches of trees into the ground, in order to mark off every tenant's portion before the field was sown. No man knew his own land until the seed was to be put into the ground; and it became almost impossible for him to have the same portion of land any two successive years. This is a mode of division, it is supposed, which is analogous to that which Cæsar has asserted to have prevailed among the ancient Gauls; which must absolutely debar the very least improvement.

This inconvenient and improper method of proceeding was greatly fostered by the feudal notions of the times; in which he that could muster the greatest number of retainers, generally constituted to himself the greatest estate. But in the present times nothing can be more absurd than to see two or three, or perhaps four men, yoking their horses together in one plough, and having their ridges alternately in the same field, with or without a bank of unploughed land between them, by way of boundary. These diminutive possessions, it is said, were carried to such a length, that in some parts of Scotland, towards the northern extremity, the term a *horse's foot*, the sixteenth part of a plough-gate of land, is not yet wholly laid aside. The land is stated to be like a piece of striped cloth, with banks full of weeds and ridges of corn in constant succession, from one end of a field to the other. Under such management, all such occupiers or possessors must have concurred in one opinion with regard to the time and manner of ploughing every field, the kind of grain to be sown, the season and weather fit for sowing, and whether they and their horses were to be employed or idle. So late as even thirty or forty years ago, this practice is stated to have prevailed, not only over the greater part of the county of Perth, but, with very few exceptions, over all other parts of Scotland. Since that period, however, it has been, it is said, gradually going into disuse; and that the benefit of laying it aside entirely is so apparent, that any remains of the runrig system, which may still be met with, must soon give way and disappear, except, it is supposed, where the landlord is as much a Goth as his tenants.

When the various avocations, which these tenants must have, and the frequent jarring animosities which must necessarily arise in a close neighbourhood, where opposite interests are constantly interfering, are fully considered, it is supposed impossible to expect, that under such a system any species of improvement can be undertaken or carried on. In short, townships and runrig are supposed such obstacles to improvement, and bolt the door so firmly against all good cultivation, that it cannot have the least entrance; they are consequently greatly destructive of all good management; and besides, hold the people in the chains of idleness and poverty wherever they may be found to prevail. It is only by the proper separation, division, and inclosure of land into distinct portions, whether small or large, for each individual tenant, occupier, or proprietor, that it can be cultivated and improved in the best manner, and to the greatest advantage.

RUNSH, in *Husbandry*, a term provincially applied to the troublesome weed wild mustard or charlock.

RUNSTYCKEN, or Ore, in *Commerce*, a money of account in Sweden, being the twelfth part of the skilling, and 48 skillings being = a rikfdaler. Also a copper coin, of 1 ore koppar and half runstycken: the other copper coins are single and double slants, at 1 and 2 ore silver, or 3 and 6 ore koppar: 96 double slants, 192 single slants, or 576 runstycken, are to pass for 1 specie rikfdaler; but in large payments, no person is obliged to take more copper coin than the value of half a rikfdaler. Un. Camb.

RUNT, the name used, with the distinction of places, for several species of pigeons. These are the Leghorn, the Spanish, the Friesland runt, &c. The *columba domestica Pisarum, Hispaniæ, et Frisiæ*, of Moore.

The Leghorn runt is a stately large pigeon, seven inches or better in the legs, close-feathered, and fast fleshed, extremely broad-breasted, and very short in the back. He carries his tail, when he walks, somewhat turned up like a duck's; his neck is longer than any other pigeon's, and he carries it bending, like a goose or swan; he is goose-headed, and his eye lies hollow in his head, with a thin skin round it, like that of the Dutch tumbler; his beak is very short for so large a bird, and has a small wattle on it, and the upper chap falls a little over. It is a very valuable pigeon, but is tender, and requires care.

The Spanish runt is the longest bodied of all the pigeons; it is short-legged and loose-feathered, and does not walk so upright as the Leghorn runt. These are of a great variety of colours, but are apt to have accidents in sitting, from their sitting too heavy, and often breaking their eggs.

The Friesland runt is a large pigeon, and has all its feathers reverted, or looking as if placed the wrong way.

The Roman runt is a pigeon of the same general make with the common kind, but so large and heavy, that it can hardly fly.

The Smyrna runt is middle-sized, and is feather-footed, and that to such a degree sometimes, as to look as if there were wings upon the feet; the feathers of these are sometimes four or five inches long, and often pull the eggs and young out of the nests.

The common runt is the common blue pigeon, kept for the table, and known to every body. Moore's Columb. p. 42. See Pigeon.

Runt is also a name given to Canary-birds, when three years old. See Canary-*Bird*.

Runt, in *Rural Economy*, a name given to a small kind of black cattle brought from Wales and Scotland.

But though this term be most usually applied to the small cattle of Wales and Scotland, it is not unfrequently employed in describing the properties and qualities of the smaller, and mixed English breeds, especially those which have a stiff compact, runt-like appearance, and which, in their feeding and their habits, have considerable resemblance to them. This sort of cattle stock is often very suitable for grazing farmers, in districts where the pastures are of the inferior kinds, and for feeding out on the artificial grass-pastures, where a large stock is wanted which will soon become fit for the butcher.

RUPALA, in *Botany*, Willd. Sp. Pl. v. 2. 536. Mart. Mill. Dict. v. 4. See Rhopala and Roupala.

RUPAS, in *Geography*, a town of Hindoostan, in Bahar; 18 miles S. of Hajypour.

RUPEE, Roupie, or *Roupias*, in *Commerce*, a money of account, and also a coin in various parts of the East Indies. During the prevalence of the Mogul power in Hindoostan, one principal coin, denominated the "sicca rupee," was every where current: it was of a determinate weight, called the "sicca," which served as a standard for other weights. The principal piece of gold was the "Mohur," which was of the same weight as the sicca rupee; and both were intentionally minted without any alloy. The same denominations of money are still current in India; but they differ from each other, and have deviated from their original purity. The

The Eaſt India Company have adhered to it as nearly as poſſible; but the monies of ſome of the native princes, which are of a high degree of fineneſs, are ſubject to frequent alterations; ſo that aſſayers and money-brokers, under the appellations of "ſhroffs, are appointed to ſet a value upon the different coins that are offered in payment.

The principal money of account in India is the "current rupee," to which real coins are reduced before they are entered into books of accounts. This reduction is performed by adding to the ſpecies a certain per-centage, called the "Batta," and varying according to the value of the coins, and alſo to the rate of exchange.

In Bengal, or Calcutta, accounts are kept in current rupees; each rupee being divided into 16 annas, and each anna into 12 pice. The Eaſt India Company, however, keep their accounts in ſicca rupees, annas, and pice, which bear a batta of 16 *per cent.* againſt current rupees, annas, and pice; and in their public and financial ſtatements, which are ſubmitted to parliament, each ſum of ſicca rupees is reduced to current rupees, by adding to it this batta; and the current rupee is then reckoned at 2*s.* ſterling. The Bengal coins, ſtruck at the Calcutta mint, are ſicca rupees, called alſo ſilver rupees, and gold mohurs, ſometimes called gold rupees; 16 of the former being, by regulation, to paſs for one of the latter. Thirty-two punns, or 2560 cowries, are generally reckoned for a current rupee; but the value of cowries fluctuates, nor are they conſidered as a legal tender above the value of 1 anna piece, without mutual conſent of parties. A lack of rupees is a ſum of 100,000, and a crore is 100 lacks, or 10,000,000 of rupees.

The ſicca rupee is to weigh 1 ſicca, correſponding to 179$\frac{2}{3}$ Engliſh grains, and to be 11 oz. 15 dwt. fine; thus it ſhould contain 175.927 grains of fine ſilver, and its value is 24$\frac{1}{2}$*d.* ſterling, or, more accurately, 24.566*d.* Theſe rupees were formerly called ſicca, only during the firſt year after their coinage, when the batta they bore on current rupees was 16 *per cent.*; the ſecond year this was reduced to 13; and the third and following years, the batta was 11 *per cent.* They were then called "ſonaut" or "ſunat" rupees. But by way of aboliſhing this diſtinction, all the rupees coined of late years by the Eaſt India Company have been dated the 19th ſun, that is, the 19th year of the Mogul emperor's reign; and thus all the rupees of the above weight and fineneſs are conſidered of equal value, in whatever year they may have been coined.

According to theſe regulations, the current rupee is worth 21.177*d.*, valuing ſilver according to the mint price in England; but the market price in India is generally much higher, making this rupee worth 2*s.* nearly, and the ſicca rupee about 2*s.* 6*d.* In the Company's books, 243 current rupees are valued at 100 dollars.

In the upper provinces of Bengal, there is another rupee, ſtruck at the Ferruckabad mint, which weighs 173 grains, and contains 165.215 grains of pure ſilver; and therefore its ſterling value is 23*d.* nearly.

The ſilver coins at Madras or Fort St. George are "Arcot" rupees. Each of theſe weighs 176.4 grains, and contains 166.477 grains of fine ſilver; and therefore its ſterling value is 23$\frac{1}{4}$*d.* It is divided into 12 annas and 192 pice, like the other rupees.

At Bombay accounts are kept in rupees; each rupee being divided into four quarters, and each quarter into 100 reas. The rupee is alſo divided into 16 annas. An urdee is two reas; a doreca, 6 reas; a dooganey, or ſingle pice, 4 reas; a fuddea, or double pice, 8 reas. A paunchea is 5 rupees, and a gold mohur, 15 rupees. The annas and reas are only imaginary monies.

The coins of Bombay are the mohur, or gold rupee; the ſilver rupee and its half; alſo the double and ſingle pice, the urdee, and doreca, which are copper coins, with a mixture of tin or lead. The old Bombay rupee was the ſame as that formerly coined at Surat under the Mogul: it weighed 178.314 Engliſh grains, and contained 1.24 *per cent.* of alloy. It was agreed that both ſhould circulate at an equal value, and the coin be kept to its exact ſtandard of weight and fineneſs. At length, in 1800, the Company found it expedient to order the Surat rupee, which had been debaſed by an augmentation of alloy, to be ſtruck at Bombay; and ſince that period, the rupees of both places have been kept at an equal value, weighing 179 Engliſh grains, and containing 164.74 grains of fine ſilver, which anſwer to 11 oz. 1 dwt. fine; and thus they are worth 23*d.* ſterling.

In the Company's financial accouuts, which are ſubmitted to parliament, the Bombay rupee is reckoned at 2*s.* 3*d.*, and then it bears a batta of 16 *per cent.* againſt current rupees, though in the tables the batta is ſtated at 10 *per cent.* It was ſettled in 1800 that the mohur ſhould be of the ſame weight and fineneſs as the ſilver rupee, and that it ſhould paſs for 15 ſuch rupees.

At Anjengo, on the Malabar coaſt, a ſilver rupee is worth, 7 old fanams, or 6 new ones, called gallon fanams: the fanam is 12 pice, or 16 vis; and a pice 4 budgerooks: all theſe are real coins. In the Company's accounts, an Anjengo fanam is reckoned to be worth $\frac{4}{5}$ths of a Calicut fanam, or $\frac{1}{5}$th of a Surat rupee, which gives its intrinſic value about 4$\frac{3}{4}$*d.* ſterling. At Calicut, 5 fanams are commonly reckoned for one rupee. The fanam is a ſmall gold coin, with a conſiderable alloy of ſilver and copper, and the tar ($\frac{1}{16}$th of the fanam) is a ſmall ſilver coin. The Calicut fanams have been found, by aſſays made at Bombay, to contain 52$\frac{1}{2}$ parts of gold, 29 of ſilver, and 17$\frac{1}{2}$ of copper. They are worth 6*d.* ſterling. At Cambay, on the Malabar coaſt, accounts are kept in rupees of 48 pezas. The rupee is worth about 2*s.* ſterling. A Venetian ſequin paſſes here for 5 rupees; a Perſian abaſſi for 1$\frac{1}{17}$ rupee; and a Perſian mamoodi for 24 pezas. At Cochin, accounts are kept in rupees of 16 annas. Theſe are reckoned of equal value to the Surat rupees. Accounts are alſo kept in fanams, 20 of which are generally reckoned for a rupee.

At Mangalore, accounts are generally kept in ſultanny pagodas, rupees, and annas; the pagoda being 4 rupees, and the rupee 16 annas. At Maſulipatam, accounts are kept in pagodas, rupees, and annas. The pagoda is 3$\frac{1}{2}$ ſilver rupees, and the rupee 16 annas. The coins are gold rupees, weighing 171$\frac{1}{3}$ Engliſh grains, about 23$\frac{3}{4}$ carats fine, and worth 1*l.* 10*s.* ſterling; pagodas of nearly the value of the ſtar pagoda of Madras; and ſilver rupees, 24$\frac{1}{4}$ of which weigh a ſeer, or 4293 Engliſh grains, and the fineneſs of theſe rupees is 11 oz. 12$\frac{1}{2}$ dwt. The value is, therefore, 23$\frac{1}{2}$*d.* ſterling.

The coins of the Myſore country are gold mohurs, paſſing for 4 pagodas; ſultany pagodas, and other pagodas, all paſſing for 13 fanams; and alſo ſultany fanams and cantery fanams, two ſmall gold coins of baſe alloy. Alſo ſultany rupees, and rajah rupees, 26 of which paſs for 7 ſultany pagodas; copper dudus, called by the Engliſh dubs: 260 dudus are the market price for a ſultany pagoda. The ſhroffs, in exchanging copper for gold or ſilver, pay at the rate of 234 dudus for a pagoda; but in changing gold and ſilver for copper, they receive 240; whilſt the price fixed by government is 182 dudus *per* pagoda. The ſultany rupee weighs 177 grains, and is 11 oz. 5$\frac{1}{2}$ dwt. fine; and is therefore worth 23$\frac{1}{4}$*d.* ſterling nearly.

At Pondicherry, accounts are kept in pagodas of 24 fanams, and the fanam is ſubdivided into 60 caſh. The coins are gold pagodas, and ſilver rupees and fanams, mentioned

under Madras rupee; alſo copper caſhes, and dudus, a copper coin, 20 of which are reckoned to a fanam. Gold and ſilver are weighed by the ſeer, pagoda, rupee, and fanam. A ſeer weighs 24⅛ rupees, 81¼ pagodas, or 731¼ fanams. A rupee weight equals 30 fanams, or 480 nellos; a pagoda weight, 9 fanams, or 144 nellos. Thus 3 rupees are equal in weight to 10 pagodas.

At Scindy, the coins current are ſilver rupees of 16 annas, or 48 copper pice. At Surat, accounts are kept in rupees of 16 annas, or 64 pice. The coins are mohurs or gold rupees, and ſilver rupees, with halves and quarters. A gold rupee paſſes for 15 ſilver rupees. Here are alſo pezas or pice, of copper or lead, 64 of which are reckoned to one ſilver rupee. See the coins under Bombay, *ſupra*.

At Tranquebar, accounts are kept in rixdollars of 12 fanams, and alſo in rupees of 8 fanams; and the fanam is divided into 80 caſh. The coins are ſilver rupees, double and ſingle fanams, and copper dudus or caſh. Rupees are here coined under ſuch regulations, that 1302 of them are worth 600 old Spaniſh dollars, weighing 43 lb. 7 oz. 2 dwt. troy. The value of the Tranquebar rupee is therefore 24⅛ *d.* ſterling.

The following Table ſhews the Aſſay and Value of Rupees.

	Aſſay.			Weight.		Contents in pure Silver.	Value in Sterling.	
		oz.	dwt.	dwt.	gr.	grains.	s.	d.
Rupee of Mohammed Shah	B.	0	6½	7	9¼	168.7	1	11½
Rupee of Ahmed Shah	B.	0	12	7	9¼	172.8	2	0¼
Rupee of Allum Ghir (1759)	B.	0	13	7	11½	176	2	0½
Rupee of Shah Allum (1772)	B.	0	14	7	10	175.1	2	0¼
Rupee of the ſame (Benares 1774)	B.	0	8	7	6¾	167.5	1	11¼
Rupee of the ſame (1779)	B.	0	14½	7	11½	177.4	2	0¾
Rupee, Sicca, coined by the Eaſt India Company at Calcutta, and dated the 19th year of the emperor's reign	B.	0	13	7	11½	175.8	2	0½
Rupee, Arcot (1759)	B.	0	7	7	9¼	170	1	11¾
Rupee, Arcot (1782)	B.	0	8	7	6	166.8	1	11¼
Rupee, Arcot (1788)	B.	0	8	7	9¼	169.8	1	11¾
Rupee, Arcot, of the lateſt coinages	B.	0	4½	7	8½	166.5	1	11¼
Rupee, Bombay, old	B.	0	13	7	10½	174.6	2	0½
Rupee, Bombay, new, or Surat	W.	0	1	7	11	164.8	1	11
Rupee, Lucknow	B.	0	8¾	7	5¼	166.5	1	11¼
Rupee, Sultanny	B.	0	3½	7	9	166.2	1	11¼
Rupee, Madepoor or Nowſee	W.	0	5	7	5¾	158.2	1	10
Rupee, Madras Rajapoor	B.	0	4	7	7	164.8	1	11
Rupee, Jeypoor	B.	0	12	7	7	170.6	1	11¾
Rupee, Furruckabad Sicca	B.	0	7½	7	5	165.2	1	11
Fanam, Cannanore	W.	0	1¼	1	11¾	32.9	0	4½
Fanam, Bombay, old	B.	0	13	1	11¾	35	0	4¾
Fanam, Pondicherry	B.	0	5½	1	0½	22.8	0	3¼
Fanam, Pondicherry, double	W.	0	3	1	18¾	39	0	5½
Rupee, Chanderry	W.	0	0¾	7	5	159.5	1	10¼
Rupee, Oukery	W.	1	0½	7	7	146.9	1	8½
Rupee, Shree Sicca of Poona	W.	0	1½	7	4½	158.5	1	10
Rupee, Halee Sicca	B.	0	12½	7	7¼	171.2	2	0
Rupee, Ougein	B.	0	5	7	6¼	166.8	1	11¼
Rupee, Maiſore or new Holkar	B.	0	7	7	5	165.1	1	11
Rupee, Indore Holkar	B.	0	4¼	7	5	164	1	10¾
Rupee, Chinſouree	B.	0	2	7	4¾	159.7	1	10¼
Rupee, Broach, old	W.	0	0½	7	10	170.8	1	11¾
Rupee, Broach, new	W.	0	10	7	10	157.3	1	10
Rupee, Brodera, old	W.	0	4½	7	10½	162.7	1	10¾
Rupee, Brodera, new	W.	0	10¼	7	10½	157.3	1	10
Rupee, Ana Sai, coined at Caira	W.	0	10¾	7	8¼	155.1	1	9¾
Rupee, Ana Sai, coined at Pitlad	W.	0	17½	7	9¼	151	1	9
Rupee, Amedabad Sicca	W.	0	7½	7	10	160	1	10¼
Rupee, Mungull Sai	W.	0	10¼	7	10½	157.2	1	10
Rupee, Mumo Sai	W.	0	8¾	7	9¾	157.6	1	10
Rupee, Seea Sai (coined in Futty Sing's time)	W.	0	9½	7	7¾	155.6	1	9¾
Rupee, Cambay	W.	0	18½	7	10	151	1	9
Rupee, Perſian (1745)	B.	0	13	7	9¼	175.4	2	0½
Rupee, Perſian (1789)	B.	0	12½	7	10	175.3	2	0½
Larin	B.	0	10½	3	2½	72.1	0	10
Buſſora Crux	W.	0	0¾	11	16	118.1	1	4½

The inſcriptions on the ſilver coins of the Eaſt Indies are as follow:

The ſicca rupee has the legends nearly the ſame as on the mohur, and may be thus tranſlated: "Struck in the ſeven climates (date of the Hegira), by the ſhadow of God's favour, Shah Allum king, diſciple in the faith of Mahomet;" and on the other ſide, "Struck at (name of the place), in the 19th year of the auguſt and glorious reign of the emperor," &c. Some rupees do not bear the date of the Hegira, but only that of the emperor's reign; and all the rupees ſtruck in Bengal of late years, at the Company's mint, have been dated the 19th year of his reign, as above.

The Arcot rupee has on one ſide, "Bleſſed coin of the conquering king" (the name); on the other ſide, "Struck at Arcot in the year —— of the reign," and the date of the Hegira. But it may be obſerved, that in theſe and many other rupees, except ſuch as are coined by the Eaſt India Company, the legends are often illegible, owing to the edge being clipt or worn, or to the piece being too ſmall to receive the impreſſion.

The rupee of the Dutch Eaſt India Company has on one ſide, "Coin of the company of Holland," and the date of the Chriſtian era; on the other ſide, "In the great iſland of Java."

The ſultany rupee of Tippoo bears the ſame impreſſions and legends nearly as Tippoo's mohur.

The rupee of Perſia, or piece of 10 mamoodies, has various legends. Some bear the ſovereign's name, as "Sultan Shahrokh;" and on the other ſide, "May God prolong his reign, coined at" (the name of the place and date of the Hegira). On other rupees, the king of Perſia ſtyles himſelf "The ſervant of the monarch," that is, of the Iman Riza, the head of their religion, whom the Perſians conſider as the real ſovereign of their empire; and the coins are often ſtruck in the name of the Iman Riza, with this legend, "By the divine decree, the coin of happy omen has been ſtruck in the name of Ally Riza, ſon of Muſa;" and on the other ſide, "There is no God but God, Mahomet is the apoſtle of God, Ally is the favourite of God, ſtruck at ——," with the date of the Hegira.

The ſilver fanam of Pondicherry bears on one ſide ſeveral flower de luces; and on the other, various flowers, dots, and lines, without any inſcription.

The larin is a ſilver wire about half an inch in length, doubled up, and flattened on one ſide to receive the impreſſions of ſome characters. It was firſt made in Arabia, and has become ſcarce, but is ſtill uſed as money of account.

The mohur, or gold rupee, (coined under the reign of the emperor Shah Allum, which began in 1770,) has on one ſide, "He who is the ſhadow of God's favour, the protector of the religion of Mahomet, the emperor Shah Allum, coins money for the ſeven climates," with the date of the Hegira; on the other ſide, "Struck at —— the year —— from the happy acceſſion." Some mohurs have only, on one ſide, "Coin of the emperor Shah Allum," with the date of the Hegira; and on the other, the year of the reign. The coins ſtruck by the Eaſt India Company bear the name of the Mogul emperor; and thoſe minted of late years are dated the 19th year of the emperor's reign, and the number 19 is viſible on ſome part of the piece.

The mohur of Tippoo has on one ſide, "The faith of Mahomet, the moſt excellent in this world, is ſupported by the ſplendour of the victories of Hyder. Hyder! exalted in equity; ſtruck at Seringapatam, the year pre-eminent in proſperity," with the date of the Hegira. On the other ſide, "He alone is the equitable ſultan; the epoch of the acceſſion was a year of happy omen," with the date of the reign. Some of Tippoo's coins are dated according to an Indian era, which is divided into cycles of 60 years each; of which cycles 81 are ſuppoſed to be now elapſed.

The faruki, or quarter mohur of Tippoo, has on one ſide, "Mahomet, he is the only and right ſultan," with the date; and on the other ſide, "Faruki, ſtruck at Pattan" (Seringapatam), with the date of Tippoo's reign, and a Perſian H, the initial of Hyder.

The zodiacal rupees are pieces of twelve different impreſſions, repreſenting the twelve ſigns of the zodiac. They were coined between the years 1616 and 1624 of the Chriſtian era, by Jehangeer, and have been long out of circulation. They are, however, much ſought after, and highly valued as objects of curioſity. Each ſign, or figure, is ſurrounded by rays repreſenting the ſun; and on the reverſe is the following inſcription: "This ornamented coin in Agra found its face (received its impreſſion) in the year —— from the ſovereign Jehangeer, ſon of king Akber."

The zodiacal rupees are exceptions to the Mahometan law, which forbids the repreſentation or emboſſment of figures; but it is ſaid that Jehangeer had little reſpect for his religion; and it is further ſtated by ſome writers, that his favourite queen, Nur Mahal, had obtained permiſſion to reign for one day, (others ſay for one year,) and that ſhe cauſed theſe coins to be ſtruck, to perpetuate the memory of her ſhort reign. This account, however, cannot be quite correct, as the dates of theſe rupees are different.

We ſhall here add, that, in the buſineſs of exchange, London draws on Bengal in current rupees at 2*s.* more or leſs, or in ſicca rupees at 16 *per cent.* above current; alſo on Madras in pagodas at 7*s.* 6*d.* more or leſs; and on Bombay in rupees at 2*s.* 2*d.* more or leſs.

Such bills are moſtly at 60 or 90 days ſight: but bills from thoſe places on London are generally drawn at 6, 9, or 12 months ſight; in which caſe, the ſicca rupee is valued at 2*s.* 6*d.*, the pagoda at 8*s.*, and the Bombay rupee at 2*s.* 4*d.* ſterling, more or leſs.

The bank of Bengal has been incorporated by a charter for ſeven years, granted under the governor-general in council, by virtue of the authority veſted in him by the act of the 47th of George III. ſec. 2. cap. 28.

The capital of the bank is 5,000,000 ſicca rupees, that is, 50 lacks. It is divided into 500 equal ſhares, 100 of which belong to the government, and the other 400 to individuals.

The buſineſs of the bank chiefly conſiſts in iſſuing notes, keeping caſh for others, diſcounting bills, and granting loans at ſhort periods, for the accommodation of merchants, and the general convenience of the public.

The notes of this bank are iſſued at ſums not leſs than 10 ſicca rupees, and not exceeding 10,000: they are paid off in ſpecie when preſented, and are therefore accepted as caſh in all tranſactions, although they have not been declared a legal tender, except in payments to be made to government at their general treaſury, and other offices of the preſidency; and likewiſe at the provincial treaſuries, but under certain conditions and limitations.

The intereſt of money in India fluctuates from 8 to 12 *per cent. per annum*, and it has been even higher; but the bank, which engages not to charge above 12, has already lowered the rate of intereſt, and has in many other reſpects rendered eſſential ſervice to trade and commerce. We are indebted for the materials of this article to the excellent work of Dr. Kelly, entitled the "Univerſal Cambiſt."

RUPEE, *Gold.* See MOHUR.

RUPELA, in *Geography*, a town of European Turkey, in the Morea; 12 miles S.W. of Corinth.

RUPELLENSIS SAL, *Rochelle Salt*, in *Chemiſtry*, a name given to a peculiar ſalt, invented by M. Seignette, apothecary, at Rochelle, and extolled as a very valuable medicine.

The preparation of it was kept a great ſecret, till Meſſrs. Boulduc and Geoffroy diſcovered and publiſhed its compoſition.

To prepare this ſalt, cryſtals of marine alkali are to be diſſolved in hot water, and into this liquor powdered cream of tartar is to be thrown. When the effervescence ceaſes, more cream of tartar is to be added, till the liquor is ſaturated; it is then to be filtered and evaporated; and very fine and large cryſtals may be obtained by cold, each of which is the half of a polygonous priſm cut in the direction of its axis.

The cryſtallization of this ſalt, according to M. Baumé, as well as of the vegetable ſalt, is much more eaſy and more beautiful, when the liquor, in which it is made, contains an exceſs of alkali, which does not prevent the ſalt from being exactly neutral, after it has been well drained.

The ſalt of Seignette has a ſaline taſte, moderately ſtrong, and diſagreeable. It retains much water in its cryſtallization, is ſoluble in a leſs quantity of hot water than of cold water, and becomes farinaceous in a dry air.

This ſalt is uſed only in medicine; being a good purgative, when taken from an ounce to an ounce and a half. It is diſſolved in pure water, or in ptiſans and mineral waters, to render them purgative. It is alſo given in ſmall doſes of one or two drachms, as an alterative, aperitive, and corrector of other purgatives. But, upon the whole, it does not differ much from ordinary ſoluble tartar. This is now known under the name of "tartrate of potaſs and ſoda," &c. &c. See SODA.

RUPELMONDE, in *Geography*, a town of France, in the department of the Two Nethes, at the union of the Ruppel and the Scheldt; 8 miles S.S.W. of Antwerp.

RUPENDA, a country of Africa, W. of Mocaranga.

RUPERSBACH, a town of Bavaria, in the principality of Aichſtadt; 3 miles N.W. of Aichſtadt.

RUPERSDORF, a town of Bohemia, in the circle of Konigingratz; 4 miles N.N.W. of Branau.

RUPERT, *Prince*, in *Biography*, third ſon of Frederic, elector palatine of the Rhine, and Elizabeth, daughter of James I., and he was, conſequently, nephew to king Charles I., was born in the year 1619. His education, like that of moſt German princes, eſpecially the younger brothers, qualified him for arms, and he was ſoon diſcovered to be extremely well fitted in reſpect to natural abilities, and acquired accompliſhments for a great commander. In his thirteenth year he accompanied the prince of Orange to the ſiege of Rhinberg, and ſo greatly diſtinguiſhed himſelf, that at the age of eighteen he was entruſted with the command of a regiment of cavalry. He was taken priſoner in the following year by the Imperialiſts, who detained him a conſiderable time. Having obtained his liberty, upon the ruin of the houſe-palatine in Germany, he came to England with his brother Maurice in 1642, and offered his ſervices to their relation Charles I., between whom and the parliament, war had juſt commenced. Through the whole war he behaved with great intrepidity; and on many occaſions his exertions were attended with very extraordinary ſucceſs. Almoſt at the outſet of the buſineſs he was placed at the head of a body of horſe, with which he immediately routed a part of lord Eſſex's cavalry, and eſtabliſhed his character for ſpirit and enterpriſe. At the ſubſequent fight at Edge-Hill he commanded the right wing of the royaliſts, with which he drove out of the field the parliament horſe; but, by an incautious purſuit, the king's infantry were left expoſed, and ſuffered ſeverely, ſo that the reſult was a drawn battle. In the next he proceeded into the weſt to join the Corniſh royaliſts: and afterwards he undertook the ſiege of Briſtol, which city he carried by aſſault. He was preſent at the battle of Newbery, where he broke the enemy's horſe; but was repulſed in his charge on their foot. The king, on account of his great ſervices, advanced him to the dignity of a peer of England, by the title of earl of Holderneſſe, and duke of Cumberland. In 1644 he relieved Newark, beſieged by the parliamentarians; after which, having collected a conſiderable force, he marched againſt the earl of Mancheſter, then inveſting York, and made a junction with the marquis of Newcaſtle. Contrary to the advice of that nobleman, he engaged the parliament army in a pitched battle at Marſton-Moor, and placed himſelf in the right wing. He was there oppoſed by Cromwell, and in the conflict prince Rupert's cavalry was put to flight. The final iſſue was a defeat of the royaliſts, which was, in fact, the commencement of the misfortunes that thenceforth attended the king's arms. In this action the courage of prince Rupert was ſignally diſplayed; but his precipitation, and want of attention to the marquis of Newcaſtle, were very much cenſured; he, however, redeemed his character by ſome ſpirited ſervices which he performed between this and the battle of Naſeby, in which he took a moſt diſtinguiſhed part. He commanded in the right wing; and by the impetuoſity of his charge he defeated the parliament's left, under the command of Ireton; but committing his uſual fault of purſuing inconſiderately, the battle was loſt before he could return to reſtore order. After this event, he withdrew towards the weſt, and threw himſelf into the city of Briſtol. That important place, thus garriſoned, was expected to make a vigorous defence; but the prince ſeems to have loſt himſelf on this occaſion, and ſurrendered the city to Fairfax before a cloſe attack was made. The king was ſo indignant at his conduct, that he recalled all his commiſſions, informing him he could thenceforward diſpenſe with his ſervices.

When a part of the Engliſh navy, in 1648, went over to Charles II., it was placed under the command of prince Rupert, who attempted, in vain, the relief of ſome maritime towns and fortreſſes, attacked by the republicans. He then carried on a predatory war, by which the Engliſh trade in the weſtern ſeas was ſo much annoyed, that admiral Blake was ſent with a ſquadron in purſuit of him. He took ſhelter in Kinſale, whence he eſcaped to Portugal, and was protected from his purſuer. He, however, loſt a great part of his fleet on the coaſt of Spain, and with the remainder ſailed to the Weſt India iſlands, where, for ſome time, he ſupported himſelf by making prizes of Spaniſh and Engliſh ſhips. His brother, prince Maurice, who commanded a ſeparate ſquadron, being ſhipwrecked among the iſlands, Rupert ſailed to France, where he diſpoſed of his prizes and ſhips, and joined Charles at the French court. Between this period and the reſtoration he occupied himſelf with thoſe ſtudies which afterwards rendered him celebrated in the annals of ſcience, and to which we ſhall have occaſion to refer at the concluſion of this article.

On the king's reſtoration, prince Rupert was invited into England, where the king, who had a ſincere affection for him, gave him various offices worthy of his high birth. In 1666 the king entruſted him, in conjunction with the earl of Albemarle, to command the fleet, and he ſoon manifeſted

all the great qualities that could be defired in an admiral; for, by his happy return to the fleet, he wrefted from the Dutch the only victory they had the appearance of gaining, and, afterwards, on the 24th of June, beat them effectually, purfued them to their own coaft, blocked up their harbours, and made them fully fenfible of the fuperiority of Englifh courage when not oppreffed by numbers. In the autumn of the fame year, having the fole command of the fleet, and learning that the Dutch were endeavouring to join a French fquadron of forty fail under the duke of Beaufort, he followed them fo clofely into the Boulogne road, that, to avoid a battle, they hauled fo near the fhore, as in all probability they muft either have been funk or burnt, if a fudden ftorm had not forced the prince to return to St. Helen's bay.

On the prince's return home he was kindly received by the king, and grew into high efteem with the nation. The Dutch war was again renewed in 1673, the French being at this time in alliance with the Englifh. Prince Rupert was appointed admiral of the Englifh fleet, having under him fir Edward Spragge, and the earl of Offory. Two indecifive actions enfued in May and June, and prince Rupert, whofe bravery could not be doubted, was fufpected, probably without reafon, of being difinclined to the favourite political fchemes of affifting the French to ruin the Dutch, and of augmenting the royal auhority at home. On his part he complained that he was ill fupplied with neceffary articles by the admiralty, which was under the controul of the duke of York. To prove the fact, he, without particular orders, returned home, immediately after the battle of the 5th of June, and had addrefs enough to perfuade the king to come and examine the ftate of the fleet with his own eyes. This put the matter beyond all cavil and difpute, and obtained the neceffary fupplies without any delay, and as he had fhewn his fpirit by appealing to the fenfes of his majefty, fo he gave as fignal a proof of his activity and enterprife, by carrying the whole fleet through the Narrow feas on the 19th of July, and appearing on the Dutch coaft, almoft as foon as they had received certain intelligence of his returning to his own. In the following Auguft, however, an engagement took place off the Texel, in which the two maritime rivals difplayed all the obftinate valour that had rendered their former contefts fo memorable in naval hiftory, and of which a full and moft intereting account will be found in Campbell's Lives of the Admirals, vol. ii. ed. 1813. Prince Rupert was perfonally oppofed to De Ruyter, and by the greateft exertions he difengaged his fquadron from numerous affailants, and came to the relief of that of fir Edward Spragge, which had loft its brave commander. (See SPRAGGE.) The French kept aloof, and both fides claimed the victory. This was the clofe of prince Rupert's warlike fervices.

On his return from the command, the king expreffed fome coolnefs, which was owing, not more to the arts of his highnefs's enemies, than to the quicknefs of his letter, in which he gave an account of this laft fight, the contents of which a contemporary hiftorian gives in the following words. "In the midft of fo many intrigues of oppofition here at home, fo many delays of his commiffion, fo few powers contained in it, fuch fcanty number of feamen, fo little affurance of divers chief commanders, fuch failure of provifions; fuch want of ammunition, and all other neceffaries, fuch deceit of navy officers, fuch non-obfervance of orders at fea, amongft his own Englifh, and fo many manifeft defections of the French, not to be ftaggered in his refolution, nor to be put out of all patience and prudence in action, nor to abate of his affection and zeal for the honour and fervice of his majefty, the fafe-guard and intereft of religion and the kingdom; in a feafon when fo many Popifh projectors played a game under board, and above too; will be an everlafting argument of his highneffes's valour and renown, and muft needs be a ftrong obligation upon the king, the parliament, and the people of England, who are now left to judge, whether it was not a wonderful good providence of God, or one of the moft memorable pieces of fervice ever done at fea, to furmount all thofe difficulties, and even envy itfelf; and, after all, to bring home the fleet royal of England, without the lofs of one man of war, to her own fhore in fafety, in defpite of all enemies that defigned otherwife by fea and land."

But the king's difpleafure was not lafting, and he was foon replaced in his favour. After this, prince Rupert led a quiet and, in a great meafure, a retired life, moftly at Windfor caftle, of which he was governor, and fpent a great part of his time in the profecution of chemical and philofophical experiments, as well as the practice of mechanic arts, for which he was very famous. He is mentioned by foreign authors with applaufe for his fkill in painting, and celebrated by one of the moft judicious of our own, for his invention of mezzo-tinto prints, fince rifen, from their foftnefs and beauty, into fo high efteem. He likewife delighted in making locks for fire-arms, and was the inventor of a compofition called, from him, Prince's metal. He communicated to the Royal Society his improvements upon gunpowder, by refining the feveral ingredients, and making it more carefully; which, as appears upon feveral trials reported to that learned body, augmented its force, in comparifon of ordinary powder, in the proportion of ten to one, an invention which, though too expenfive for common occafions, deferves to be remembered, becaufe, in particular cafes, it may be of fingular utility. He alfo acquainted them with an engine he had contrived for raifing water, and fent them an inftrument, of which he made ufe, to caft any platform into perfpective, and for which they deputed a felect committee of their members to return him their thanks. He was the inventor of a gun for difcharging feveral bullets with the utmoft fpeed, facility, and fafety, which was generally and juftly admired. The Royal Society received likewife from his highnefs the intimation of a certain method of blowing up rocks in mines, and other fubterraneous places. The very ingenious and indefatigable Dr. Hooke has preferved another invention of his for making hail-fhot of all fizes. He devifed a particular kind of fcrew, by the means of which, obfervations taken by a quadrant at fea were fecured from receiving any alteration by the unfteadinefs of the obferver's hand, or through the motion of the fhip. It was faid that he had alfo, among other fecrets, one that was very curious, and, if preferved, might be very beneficial, which was that of melting or running black lead, like a metal, into a mould, and reducing it back again into its original form.

As to his public character in the laft ten years of his life, it was that of a patriot, which was owing to the innate honefty of his temper, and not to his having any liking to intrigues. He gave indefatigable attention to whatever appeared to him conducive to the public good. He was a great promoter of the trade to Africa, and a principal protector of the Royal African Company; as a proof of which, before the firft Dutch war in this reign, he offered his majefty to fail with a fquadron to the coaft of Guinea, in order to vindicate the honour of the crown, affert the juft rights of the company, and redrefs the injuries done to the nation; but the king, unwilling to hazard his perfon at fuch a diftance, and in fo fickly a climate, though he received the motion kindly, would not confent to it, but contented himfelf

ſelf with taking an officer of his recommendation (captain Holmes), under whom the ſquadron was ſent. He was an active member of the council of trade. It was owing to his ſolicitations, after being at great expence, not only in the inquiry into the value, but in ſending ſhips thither, that the Hudſon's Bay Company was erected, of which he was the firſt governor appointed by the charter. In memory of him, a conſiderable opening on the eaſt ſide of that bay, in Terra de Labrador, is called Rupert's river. In general, his highneſs was a great friend to ſeamen, and to all learned, ingenious, and public-ſpirited perſons, and aſſiſted them with his purſe, as well as afforded them his countenance. He was concerned in the patent for annealed cannon, in a glaſs-houſe, and other undertakings for acquiring or improving manufactures, for which ſome have cenſured him, as giving encouragement to projectors. But ſurely this cenſure is very ill placed, ſince, without ſuch patrons, induſtry and ingenuity would want ſupport, and many uſeful inventions, many valuable diſcoveries, barely emerge, and then ſink again into oblivion. But ſtrict juſtice has been done to his highneſs's many virtues, and amiable qualities, by abler and more impartial judges, eſpecially in that excellent character of him by the elegant pen of biſhop Sprat. In reſpect to his private life, he was ſo juſt, ſo beneficent, ſo courteous, that his memory remained dear to all who knew him. This, obſerves Campbell, I ſay of my own knowledge; having often heard old people in Berkſhire ſpeak in raptures of prince Rupert.

He died at his houſe in Spring-Gardens, on the 29th of November 1682, in his grand climacteric, leaving behind him a natural ſon, uſually called Dudley Rupert, by a daughter of Henry Bard viſcount Bellemont, though ſtyled in his father's laſt will and teſtament Dudley Bard. He received the firſt tincture of letters at Eton ſchool, where the gentleneſs of his temper, and the modeſty and amiableneſs of his behaviour, procured him univerſal eſteem. His genius, however, inclining rather to arms than ſtudy, he was placed under the care of that celebrated mathematician ſir Jonas Moore at the Tower. Here he continued till the demiſe of that prince, when he made a tour into Germany to take poſſeſſion of a conſiderable fortune which had been bequeathed to him. He was very kindly received by the Palatine family, to whom he had the honour of being ſo nearly allied. In 1686 he made a campaign in Hungary, and diſtinguiſhed himſelf at the ſiege of Buda, where he had the misfortune to loſe his life, in the month of July or Auguſt, in a deſperate attempt made by ſome Engliſh gentlemen upon the fortifications of that city, in the 20th year of his age, and, though ſo young, he had ſignalized his courage in ſuch an extraordinary manner, that his death was exceedingly regretted. Hume. Campbell's Lives of the Admirals.

Rupert, in *Geography*, the north-weſternmoſt townſhip of Bennington county, in the ſtate of Vermont, America, containing 1630 inhabitants; 20 miles N. of Bennington.

Rupert's *Bay*, a bay on the N.W. coaſt of the iſland of Dominica, which is deep, capacious, and ſandy, and affords good ſhelter from the winds. It is the principal bay of the iſland, and on it is erected the town of Portſmouth. N. lat. 15° 40′. W. long. 61° 18′.

Rupert's *Fort*, lies at the bottom of Hudſon's bay, in North America, ſituated on a river of the ſame name, on the E. ſide of James's bay, between Slade river N., and Nordway river S. N. lat. 51° 50′. W. long. 80° 5′.—Alſo, a fort on the W. coaſt of the iſland of Barbadoes; 1 mile N. of Speight's town.

Rupert's *Head*, a cape on the W. coaſt of the iſland of Dominica. N. lat. 15° 41′. W. long. 61° 19′.

Rupert's *Iſland*, the moſt weſterly of four iſlands in the ſtraits of Magellan, forming the S. ſide of Royal Reach; 3 miles S. of Paſſage Point.

Rupert's *River*, a river of North America, which runs from lake Miſtaſin into James's bay, Hudſon's bay. N. lat. 51° 28′. W. long. 78° 56′.

Rupert's *Drops*, *lacryma Batavicæ*, a ſort of glaſs drops with long and ſlender tails, which burſt to pieces on the breaking off thoſe tails in any part, ſaid to have been invented by prince Rupert, and therefore called after his name.

The hiſtory of theſe drops is this: they were firſt brought into England by prince Rupert out of Germany, and ſhewn to king Charles II. who communicated them to the Royal Society at Greſham College; and a committee, appointed on this occaſion by the ſociety, gave the following account of them. They muſt be made of green glaſs well refined, for till the metal, as the glaſs-men call it, is perfectly refined, they never ſucceed if made of it; but always crack and break ſoon after they are dropped into the water.

The beſt way of making them is to take up ſome of the metal out of the pot upon the end of an iron rod, and immediately let it drop into cold water, and there lie till it is cold. If the metal be too hot when it is dropped into the water, the buſineſs does not ſucceed, but the drop froſts and cracks all over, and falls to pieces in the water, and every one that does not crack in the water, but lies in it whole till it is quite cool, is ſure to be good. There is great nicety in the hitting a due degree of heat in the metal, and the workmen who beſt know their buſineſs cannot promiſe before hand which ſhall ſucceed, but often two fail for one that hits right. Some of them froſt over the ſurface without falling to pieces, and others break into pieces before the red heat is quite over, and that with a ſmall noiſe; others break ſoon after the red heat is over and make a great noiſe, and ſome neither break nor crack till they ſeem to be quite cold; and others hold together while they are in the water, but fly to pieces with a ſmart noiſe when they are taken out of it; ſome do this on the inſtant, others an hour or two after, and others will keep ſeveral days, nay weeks, and at laſt fall to pieces without being touched.

Theſe drops, thus formed, are ſo hard, that they will bear ſmart blows of a hammer, on the rounded end, without breaking; and yet if you grind the ſurface, or break off the tip of the tail, they will ſhatter, with a loud report, into powder; and in an exhauſted receiver, with greater impetuoſity than in the open air, and into a finer powder, exhibiting light, when the experiment is made in the dark. But if the drops are ground with powder of emery and oil, or annealed by the fire, they will eſcape breaking.

This ſurpriſing phenomenon is ſuppoſed to ariſe from hence; that while the glaſs is in fuſion, or in a melted ſtate, the particles of it are in a ſtate of repulſion; but being dropped into cold water, it ſo condenſes the particles in the external parts of their ſuperficies, that they are thereby reduced within the power of each other's attraction, and by that means they form a ſort of hard caſe, which keeps confined the before-mentioned particles in their repulſive ſtate; but when this outer caſe is broke by the breaking off the tail of the drop, the ſaid confined particles have then liberty to exert their force, which they do by burſting the body of the drop, and reducing it to a very peculiar form of powder. See a paper on the phenomena and explication of theſe glaſs-drops, by Dr. Le Cat, in the Philoſ. Tranſ. vol. xlvi. p. 175, &c. See *Annealing of* Glass.

RUPERTSDORF, Hohen, in *Geography*, a town of Auſtria; five miles S.W. of Ziſterſdorf.

RUPICAPRA, in *Zoology*, a ſpecies of antilope. See Chamois. See alſo Ovis *Ammon*.

RUPICHSTERADT, in *Geography*, a town of the duchy of Berg; four miles N.E. of Blankenberg.

RUPINIA, in *Botany*, from *rupes*, a rock, alluding to its place of growth, is a name given in the Supplement of Linnæus to what Forſter had called *Aitonia*, after the celebrated curator of Kew garden; there being another *Aitonia* in that ſame work. Mr. Dickſon diſcovered, by examining original ſpecimens, that Forſter's plant is no other than *Marchantia hemiſphærica*, without fructification; the ſuppoſed *anthers* being nothing but the hairs of the leaf!

RUPITANI, a name given to the Donatiſts. See Campitæ.

RUPOLY, in *Geography*, a town of Bengal; 22 miles W. of Purneah.

RUPPAN, a town of Bohemia, in the circle of Pilſen; 17 miles S. of Pilſen.

RUPPE, a town of France, in the department of the Voſges; eight miles N. of Neufchateau.

RUPPEL, a river of France, formed by the union of the Senne, the Demer, and the Dyle, which joins the Scheldt at Rupelmonde.

RUPPERTSGRUN, a town of Saxony, in the Vogtland; ſix miles N. of Plauen.

RUPPIA, in *Botany*, was named by Linnæus, in memory of Henry Bernard Ruppius, native of Gieſſen, a ſtudent of phyſic, who ſoon gave up that and every other purſuit for botany. Haller characterizes him as "of ſhort robuſt ſtature, with the eyes of a lynx, unwearied limbs, a penetrating genius, and moſt tenacious memory." He travelled through various parts of Germany, living with the mountain cottagers, diſdaining every indulgence, except the ſtudy of plants. He ſeems to have died at an early age. The firſt edition of the *Flora Jenenſis*, compiled from his papers, and arranged after the ſyſtem of Rivinus, which he much approved, was publiſhed in 1718, by J. H. Schutte. Another came forth in 1726; and a third, under the care of Haller, with beautiful plates, in 1745. Each makes an octavo volume.—Linn. Gen. 68. Schreb. 92. Willd. Sp. Pl. v. 1. 717. Mart. Mill. Dict. v. 4. Ait. Hort. Hew. v. 1. 281. Purſh 121. Sm. Fl. Brit. 198. Prodr. Fl. Græc. Sibth. v. 1. 109. Juſſ. 19. Lamarck Illuſtr. t. 90. Gærtn. t. 84. (Buccaferrea; Mich. Gen. 72. t. 35.)—Claſs and order, *Tetrandria Tetragynia*. Nat Ord. *Inundatæ*, Linn. *Naiades*; Juſſ.

Gen. Ch. *Cal.* Perianth none. *Cor.* none. *Stam.* Filaments none; anthers four, ſeſſile, equal, roundiſh, of two roundiſh valves, burſting tranſverſely. *Piſt.* Germens four or five, nearly ovate, crowded cloſe together; ſtyles none; ſtigmas obtuſe. *Peric.* none. *Seeds* four or five, ovate, oblique, each elevated on a long ſlender ſtalk, and terminated by the permanent, flat, orbicular ſtigma.

Eſſ. Ch. Calyx none. Corolla none. Seeds four, on long footſtalks.

1. R. *maritima*. Sea Ruppia. Linn. Sp. Pl. 184. Willd. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 136. Lightf. Scot. 124. t. 8. f. 1. (Potamogiton maritimum, gramineis longioribus foliis, fructu ferè umbellato; Raii Syn. 134. t. 6. f. 1. Fucus ferulaceus; Ger. Em. 1573. Buccaferrea maritima, foliis acutiſſimis; Mich. Gen. 72; as well as fol. minùs acutis; ibid. t. 35.)—Native of ſalt-water ditches, in moſt parts of Britain, flowering in July, and ripening ſeed in Auguſt. Dr. Sibthorp obſerved it in Cyprus, as well as on the claſſic ſhore of Argos. Mr. Purſh ſays it occurs about the mouths of moſt rivers in America. The habit of the plant agrees with Potamogeton; ſee that article. The *root* is probably annual. *Stems* capillary, very much branched, clothed with alternate, linear, more or leſs pointed *leaves*, which embrace the ſtem with a membranous united *ſtipula*. *Flower-ſtalks* axillary, ſolitary, ſimple, variable in length, according to the depth of the water in which the herb grows, and often ſpiral, accommodating itſelf to any alteration, that the *flowers*, which ſtand two together at the top, one a little above the other, may not be ſpoiled by immerſion. The plant is moſt diſtinguiſhable when in *fruit*, by means of the ſingularly ſtalked, and as it were umbellate, *ſeeds*. Dillenius, in his edition of Ray's *Synopſis*, greatly errs in reporting that the *flowers*, or *ſtamens*, grow remote from the *fruit*, and that the latter appears firſt.

Labillardiere, in his account of the plants of New Holland, v. 2. 116. t. 264, deſcribes a *Ruppia antarctica*, whoſe genus he merely conjectured, having ſeen nothing of the fructification. This is referred, perhaps more properly, though likewiſe from the habit only, by Mr. Brown, to Decandolle's genus *Caulinia*; ſee Br. Prodr. Nov. Holl. v. 1. 339.

RUPPIN, New, in *Geography*, a town of the Middle Mark of Brandenburg, the capital of a county or circle of the ſame name, containing two Lutheran churches, and 800 burghers. It is ſituated on a large lake, formed by the river Rhine, and has conſiderable manufactures of cloth. "Old Ruppin" is ſituated on the ſame lake, oppoſite to New Ruppin; 30 miles N.N.W. of Berlin. N. lat. 52° 55′. E. long. 12° 55′.

RUPPOLI, a mountain of Etruria; 10 miles S.W. of Florence.

RUPRECHTSHOFEN, a town of Auſtria; 12 miles S.E. of Ips.

RUPSTA, a town of Sweden, in Eaſt Gothland; ſix miles W. of Linkioping.

RUPTORIUM, in *Surgery*, a cauſtic applied with a view of opening an abſceſs.

RUPTURE. See Hernia.

Rupture-*Wort*, in *Botany*. See Herniaria.

Although there be no foundation for the virtues aſcribed to this plant, and implied in its name in the curing of ruptures; yet there is another caſe in which German phyſicians ſtrongly recommend it. It is in the diſorder of the eyes which is brought on by reading or writing by candle-light, or by examining nice objects, or very fine work. This diſtemperature ſeems to be properly a diminution of ſight, without any apparent cauſe, or viſible alteration in the eye, and is probably owing to a viſcid matter obſtructing the optic nerves, and preventing a ſupply of their proper fluid. The herniaria, being a gentle and mild attenuant, is ſuppoſed to be adapted for the relief of this diſorder. Gruhlman De Novo Caliginis Remedio.

The author gives many inſtances of the ſucceſs of this remedy, and mentions two methods of giving it; the one in powder, and the other in tincture: the former way is preferred, and the method is to gather the herb in its prime, and powder it after it has been dried in the ſhade; then to ſprinkle the quantity of a ſcruple of this powder on the bread and butter uſed for breakfaſt. If this is not liked, the tincture is to be made with ſpirit of wine, as ſtrong as the plant will make it, and forty drops are to be taken every morning and evening in any liquor.

The diſtemperature this is propoſed to cure is very common, yet this is almoſt the only thing, as it has been ſaid, that has been preſcribed by way of remedy, and deſerves to be

be fairly tried. But no modern practice ſeems to warrant the above-mentioned author's recommendation of it.

RUPUTTY, in *Geography*, a town of Hindooſtan, in Bahar; 12 miles E. of Chuprah. N. lat. 25° 44′. E. long. 85° 11′.

RURAL, or RUSTIC, formed of *rus*, *ruris*, *country*, ſomething that relates to the country.

RURAL *Dean*, in the *Ancient Church*. See DEAN.

RURAL *Economy*, a term which comprehends the amelioration and improvement of the landed and different other property, habits, and cuſtoms of a country, in whatever way or by whatever means of a rural nature they may be capable of being accompliſhed, as, whether in the laying out, incloſing, and cultivating the ground, or in the management of the different practices, operations, and proceſſes which have a relation to it, or to its produce, the regulation of the various kinds of labour which attends them, as well as that of the ſale of the different articles of proviſions which are raiſed from it in the ſeveral fairs and markets, and the proviſion of a variety of ſubſtances which are neceſſary for uſe as fuel, as well as for many other purpoſes of the rural kind. In theſe views, the bettering of the condition of different ſorts of land, by the particular modes and practices of huſbandry which have been lately diſcovered, are of very great importance, as well as the improved management in feeding animals, dairying, and making a great number of other articles, and the working of different ſorts of quarries and pits for the raiſing of materials which are uſeful in various rural intentions, beſides thoſe of being conſumed as fuel.

There are many other kinds of works, eſtabliſhments, and conſtructions which are partly of this nature, and which contribute in no ſmall degree to the general improvement and advantage of a country, ſuch as thoſe of roads, ſo far as the ſtate, form, and convenience of them are beneficial in this way; the conſtruction of convenient railways for the more ready conveyance of weighty articles of ſlate, coal, and other kinds of produce; the formation of canals, and the widening and altering of rivers, for the benefit of water-carriage for different bulky matters; and the raiſing of embankments againſt the ſea, or large rivers, for the better cultivation, protection, and acquiſition of land. To which may be added, the eſtabliſhing of fiſheries of different kinds, and improving the management of them, as well as ſome other undertakings.

The rural habits and practices of a country, which are neceſſarily either different at different times, in conſequence of the changes which are always taking place in the circumſtances and conditions of it, or fixed by the hilly and mountainous nature of its ſurface, are conſtantly ſlow in their progreſs towards the ſtate of amelioration and perfection; on which account, they and the induſtry of the rural population of a nation ought to be looked upon and conſidered in reſpect to what they were formerly at different periods of time, what they are now, and what there is the probability of their becoming by the progreſs of man in the ſtate of ſociety.

In the infant ſtate of a country, while its riches and reſources chiefly conſiſt in the number of herds and flocks which it can ſupport, the attention and exertion of the people are, for the moſt part, with much propriety, directed to the rearing, feeding, protection, and management of theſe ſorts of live-ſtock. Afterwards, when the tillage ſyſtem becomes, in ſome meaſure, to be connected and incorporated with the paſtoral ſtate, there is a diviſion of their cares and labours, between the cultivation of the ſoil for the raiſing of grain, and the attendance on their cattle, ſtocks, and ſheep flocks. And ultimately, when the benefits and numerous advantages of commerce begin to be known and appreciated, no ſmall part of them leave the cattle and the tillage plan for that of trade, and the manufacturing of different kinds of articles for its uſe and benefit.

The hiſtory of all nations, as well as that of the ſame nation at different periods of time, furniſhes numerous inſtances in proof of theſe progreſſive ſtages of change in their rural ſtate. It is therefore a great abſurdity, as well as error, to ſtigmatize and reprobate the cuſtoms and practices of a people or country, in any one of ſuch ſtages or changes of their rural means, by the compariſon of thoſe of another, as the object of their induſtry and application is widely different at the different times, and conſequently the teſt by which they ought to be judged of, muſt be equally different. Thus, the condemnation and reprehenſion of particular modes, practices, and habits of the rural kind, from preconceived notions peculiar to the ſituation and way of life in which the perſons have been themſelves placed, are highly prepoſterous and fooliſh, as any one is well employed in purſuing an uſeful and laudable occupation or undertaking with induſtry and perſeverance, whatever the nature of it may be, whether it be that of tending and managing herds and flocks, or that of conducting ſome other buſineſs, practice, or proceſs, each contributing to the convenience of the community, however different their engagements may be, or the rank which they hold in ſociety.

The practice and cuſtom of attending herds and flocks, which prevailed in a certain ſtage of ſociety in all countries, was more quickly departed from in caſes where the land was ſuitable for the purpoſes of tillage than in other inſtances; but moſt ſo on the ſea-coaſts and the banks of navigable rivers.

Improvements of this nature are always highly deſerving the attention and encouragement of the public, on account of the general influence which they have in promoting and bettering the ſtate and condition of ſociety; as they may be ſaid to embrace the introduction of whatever is uſeful and advantageous, as well as, in ſome meaſure, what is ornamental, into a country. Theſe beneficial changes and alterations are accompliſhed in a great variety of different ways, and by a number of different methods, but principally by the diſcovery of new means, the cultivation of what has been formerly overlooked or neglected, and by having recourſe to ſuperior and more enlightened modes of management in the whole. In this manner a vaſt increaſe of produce of different kinds, as well as of national wealth, may be brought forth, and at the ſame time much ornamental effect and convenience be produced.

RURAL *Architecture*, the nature of any ſort of country building, but principally thoſe of the farm or agricultural kind. See FARM.

RURAL *Artificers*, all thoſe perſons who are employed in the making of any ſort of tool, implement, or machinery, for the purpoſe of agriculture, huſbandry, or any other rural art or buſineſs. The excellencies or defects of theſe ſorts of workmen depend upon their ingenuity and knowledge of the nature of mechaniſm in general, or their deficiency in both theſe reſpects.

Wherever the conſtruction of machinery has made any conſiderable progreſs, there is moſt commonly a portion of the ſame ſpirit diffuſing itſelf among the rural artificers of the ſame neighbourhood; but where this has not happened, the contrary is always the caſe. It is, however, of vaſt importance to the farmer and landed intereſt in general to be in poſſeſſion of, or capable of procuring, ingenious and intelligent workmen of this deſcription, as the progreſs and

and advancement of the art of farming greatly depends upon it.

The writer of the Agricultural Report of the County of Middlesex has remarked, that not only the common wheelwrights and smiths of that district have no ideas of machinery, or the capacity of executing any thing from drawings or specifications; but that the generality of the farmer's labourers are equally stupid, and unwilling to execute their work in any way to which they are not accustomed. Hence, it is contended, the difficulty of introducing any thing new in the implements or practice of husbandry is almost insurmountable. Even the most trifling alteration, or deviation from the old system or plan, is resisted, it is said, both by the artificers and labourers; and every possible obstruction thrown in the way of the farmers, to prevent what they deem an innovation on the established custom of the place, or part of the county where it may take place. The same is the case in regard to all the more complex kinds of machinery, as it is asserted that it is absolutely impossible to get a plough, a threshing-mill or machine, a winnowing machine, or indeed any other similar sort of implement of husbandry, constructed on a good principle by the artificers of this county; and that it is not much less difficult to induce the labourers to make use of them, when they are brought from any other place at a distance. Thus the farmer is reduced to the necessity of treading in the steps of his forefathers, though the practice may be at war with his own better judgment and inclination; and many useful alterations and improvements in the art of cultivation retarded and kept back.

But though there may be some expert, ingenious, and sensible mechanics in a district, who are capable, and fully competent to execute orders for all kinds of implements and machinery, which may be useful or necessary to the different purposes of agriculture and husbandry, their exertions and labours are often more considerably lessened in utility and value than might be supposed, on account of the unavoidable wear and tear which they undergo, necessarily subjecting them to frequent repairs, which are utterly impossible to be got done in any skilful manner by the common country artificers; and the great inconvenience, expence, and loss of time, which must be sustained by sending them for such purposes to the original constructors of them, who are not unfrequently at a great distance. This is another great drawback on improvements in the practice of farming.

Mere theoretical cultivators, who have not experienced these difficulties and inconveniencies, and are so frequently condemning the whole body of farmers as obstinately resisting every attempt at improvement in the art, often display their own want of knowledge and superficialness on the subject, by bestowing that degree of reprobation and censure on the farmer, which ought to have been applied to his labourers and rural artificers.

The proper encouragement of good and expert rural artificers is consequently a matter which tends greatly towards promoting and bettering the state and condition of agriculture, in various essential points, as well as to augment and render its conveniencies much more numerous and beneficial.

Rural *Buildings* and *Seats*, in *Gardening*. See Retreat and Seat.

Rural *Gates*, in *Ornamental Gardening*, are such as are employed for ornamenting the entrances to country residences, or other similar purposes. They should have a form and construction, so as in some measure to harmonize and accord with the nature and style of the residence to which they are to belong; the same general principles being, in some degree, applicable here as in the case of rural lodges. It is indeed suggested, that they both present ample scope for invention, which has been productive of two great evils: the first of which is, that too many designs of this nature have been given to the public; and the latter, that the proprietors and other persons have adopted, copied, and executed them, without any regard to the nature of the situation, or the character of the mansion or residence to which they are to be affixed. It is believed that no person will require proofs of this, who has seen any thing of the country. In regard to what relates to economy and utility in gates for common purposes, it may be seen under the head Gate.

Rural *Lodges*, are such adorned small buildings as are necessary for the entrances, or other parts of the approaches or drives of country residences. Those for the former, according to the opinion of Mr. Loudon, should be designed and constructed in a character and on principles somewhat analogous to that of the residence to which they belong; while those of the latter, or for the drives, should seldom be more than improved rural cottages, unless the nature of the situation should suggest some peculiarity of form, or description of them. It is supposed, that the notion of appropriating a country, by stamping all such buildings, as well as some others, with something which may denote the continuation of the proprietor's estate, is only calculated to gratify the vanity and ostentation of such persons. The truly great, it is conceived, need nothing to make them appear so; and in the country, they will ever be more assiduous to render themselves agreeable to their neighbours, than to shew the unsociable disposition of monopolizing territory. In regard to their grounds, it is suggested that they will be ready with Marlborough, Argyle, Howard, and other noble proprietors of grand residences, to say with the marquis of Ermeonville, "This, the farm, only is shut up; the three others, the wood, the forest, and the meadow, are open to every body; and I only wish that they should think themselves as much at home as if they belonged to them." On the whole, those sorts of buildings should always partake somewhat of the nature of the situations, and the styles of building in the residences to which they are to be attached. See *Country* Residence.

RUREMONDE, or Roermond, in *Geography*, a town of France, and principal place of a district, in the department of the Lower Meuse, late of Upper Guelderland, in the Austrian Netherlands, situated at the conflux of the Roer and Meuse. It derives its name from that of the former river and the term *Mondt*, signifying mouth, both expressing its situation at the Mouth of the Roer. It was encompassed with walls and six gates by Otho, surnamed the Cripple, 14th count of Guelderland. In 1290 it obtained from Rodolphus the privilege of coining money; and in 1562 it was created into a bishopric by pope Paul IV., under the archbishopric of Malines. The cathedral is the only parish church. Its magistracy is composed of nine echevins and two secretaries. In 1665 an accidental fire destroyed almost all the houses, convents, and the bishop's palaces. It has been often taken and retaken by the Dutch and Spaniards, in their civil wars; 30 miles N. of Aix-la-Chapelle. The town contains 3788, and the canton 14,621 inhabitants, on a territory of 222½ kiliometres, in 20 communes. N. lat. 51° 12′. E. long. 5° 50′.

RUREY, a town of France, in the department of the Doubs; 4 miles E. of Quingey.

RURROW, a town of Hindoostan, in Dooab; 30 miles E. of Etaya.

RUS, a mountain of Arabia, in Yemen; 8 miles S. of Sana.

RUSAZUS, in *Ancient Geography*, a town of Africa, on the coaſt of Mauritania Cæſarienſis, between Ruſubirſis and Vabar, according to Ptolemy. Pliny gives to this town the appellation of Colonia Auguſta; and in the Itinerary of Antoninus it is named Ruſazis Municipium, and placed between Iomnium Municipium and Saldis Colonia.

RUSBACH, in *Geography*, a river of Auſtria, which runs into the Danube, 2 miles above Hainburg.

Rusbach, *Hohen*, a town of Auſtria; 9 miles N. of Korn Neuburg.

RUSCEK, a town of European Turkey, in Bulgaria, on the Danube; in which are 20 moſques, 3 churches, and a Jews' ſynagogue. It is defended by a caſtle, with a garriſon; 50 miles E. of Nicopoli. N. lat. 53° 52′. E. long. 25° 15′.

RUSCINO, in *Ancient Geography*, a town of Gallia Narbonnenſis, the capital of the people called Conſuarani. It was in this town that the people of the country aſſembled, to deliberate on the paſſage demanded by Hannibal, according to Livy, lib. xxi. cap. 24. It was a Roman colony, according to Mela; and Pliny ſays, that it enjoyed the jus Latinum. It was ruined by the Normans, and its name is preſerved in Rouſſillon. In the Itinerary of Antonine, this town was marked on the route from Narbonne to Caſtulo, between Combuſta and Ad Centuriones.—Alſo, a river of Gallia Narbonnenſis, according to Strabo, who ſays that it had its ſource in the Pyrenées, and watered a town of the ſame name. Ptolemy calls it Ruſcio, and places its mouth between thoſe of the Illiberis and Atages.

RUSCINONA, a port of Africa, whither, according to Dr. Shaw, the Carthaginian fleet retired, the night before it engaged with Scipio near Utica. This name is ſaid to be of Phœnician origin; the firſt part of it, *Rus* or *Ras*, denoting cape; and the latter, *annona*, expreſſing the great quantity of corn and proviſions that were ſhipped off from this place. Theſe circumſtances lead Shaw to conclude, that Ruſcinona is the preſent "Porto Farina," on the coaſt of Tunis, called by the inhabitants, from an ancient ſaltwork near it, "Gar-el-Mailah," *i. e.* the cave of ſalt. This port, eſpecially the Cothon, or inward part of it, is ſafe in all accidents of weather, and opens into a large navigable pond, formed by the Majerdah or ancient *Bagrada*, which at preſent diſcharges itſelf through it, in its way to the ſea. The town belonging to this port was formerly very conſiderable.

RUSCIUD, in *Geography*, a river of Perſia, which runs into the Perſian gulf, 48 miles W. of Ormus.

RUSCUNIÆ Colonia, *Temendſuſe*, in *Ancient Geography*, a promontory and colony of the eaſtern part of Mauritania Cæſarienſis, according to Ptolemy, Pliny, Mela, and the Itinerary of Antonine. Antonine places it 15 miles E. of Icoſium. The ruins are ſtill viſible.

RUSCURIUM, Rusuccoræ of Ptolemy, and the *Ruſuccuro* of the Peutingerian Tables, now *Dellys*, formerly an ancient city, but at preſent a ſmall town, of Africa, on the coaſt of Algiers, ſituated partly at the foot and partly upon the declivity of a high mountain. In a wall, juſt over the harbour, is a ſmall niche, with an image, in the attitude of a Madonna; but the features and drapery, ſays Dr. Shaw, are defaced.

RUSCUS, in *Botany*, an ancient name, whoſe derivation has been given up by moſt authors, as hopeleſs. De Theis juſtly obſerves, that it was originally *Bruſcus*, and this leads him to the Celtic name of the plant in queſtion, *Beuſkelen*, equivalent to Box-holly, which is certainly the beſt explanation that has ever fallen in our way.—Linn. Gen. 534. Schreb. 709. Willd. Sp. Pl. v. 4. 874. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 5. 420. Sm. Fl. Brit. 1073. Juſſ. 42. Lamarck Illuſtr. t. 835. Gærtn. t. 16.—Claſs and order, *Dioecia Triandria*. (*D. Syngeneſia*, Linn. *D. Monadelphia*, Willd.) Nat. Ord. *Sarmentaceæ*, Linn. *Aſparagi*, Juſſ.

Gen. Ch. Male, *Cal.* Perianth of ſix ovate-oblong, rather ſpreading, convex leaves, reflexed at the ſides. *Cor.* Petals none, except three alternate leaves of the calyx be taken for ſuch. Nectary central, ovate or cylindrical, the ſize of the calyx, hollow, erect, coloured, perforated at the ſummit. *Stam.* Filaments none; anthers three, ſpreading, ſeated on the extremity of the nectary, connected at the baſe. *Piſt.* obſolete.

Female, *Cal.* as in the male. *Cor.* Petals as in the male. Nectary the ſame. *Piſt.* Germen ſuperior, oblong-ovate, concealed within the nectary; ſtyle cylindrical, the length of the nectary; ſtigma obtuſe, projecting out of the orifice. *Peric.* Berry globoſe, of three cells. *Seeds* two in each cell, globoſe.

Obſ. There is one ſpecies, *R. racemoſus*, with united flowers, whoſe calyx is globoſe, with ſix ſegments at the mouth only. It is ſeldom that in this genus and its allies, *Smilax*, *Tamus*, *Convallaria*, &c., the ſeeds all come to maturity. One of them commonly ſuffocates the reſt.

Eſſ. Ch. Male, Calyx of ſix leaves. Petals none. Nectary ovate, tubular, bearing the ſtamens on its margin within.

Female, Calyx and Nectary like the male. Stamens none. Style one. Berry ſuperior, of three cells, ſeeds originally two in each cell.

The ſpecies of this genus are not in general truly ſhrubby, but biennial evergreens, with perennial roots. Their young ſhoots reſemble aſparagus.

The ſubſtance of the herbage is peculiarly hard and rigid. The green colour either dark and opaque, or bright and poliſhed. Flowers in moſt inſtances borne by the leaves.

1. R. *aculeatus*. Prickly Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 1. Ait. n. 1. Fl. Brit. n. 1. Engl. Bot. t. 560. Woodv. Med. Bot. ſuppl. t. 237. Mill. Illuſtr. t. 96. (Ruſcus; Ger. Em. 907. Matth. Valgr. v. 2. 555. Camer. Epit. 935.)

β. R. laxus; Sm. Tr. of Linn. Soc. v. 3. 334. (R. flexuoſus; Mill. Dict. ed. 8. n. 6.)

Leaves ſharply pointed, flowering on the upper ſide, without a leaflet.—Native of buſhy woody places, throughout the middle and ſouthern countries of Europe, eſpecially on a gravelly or barren ſoil, flowering early in ſpring. Not uncommon in England. The variety *β* was obſerved at Stoke, near Goſport, by Mr. G. Caley, growing plentifully. This is an old inhabitant of Chelſea garden, and we have no heſitation in adopting profeſſor Martyn's opinion, as to Miller's ſynonym. The *root* of this ſpecies is branched, and rather creeping. *Plant* truly herbaceous, though ſo firm and rigid. After living one year without flowering, and remaining in leaf all the winter, it dies down to the root, after ripening fruit, in the following autumn. Every part is devoid of pubeſcence. *Stems* about two feet high, round, ſtriated, branched, rather ſpreading. *Leaves* alternate, ſpreading every way, not quite ſeſſile, twiſted, hard, ovate, entire, tipped with a ſharp thorn, and bearing a ſolitary pale *flower* about the middle of their upper ſide. *Nectary* purpliſh. *Berry* ſcarlet, the ſize of a black

a black currant, with a ſweet pulp, encloſing one or two large, ſhining, globular, horny or ſemitranſparent *ſeeds*. The above-mentioned variety has longer, more lax, *branches*, and elliptical *leaves*, tapering at each end; but there are many intermediate ſtates, which connect it with the common kind. Mr. Woodward has rightly obſerved, that the *flower* has a real ſtalk, immerſed in the *leaf*, under the cuticle. We would remark, that the ſtrict union of the leaves and the branches, in this genus, is like that of Moſſes, and Ferns, which laſt they reſemble further in mode of inflorescence, and exceed them in firmneſs of texture.

2. R. *Hypophyllum*. Broad-leaved Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 2. Ait. n. 2. (Laurus alexandrina et Chamædaphne; Column. Ecphr. 164. t. 165. f. 1.)

β. R. latifolius, fructu in medio foliorum extra pendente; Till. Piſ. 149. Dill. Elth. 333. t. 251. f. 323.

Leaves flowering on the under ſide, without a leaflet. —Native of rather hilly ſituations in Italy. Dr. Sibthorp gathered it alſo on mount Athos, in ſhady woods, and took it for the Χαμαιδαφνη of Dioſcorides, of which we conceive there can be no doubt. The *roots* are much like thoſe of the foregoing, but the *plant* is not branched, and the *leaves* are much larger, more elliptical, with an acute, but not ſpinous, point. Each *leaf* bears, from the middle of its under ſide, a pair of ſtalked pendulous *flowers*, whoſe ſegments and *nectary* are of a more ſlender form than in the *aculeatus*. Their *ſtalks* are accompanied at the baſe by a ſmall ſcaly *bractea*, but not by any acceſſory leaf, as in the following. The *berries* are red.

3. R. *Hypogloſſum*. Double-leaved Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 3. Ait. n. 3. Sm. Fl. Græc. Sibth. t. 955, unpubliſhed. (Hippogloſſum Dioſcoridis, et Lauro-Taxa Plinii; Column. Ecphr. 166. Hypogloſſon; ibid. t. 165. Δαφνη αλεξανδρεια, Dioſc. *Sibth.*) —Leaves flowering on the upper ſide, under a leaflet.— Native of Hungary, Italy, mount Athos, and the borders of the Black ſea, in buſhy, rather hilly ſituations. Gerarde appears to have cultivated it in 1596. The plant is kept in ſome curious gardens, where it bloſſoms imperfectly early in ſpring, but we have never ſeen the berries, which in Dr. Sibthorp's figure make a beautiful appearance, being of a deep rich ſcarlet, the ſize of black currants. The habit of this ſpecies is like the laſt, but the *leaves*, though variable in breadth, are commonly narrower, and particularly diſtinguiſhed by the ſmall leaf on their diſk, from beneath which proceeds a ſolitary, ſtalked, pale-green *flower*, with a ſlender, purpliſh, curved, furrowed *nectary*. The *ſtems* are ſimple, ſcarcely a foot high, not quite erect.

4. R. *androgynus*. Climbing Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 4. Ait. n. 4. (R. latifolius, è foliorum ſinu florifer et baccifer; Dill. Elth. 332. t. 250.) —Stem twining, branched. Leaves flowering at the edge. —Native of the Canary iſlands, and long cultivated in England, where it proves a hardy green-houſe plant, flowering moſt part of the ſummer. We have never ſeen this ſpecies in ſuch perfection as in the celebrated garden of the late Dr. Fothergill at Upton, where, under the foſtering care of his worthy ſucceſſors, ſeveral relics of his collection ſtill remain. The *Ruſcus*, trained up the inſide of the old green-houſe, to the height of many feet, makes a very elegant appearance with its broad, ovate, drooping *leaves*, of a rich ſhining green, from one of whoſe margins proceeds a copious tuft of cream-coloured *flowers*, male and female on the ſame plant. The *berries* are deſcribed by Dillenius nearly the ſize of the laſt, yellowiſh, and uſually ſolitary, one ripe *ſeed* in each.

5. R. *racemoſus*. Alexandrian Laurel, or Cluſtered Butcher's-broom. Linn. Sp. Pl. 1474. Willd. n. 5. (Laurus alexandrina anguſtifolia ramoſa; Moriſ. ſect. 13. t. 5. f. 4. L. alexandrina, fructu è ſummitate caulium prodeunte; Herm. Lugd. Bat. 679. t. 681.)—Stem erect, branched. Cluſter terminal. Flowers united.—Native of Portugal, according to Mr. Aiton. Linnæus was unacquainted with its origin, and Willdenow by miſtake, it ſeems, mentions the iſlands of the Archipelago, as Dr. Sibthorp did not obſerve the plant any where in his tour, though he could not poſſibly have over-looked it at any ſeaſon of the year. Nothing is more common in ſhrubberies, and ruſtic gardens. The *ſtems* are buſhy, from two to four feet high. *Leaves* ſeſſile, lanceolate, twiſted, of a bright and poliſhed green. *Flowers* in terminal cluſters, pale buff or cream-coloured, the *ſtamens* and *piſtils* complete in each flower, but they afford no great quantity of *fruit*; except occaſionally, in retired country ſituations, where the herb grows luxuriantly. The *berries* are orange-coloured.

6. R. *reticulatus*. Reticulated Butcher's-broom. Thunb. Prodr. 13. Willd. n. 6.—"Stem climbing. Leaves ovate, many-ribbed, reticulated. Flowers ſolitary, ſtalked."— Native of the Cape of Good Hope.

7. R. *volubilis*. Twining Butcher's-broom. Thunb. Prodr. 13. Willd. n. 7.—"Stem twining. Leaves ovate-oblong, many-ribbed."—From the ſame country. We know nothing of this or the laſt, but from Thunberg's ſhort definitions.

Miller has a *R. trifoliatus*, from Zante and the Greek iſlands, which profeſſor Martyn juſtly prefers to *Hypophyllum*. The ſame author deſcribes another ſpecies, under the name of *R. fruteſcens*, gathered by Houſtoun near Carthagena. This we conceive to be a *Jacquinia*; probably the *ruſcifolia* of Linnæus.

Ruscus, in *Gardening*, contains plants of the ſhrubby and under-ſhrubby evergreen kind, of which the ſpecies cultivated are, the prickly-butcher's-broom (R. aculeatus); the broad-leaved butcher's-broom (R. hypophyllum); the double-leaved butcher's-broom (R. hypogloſſum); the Alexandrian laurel (R. racemoſus); and the climbing butcher's-broom (R. androgynus).

Method of Culture.—Theſe plants are capable of being readily increaſed by the roots, which ſend up numerous ſtalks or ſuckers, which may be taken up in autumn, winter, or ſpring in open weather, and divided into many ſeparate ſets, each forming a proper plant, though they need not be divided very ſmall unleſs where a great increaſe is required, planting the largeſt at once where they are to remain, and the ſmalleſt in nurſery rows, &c., when each plant ſoon increaſes by offsets, and aſſumes a buſhy growth. They are alſo capable of being raiſed from ſeeds, but they often remain in the ground till the ſecond ſpring. The ſeeds of the hardy ſort ſhould be ſown in any bed or border an inch deep, and the tender kind in pots, placed under ſhelter in cold weather; and when the plants are a year old, pricking them out in March, the hardy ſorts in nurſery-beds for two or three years, and the tender ſorts in pots.

All the different hardy ſorts are proper for being placed out near the verges of ſhrubberies, or any cloſe plantations, as they thrive under the drip of trees, and remain green the year round. But the laſt tender ſort requires the ſhelter of a green-houſe in winter, where it affords variety among other potted plants of that kind.

RUSE, in *Geography*, a town of European Turkey, in Romania; 60 miles N.E. of Adrianople.

RUSECK, a town of Bohemia, in the circle of Konigingratz; two miles N. of Konigingratz.

RUSEI, a town of Walachia, in the Kodmana; 45 miles W. of Bucharest. N. lat. 44° 21′. E. long. 24° 47′.

RUSGUNIA, in *Ancient Geography*, *Rustonium* of Ptolemy, *Ruthisia* of Mela, and *Rusconia* of Pliny and others, a cape near Algiers, on the coast of Africa, now Temendfuse, or Metafus, with a tabled land, as the mariners call a flat hillock that rises up in the middle of it. The Turks have here a small castle for the security of the adjacent roads, once the chief station of their navy, where are still the traces of an ancient Cothon, with several heaps of ruins of the same extent with those of Tefessad, and which have no less contributed to the fortification of Algiers.

RUSH, Benjamin, in *Biography*, an eminent physician, and professor of the institutes and practice of medicine in the university of Pennsylvania, was born near Bristol, in the state of Pennsylvania, on the 5th of January, 1745. His ancestors belonged to the society of Quakers, and were of the number of those who followed the celebrated William Penn to Pennsylvania, in the year 1683: his grandfather, James Rush, resided on his estate near Philadelphia, and died in the year 1727: his son, who was the father of the subject of these memoirs, inherited both his farm and his trade, which was that of a gun-smith. He died while Benjamin was yet young. His widow, a most excellent woman, upon whom the education of young Rush thus necessarily devolved, placed him, at an early age, under the direction of the late Rev. Samuel Finley, at West Nottingham, in Chester county, Pennsylvania, by whom he was taught the rudiments of classical knowledge. Dr. Finley, afterwards better known as the president of Princeton college, New Jersey, was an able scholar and faithful teacher, and, being also related to Mrs. Rush, may be supposed to have paid great attention to the improvement of his young pupil. But whatever may have been the assiduity with which his education was directed by his preceptor, he possessed an ardent desire for knowledge, and was most unwearied in the pursuit of it.

From the academy of Dr. Finley he was removed to the college of Princeton, where he finished his classical education, and was admitted to the degree of A. B. in 1760, when he had not yet completed his sixteenth year. He was now left to choose a profession, and in the choice which he made, he doubtless was actuated by conscientious motives. He seems to have fully known his own character, and to have formed a proper estimate of his talents, and by applying them to the science and practice of medicine, to have been desirous of doing all possible good to the family of mankind. That he was directed by these motives, may be inferred from his own opinion of the utility of medicine. "So great," says he, "are the blessings which mankind derive from it, that if every other argument failed to prove the administration of a providence in human affairs, the profession of medicine would be fully sufficient for that purpose."

He accordingly, soon after leaving college, placed himself under the care of the late Dr. John Redman, of Philadelphia, a gentleman who had deservedly obtained an extensive share of professional business, and who was justly considered an excellent practitioner. With Dr. Redman young Rush continued some time, zealously engaged in the acquisition of the several branches of medicine. At that day, however, no institution for the purpose of medical instruction was established in Philadelphia, and his thirst for knowledge being rather excited than gratified with what he had learned from his preceptor, he formed the resolution of going abroad in order to avail himself of those advantages which were not within his reach in his native country. The university of Edinburgh, at that time, was at the zenith of its reputation, and justly boasted of its able professors, among whom were the elder Munro, the elder Gregory, Dr. Cullen, and Dr. Black. Thither Rush repaired, and was graduated M.D. in 1768, after having performed the usual collegiate duties with much honour, and published his inaugural dissertation "De Concoctione Ciborum in Ventriculo." In this performance he candidly acknowledged himself indebted, for many of the opinions which he advanced, to his distinguished teacher Dr. Cullen.

About the period of Dr. Rush's return to his native country, the first attempt was made in Philadelphia for the organization of a medical school. Lectures on anatomy and surgery had indeed been delivered in that city, in 1763 and 1764, to a small class of pupils, by the late Dr. William Shippen, who, two years before, had returned from Europe, where he had completed his education under the direction of the celebrated Dr. William Hunter; and, in 1765, Dr. John Morgan, also, gave instruction on the institutes of medicine and the practice of physic. Three years after this, the venerable Dr. Kuhn, who had been a pupil of the illustrious Linnæus, and had preceded Dr. Rush in his medical honours at Edinburgh only one year, was made the professor of botany and the materia medica. To this list of teachers, Dr. Rush himself was added as professor of chemistry, immediately upon his arrival from England in 1769. Such was the first organization of the medical college of Philadelphia.

That Dr. Rush had, in an eminent degree, the qualifications of a teacher, and discharged with exemplary fidelity the important duties belonging to the elevated station to which he was chosen, the popularity attending his lectures, the yearly increase in the number of his hearers, and the unexampled growth of the college with which he was connected, bear ample testimony. Shortly after this period, he was elected a fellow, and also one of the curators of the American Philosophical Society.

While Dr. Rush was thus engaged in the active pursuits of his profession, the dispute of the then American colonies with Great Britain arose. Considering the claims of the British government unjust, he entered with warmth into the defence of the rights of his countrymen. His talents were already well known, and the fullest confidence was placed in his integrity and patriotism. The crisis demanded his services; and in the year 1776 he was chosen a member of congress for the state of Pennsylvania, and, on the 4th of July, with eight other delegates from that state, he signed the instrument of independence. Upon the 11th day of April, 1777, he was appointed surgeon-general of the military hospital in the middle department. His colleague in the medical school, Dr. Shippen, on the same day was appointed director-general of all the military hospitals for the armies of the United States, and Dr. J. Jones was made physician-general of the hospital in the middle department. The office of surgeon-general was not long held by Dr. Rush, for upon the 1st of July, 1777, he was created physician-general of the hospital, in the middle department, in the room of Dr. Jones.

On the 6th of February ensuing, Dr. Rush resigned the station of physician-general, and Dr. William Brown was appointed in his place.

Doctor Rush, however, still continued to take an active part in the politics of the state to which he belonged. The original government of Pennsylvania is known to have been perfectly unique in its form, and the constant source of in-

calculable mischief. The house of representatives, chosen annually by the people, and on which there was no check, was the sole legislative power; and each succeeding assembly often made it their business to undo all that their predecessors had done. This kind of government was justly reprobated by Dr. Rush, and the necessity and wisdom of a reformation in it were too apparent not to be attempted. Dr. Rush, and many other distinguished abettors of the cause, had soon after the satisfaction of seeing a new form of government established in Pennsylvania, by a general convention of the people.

Soon after, he formed the resolution of retiring from political life, and of devoting the remainder of his days, with increased ardour, to his profession. He was still further induced to this resolution, from the consideration of the state of medicine in his native country at that time, which, it is scarcely necessary to remark, was in a very low condition. Happy for medical science and the interests of humanity, that he so early formed such a resolution, and that he was so steady, uniform, and indefatigable in the accomplishment of it!

During the long and brilliant career of Dr. Rush's life, from this time to its termination, he may be considered as exclusively occupied in duties pertaining to his profession, and not unlike another Howard, in "surveying the mansions of sorrow and pain," and in mitigating and removing the distresses of all within his power. His biography, therefore, like that of most other scientific men, consists chiefly in a history of his professional labours. How numerous and important his services, as an author, have been, will be readily seen from a brief detail of his writings, which we shall attempt to give, as nearly as practicable, in chronological order.

The first fruits of his professional labours, as an author, was an account of the effects of the Stramonium, or thorn apple; this appeared in the year 1770, and was published in the Transactions of the American Philosophical Society, vol. i. The same year he addressed a letter, on the usefulness of Wort in ill-conditioned ulcers, to his friend Dr. Huck, of London, which was published in the Medical Observations and Inquiries of London, vol. iv. In 1774 he read, before the Philosophical Society, his interesting Inquiry into the Natural History of Medicine among the Indians of North America, which formed the subject of an anniversary oration. He this year again addressed another letter to Dr. Huck, containing some remarks on Bilious fevers, which was printed in the London Medical Observations and Inquiries, vol. v. To this succeeded his Account of the Influence of the Military and Political Events of the American Revolution upon the Human Body, and Observations upon the Diseases of the Military Hospitals of the United States, which his situation in the army eminently qualified him to make. In 1785 he offered to the Philosophical Society of Philadelphia an Inquiry into the Cause of the Increase of Bilious and Intermitting Fevers in Pennsylvania, published in their Transactions, vol. ii.; and soon after, in quick succession, appeared Observations on Tetanus, an Inquiry into the Influence of Physical Causes upon the Moral Faculty, Remarks on the Effects of Ardent Spirits upon the Body and Mind, and his Inquiry into the Causes and Cure of the Pulmonary Consumption. About this time, also, appeared his paper entitled Information to Europeans disposed to migrate to the United States, in a letter to a friend in Great Britain; a subject which had already occupied the attention of Dr. Franklin, but which Dr. Rush considered still further deserving notice, on account of the important changes which the United States had lately undergone. To this paper followed his Observations on the Population of Pennsylvania, Observations on Tobacco, and his Essay on the Study of the Latin and Greek Languages, which was first published in the American Museum of Philadelphia. This last-mentioned paper, which has been the fertile topic of much animadversion, was, with several other essays of Dr. Rush, and his Eulogiums on Dr. Cullen and the illustrious Rittenhouse, the former delivered in 1790, the latter in 1796, embodied in an octavo volume, entitled Essays, Literary, Moral, and Philosophical, and published in 1798.

In 1791, the medical colleges of Philadelphia, which, on account of certain legislative proceedings, had existed as two distinct establishments since the year 1788, became united under the name of the University of Pennsylvania; and Dr. Rush was appointed to the chair of the professorship of the institutes of medicine and clinical practice. He now gave to the public his Lectures upon the Cause of Animal Life. The same year he presented the Philosophical Society his Account of the Sugar Maple Tree of the United States, which was published in their Transactions, vol. iii.; and in 1792, Observations, intended to favour a supposition that the Black Colour of the Negro is derived from Leprosy; published in their Transactions, vol. iv.

The year 1793 is memorable in the medical annals of the United States, on account of the great mortality occasioned by the yellow fever, which prevailed in the city of Philadelphia; and the history of that epidemic, which was published by Dr. Rush in 1794, cannot be too highly valued, both for his minute and accurate description of the disease, and the many important facts he has recorded in relation to it. It was comprised in one volume octavo, and has undergone several editions, and been extensively circulated in the Spanish and in the French languages. About this period, also, he offered to the medical world his observations on the Symptoms and Cure of Dropsy in general, and on Hydrocephalus Internus; an Account of the Influenza, as it appeared in Philadelphia in 1789, 1790, and 1791; and Observations on the State of the Body and Mind in Old Age. In 1797 came out his Observations on the Nature and Cure of Gout, and on Hydrophobia; an Inquiry into the Cause and Cure of the Cholera Infantum; Observations on Cynanche Trachealis, &c.

It is proper to state, as connected with the literary labours of Dr. Rush, that in 1788, many of his medical papers were collected together, and that he offered them to the public under the title of Medical Inquiries and Observations, vol. i. These he, from time to time, continued, embracing most of the writings above enumerated, besides observations on the climate of Pennsylvania, and some others, until a fifth volume was completed in 1798. In 1801 he added to his character as a writer, by the publication of six Introductory Lectures to a course of Lectures upon the Institutes and Practice of Medicine, delivered in the University of Pennsylvania. In 1804 a new and corrected edition of his Medical Inquiries, &c. was printed in four volumes, octavo. In 1806 he also published a second edition of his Essays. In 1809, such was the demand for the Medical Inquiries and Observations, he again revised and enlarged the work throughout, and enriched the medical profession with a third edition. In this edition he continued his several histories of the yellow fever, as it prevailed in Philadelphia from 1793 to 1809. It also contained a Defence of Blood-letting, as a Remedy for certain Diseases; a view of the comparative state of Medicine in Philadelphia between the years 1760 and 1766, and the year 1809; an Inquiry into the various sources of the usual forms of Summer

mer and Autumnal Diſeaſes in the United States, and the means of preventing them; and the recantation of his opinion of the Contagious nature of the Yellow Fever.

He now formed the idea of ſelecting ſome of the beſt practical works for republication in America, and in order to render them more uſeful, of adding to them ſuch notes as might the better adapt them to the diſeaſes of his own country. His editions of Sydenham and of Cleghorn were publiſhed in 1809, and in 1810 appeared thoſe of Pringle and Hillary. In 1811 appeared a volume of Introductory Lectures, containing thoſe he had formerly publiſhed, with ten others delivered at different years before his claſs, and alſo two upon the pleaſures of the ſenſes and of the mind. His work upon the Diſeaſes of the Mind, which had long and ardently been looked for, was next added to his writings. It appeared towards the cloſe of 1812, in one volume octavo. The laſt effort of his pen was a letter on Hydrophobia, containing additional reaſons in ſupport of the theory he had formerly advanced, as to the ſeat of the diſeaſe being chiefly in the blood-veſſels. It was addreſſed to Dr. Hoſack, and written not many days before his fatal illneſs.

While thus aſſiduouſly engaged in enriching medical ſcience with the valuable fruits of his long and extenſive experience, and in the active diſcharge of the practical duties of his profeſſion, he was, on the evening of the 13th of April, ſeized with ſymptoms of general febrile irritation, which were ſoon accompanied with conſiderable pain in his cheſt. His conſtitution was naturally delicate, and he had acquired, from previous illneſs, a prediſpoſition to an affection of his lungs. He loſt a moderate quantity of blood, by which he felt himſelf conſiderably relieved. But his ſtrength was not ſufficient to overcome the ſeverity of his complaint; the beneficial effects reſulting from the moſt ſkilful treatment were but of temporary duration. His diſeaſe rapidly aſſumed a typhus character, attended with great ſtupor, and a diſinclination to converſation. In other reſpects, however, he retained his faculties, and the perfect conſciouſneſs of his approaching diſſolution. On Monday evening enſuing, after a ſhort illneſs of five days, and in the 69th year of his age, he ended his truly valuable and exemplary life. His death was the ſubject of univerſal lamentation, and he was followed to the grave by thouſands, who aſſembled to bear teſtimony to his excellence.

In January, 1776, he married Miſs Julia Stockton, daughter of the Hon. Judge Stockton, of New Jerſey, a lady of an excellent underſtanding, and whoſe amiable diſpoſition and cultivated mind eminently qualified her as the companion of Dr. Ruſh. Thirteen children were the fruits of their marriage, nine of whom ſtill ſurvive. Two of theſe are choſen to offices of high reſpectability in the general government of the United States.

It were no eaſy taſk to do adequate juſtice to the great talents, the uſeful labours, and the exemplary character of Dr. Ruſh. From the preceding ſketch, it is preſumed, ſome idea may be formed of his inceſſant devotedneſs to the improvement of that profeſſion of which he was ſo bright an ornament. His merits, as a practitioner, are too well known to need particular notice; he was fully aware of the great reſponſibility attached to the medical character, and uniformly evinced the deepeſt ſolicitude for the recovery of his patient. His kindneſs and liberality in imparting aid to thoſe from whom no remuneration was ever to be expected were unbounded, and aroſe from the generous impulſe of his nature, the cordial concern he felt in whatever affected the intereſts of his fellow creatures. His mind was of a ſuperior order: to a perception naturally ready and acute, he united a diſcriminating judgment, a retentive memory, which was greatly improved by habits of cloſe attention, a brilliant imagination, and a highly cultivated taſte. He poſſeſſed a comprehenſive underſtanding; his knowledge was varied and profound, and he eminently excelled in the ſeveral departments of his profeſſion. In his aſſiduity and perſeverance in the acquiſition of knowledge he had no ſuperior, and few equals. Accuſtomed to conſtant and regular exerciſe, his intellectual powers acquired additional vigour from employment. Notwithſtanding the great fatigue he had to undergo in the diſcharge of the practical duties of a laborious profeſſion, and the conſtant interruptions to which he was expoſed, when engaged in his purſuits as an author, he never for a moment abated of his ardour in the cauſe of ſcience. His habits of punctuality to every kind of buſineſs in which he was employed, added to a judicious arrangement of time for his multifarious occupations, ſecured to him ſufficient leiſure for the publication of thoſe works which have given ſuch celebrity to his name.

His writings claim our attention, both on account of their extent and their variety. Inſtead of being a mere collator of the opinions of others, he was conſtantly making diſcoveries and improvements of his own, and from the reſults of his individual experience and obſervation, added more facts to the ſcience of medicine, than all who had preceded him in his native country. His deſcription of diſeaſes, for minuteneſs and accuracy of detail, cannot be exceeded, and may ſafely be regarded as models of their kind. His volume on the diſeaſes of the mind, as far as it exhibits the infinitely varied forms which thoſe diſeaſes exhibit, is a ſtorehouſe of inſtruction. Had his labours been limited to theſe ſubjects alone, his character would deſervedly have been cheriſhed by future ages. His reputation, however, will permanently depend upon his ſeveral hiſtories of the epidemics of the United States, which have rendered his name familiar wherever medical ſcience is cultivated, and will hereafter cauſe to be inſcribed upon the ſame imperiſhable column that bears teſtimony to the merits of Sydenham and Boerhaave, the illuſtrious name of Benjamin Ruſh. The reſpect and conſideration which his publications procured for him among his contemporaries, were ſuch, that the higheſt honours were accumulated upon him in different parts of Europe, as well as in his own country, and he was admitted a member of many of the moſt diſtinguiſhed literary and philoſophical aſſociations.

There are other qualities which ſtill more entitled Dr. Ruſh to our reſpect and eſteem. In private life, his diſpoſition and deportment were in the higheſt degree exemplary. Admired and courted for his intellectual endowments, he riveted to him the affections of all who enjoyed the pleaſure of an intimate acquaintance. The affability of his manners, the amiableneſs of his temper, and the benevolence of his character, were ever conſpicuous. He was ardent in his friendſhips and forgiving in his reſentments, and yet entertaining a due regard for himſelf and a high ſenſe of honour, he poſſeſſed a manly independence of ſpirit which diſdained every thing mean and ſervile. He had an extraordinary command of language, and always imparted his thoughts in a peculiarly impreſſive and eloquent manner. Thoſe who had the happineſs to experience the delights of his converſation, will long recollect, with pleaſure, his unaſſuming modeſty, and the rich ſtores of knowledge he poured forth on the moſt inſtructive topics. Even when his opinions were ſolicited, they were given, not as the dictates or admonitions of a ſuperior, but as the kind advice of a friend and equal. He never evinced any of that haughtineſs and affectation of importance, which ſometimes attaches to

men

men of eminence, and which ſo materially leſſens the pleaſures and comforts of ſocial life.

He was a believer in Chriſtianity from an examination of its principles and the deepeſt conviction. The purity of its doctrines, and the excellence of its precepts, were a frequent topic of his converſation; its practical influence upon his conduct through life he often acknowledged, and cheriſhed with a fervent hope the animating proſpects it affords. His writings, in numerous places, bear teſtimony to his Chriſtian virtues; and in a manuſcript letter, written a ſhort time previous to his fatal illneſs, and now before the writer of this imperfect ſketch, he candidly declares that he had "acquired and received nothing from the world which he ſo highly prized as the religious principles he received from his parents." It is peculiarly gratifying to obſerve a man ſo diſtinguiſhed in a profeſſion in which, by the illiberal, religious ſcepticiſm is ſuppoſed to abound, directing his talents to the maintenance of genuine piety, and the enforcing of Chriſtian virtue. To inculcate thoſe principles which flow from the ſource of all truth and purity, and to impart them as a legacy to his children, was an object dear to his heart, and which he never failed to promote by conſtant exhortation and the powerful influence of his own example.

There is one particular circumſtance in the character of Dr. Ruſh, which we cannot permit to be paſſed over without obſervation; we allude to the union, ſo eminently conſpicuous in him, of the eminent practitioner, and the able and voluminous writer. But our limits will not allow us to enlarge. The materials of the above biographical article have been extracted from the American Medical and Philoſophical Regiſter, conducted by Dr. Hoſack and Dr. Francis, of New York; July, 1813.

Rush, in *Botany*. See Juncus.

Ruſhes always indicate a deepiſh rich ſoil, and they thrive moſt in land that is too wet and cold for moſt other plants. It has been obſerved that plants of the ruſh kind may be eaſily removed by preventing the ſtagnation of moiſture near the ſurface by judicious under or ſurface draining, and the application of ſubſtances of the ſaline or calcareous kinds, as aſhes, lime, drift from the roads, and other ſimilar materials. Theſe are beſt made uſe of in a dry ſeaſon in either the autumn or ſpring, but the latter is probably the beſt; as theſe abſorbent materials will thereby be made uſe of at the time ſuch plants begin to ſhoot and eſtabliſh themſelves, and when there will be the leaſt danger of their operation being leſſened or prevented by too great a degree of moiſture. It has been ſtated by Mr. Kent, that in naturally coarſe meadows, or ſuch as become ſo in conſequence of ruſhes growing upon them before they have been rendered ſufficiently dry by draining, it forms a great improvement to apply a thin coat of ſand evenly over the ſurface of them in the proportion of from twenty to thirty common loads. By this means the ſward is rendered much finer, and a much better ſort of herbage brought up, white clover being predominant in moſt caſes. And there is ſtill another method, that, in particular ſituations, may be more eaſy and convenient, and which has been found to quickly deſtroy plants of this coarſe kind by bringing up thoſe of a finer deſcription. It is a mode that may, at firſt, ſeem ſingular to thoſe who have not ſeen its ſudden and aſtoniſhing effects. It is that of conducting water over the ſurface of ſuch ground; but in this intention it ſhould not be ſuffered to have the leaſt degree of ſtagnation, but be conveyed off with as much expedition as poſſible, by ſuitable drains being made. Frequent cutting over while in their young growth has alſo been found uſeful in deſtroying them.

Another method of deſtroying ruſhes is to fork them up clean by the roots in July, and after having let them lie a fortnight or three weeks to dry, lay them in heaps and burn them gently, and the aſhes which theſe afford will be tolerable manure for the land; but, in order to prevent their growing again, and to make the paſture good, the land ſhould be drained, otherwiſe there will be no deſtroying them entirely; but after it is well drained, if the roots are annually drawn up, and the ground kept duly rolled, they may be ſubdued. Miller.

Rush, *Flowering*, or *Water Gladiole*. See Butomus.

Rush, *Leſſer Flowering*. See Scheuchzeria.

Rush, *Round, Black-headed, Marſh*, or *Bog*. See Schoenus.

Rush, *Sweet*. See Acorus.

Rush-*Graſs*. See Scirpus.

Rushes, *Petrified*. What is uſually called by this name is a kind of foſſile coral. But we have in England, alſo, another not uncommon ſubſtance, frequently called by the ſame name: this is an incruſtation of ſpafry matter, in the form of a ſtony cruſt on the outſides of real ruſhes; though, in this caſe, it is no real petrifaction, but only a covering of this ſtone-like matter.

Incruſtations and petrifactions are uſually confounded together, and the generality of people do not attend to the diſtinction, which is, that in a real petrifaction, the ſtony matter penetrates the very ſubſtance of the body, as is the caſe in the petrified wood of Ireland, and other places; whereas, in theſe incruſtations the ſubſtance itſelf remains unaltered within, and its outer part alone is covered with the ſtony ſubſtance; this is the caſe with what is called the petrified moſs at Scarborough, and in other parts of England, and this is the caſe in regard to what we call ſometimes petrified ruſhes.

Rush, in *Rural Economy*, a term ſignifying a tuft, cluſter, or a knot of plants of the corn or graſs kind.

Rushes is alſo a term provincially applied to the wire ruſh.

Rush, in *Geography*, a fiſhing-town of the county of Dublin, Ireland, well ſituated for carrying on buſineſs to advantage. The ling cured here, of which much is exported, is celebrated for its ſuperior flavour. It is ſituated on a point of land projecting into the Iriſh ſea; 13½ miles N. by E. from Dublin.

Rush, *The*, a ſand-bank near the E. coaſt of Ireland, and county of Wexford, about four miles long, and hardly one broad; a little to the ſouth of Glaſcarrick Point.

RUSHA, a ſmall iſland near the W. coaſt of Scotland. N. lat. 58°. W. long. 2° 20′.

RUSHIN, or Castle Rushin. See Castle-town.

RUSHWORTH, John, in *Biography*, was born in or about the year 1607, ſomewhere in the county of Northumberland. Of the early part of his education we have no account. He was ſome time a ſtudent in the univerſity of Oxford, after which he entered himſelf at Lincoln's Inn, and was called to the bar. He was, however, more attached to politics than to the purſuits of the profeſſion, and was almoſt perpetually an attendant on the parliament, ſtar-chamber, and other courts, taking notes, in ſhort-hand, of the proceedings at thoſe places. In the troubles of that period he attached himſelf to the parliamentarian and preſbyterian parties, and in 1640 he was admitted an aſſiſtant clerk of the houſe of commons. He ſoon gained the confidence of the houſe, and, during the king's reſidence at York, was employed to convey to him its addreſſes and meſſages, on which occaſions he is ſaid, even at that period, to have rode from London to that city in 24 hours. For theſe ſervices he was recommended by the houſe to

to a place in the excise. In 1643 he took the covenant, and sir Thomas Fairfax, to whom he was nearly related, being made general of the parliamentary forces, appointed Mr. Rushworth to be his secretary. In this situation he was very zealous and active in performing his duties, public and private. In 1649 he attended Fairfax to Oxford, where he was created M.A. as a member of Queen's college. When Fairfax resigned his commission, Rushworth took up his residence in London, and was nominated in 1652, by the house of commons, one of the commissioners to reform abuses in the common law. At this time he was engaged in the compilation of his "Historical Collections," of which the first part appeared in 1659, dedicated to Richard Cromwell, at that time Protector. He was at this period member of parliament for Berwick-upon-Tweed. In 1660 he was appointed one of the clerks of the new council of state. After the Restoration, he endeavoured to ingratiate himself with Charles II. by presenting to him several books of the privy-council during the former reign, which he had preserved from destruction, for which, however, he probably received no higher reward than that of thanks. In 1667, sir Orlando Bridgeman, keeper of the great seal, made him his secretary, when he was again elected representative for Berwick in the parliament of 1678-9, and the subsequent one held at Oxford. After the dissolution of the latter, having always been careless of his private affairs, he fell into necessitous circumstances, and lived in great obscurity in Westminster, assiduously employed in his Collections, of which he published the second part in 1680. He was at length arrested for debt, and committed to the king's bench prison, where he spent, in great wretchedness, the last six years of his life. He died in 1690, at the age of 83. He had several daughters, one of whom was married to sir Francis Vane. The "Historical Collections" of this author include private passages of state, weighty matters of law, remarkable proceedings in parliament, &c. and they commence in the reign of king James, in the year 1618, and were brought down to 1740. The third and fourth parts, printed from his MSS., extend to the death of Charles I. in 1648-9. The whole was reprinted uniformly in 7 volumes, folio, in 1721. Of his Collections, the writer in the Biographia Britannica says, all that have written on the Puritan or Presbyterian side have highly extolled, nay almost idolized them; such as Coke, Rapin, Oldmixon, &c. Others, on the contrary, who were favourers of king Charles I. and his cause, condemn them as extremely partial, and have discredited them as much as possible. But the person who professedly set himself to oppose them was John Nalson, L.L.D., who published, by command of king Charles II., "An Impartial Collection of the great Affairs of the State, from the Beginning of the Scotch Rebellion in the Year 1639, to the Murder of King Charles I." &c. Dr. Nalson did not continue his history lower than January 1641-2. He brings four capital accusations against Rushworth, *viz.* that he does not inform us whence he had his materials, and therefore that his facts do not stand upon sufficient authority;—that he prints false and erroneous copies of some papers;—that, under the colour of epitomizing others, he has not only obscured, but, in many places, corrupted and disguised the sense;—and that he has recorded little but what relates to the justification of those whom he favours, and their proceedings, omitting what might serve to manifest the king's innocence. In a compilation of such extent, it is no wonder there should be errors, and the writers of the "Parliamentary History" have taken pains to frame a long list of his mistakes, which is copied in a note to the article Rushworth, in the Biog. Brit.; they, however, attribute them rather to the negligence and ignorance of transcribers, than to wilful misrepresentation. It can, however, scarcely be expected that a man, writing as he did, should be free from partialities, or that his personal attachments should not enter into his work. Besides, it is certain that the first part of his work was submitted to the revision of Oliver Cromwell, who being too much occupied to examine it himself, put it into the hands of Whitelock, under whom it underwent various alterations. Nevertheless, Mr. Rushworth professes great impartiality and faithfulness, assuming that he must be in possession of a sufficient degree of knowledge and information for all the objects he had in view; and he, moreover, gives himself as an instance, that it is possible for a man to be of a *party* and not *partial*. The value of the "Historical Collections" arises from their having preserved together several detached pieces, which otherwise would have been lost, and from being the fullest compilation during the period of which they treat. Biog. Brit.

RUSHY Land, in *Agriculture*, that which is much infested and troubled with the growth of rushes upon it. Lands of this nature and quality prevail in many places to very considerable extents, which, when properly reclaimed and managed, constitute extremely good meadows and pastures. They are also, in some cases, capable of being broken up and converted to the purpose of tillage, with great advantage.

In many instances of this nature, very great benefit has been derived from a thick covering of chalk rubbish, or the rubbish of lime-stone and free-stone quarries, applied in a considerably reduced or powdery state, after the land had been sufficiently freed from stagnant water by means of pipe or other kinds of under draining, as such heavy materials soon sink in the ground, and by consolidating it are the cause of bringing up another sort of better plants of the grass kind. When such rushy lands have once acquired a certain state and degree of firmness by these or any other means, they may be further benefited and improved by rolling, and close feeding down with sheep stock, which should be confined on particular portions of them, in great numbers, in order to insure the fullest effect and advantage.

It is better likewise, where they are capable of it, to let these sorts of lands remain for some years in the state of pasture, than to bring them directly under the mowing system; as, in that way, they are constantly advancing to a more solid and finer state of herbage, whereas under the contrary practice, they are invariably getting more open, loose, and coarse in their produce. See Rush.

RUSIBIS Portus, in *Ancient Geography*, a port of Africa, in Mauritania Tingitana, between the mouth of the river Cosa and that of Asama, according to Ptolemy. It is called *Rutubis Portus* by Pliny.

RUSICADA, Sgigata, a town of Africa, according to Mela and Ptolemy. It was situated towards the middle of the gulf of Numidia, about 30 miles E. of Collops Magnus. In the Itinerary of Antonine, this town is placed in Mauritania Cæsariensis, upon the route from Carthage to Leninx, between Chuli Municipium and Paratianæ. Here are some remains of antiquity. Its cisterns serve as a corn magazine.

RUSICIBAR, a town of Africa, in Mauritania Cæsariensis, between Rustonium and Modunga, according to Ptolemy. Antonine calls it Rusubbicari, and in the Peutingerian Tables it is Rusibricari Matidiæ.

RUSIN, in *Geography*, a town of Bohemia, in the circle of Schlan; 4 miles N. W. of Prague.

RUSK, Al, a town of Curdistan; 18 miles S.E. of Amadieh.

RUSKO,

RUSKO, a town of Sweden, in the government of Abo; 6 miles N.W. of Abo.

RUSKOBAGAN, the Indian name of Parker's island in Kennebeck river.

RUSKY, or RUSKYBRIDGE, a small post-town of Ireland, in the county of Leitrim, where there is a bridge over the Shannon. It is 67 miles N. by W. from Dublin, and 7 from Longford.

RUSLAM RIVER, a river of Upper Canada, which runs into lake St. Clair, between Point aux Roches and Belle river; it is navigable by a loaded boat six miles upwards. The land on its banks is very good, and at the distance of a few miles in ascending it there is an Indian settlement.

RUSMA, in *Natural History*, the name given by the Eastern nations to the substance called by the ancient Greeks *sory*, and used as a depilatory.

The Turks call this substance *rusma*, and the Arabians *nouret*. It is not, as some have imagined, a mineral substance found ready for use, as a depilatory, in the bowels of the earth; but it requires a preparation and an alloy to give it that property. Bellon, who first described (at Cuta, in Galatia,) "the source of a mineral which they call *rusma*," adds, that this mineral alone cannot be used "till it has been beaten into a very fine powder, putting half as much quick-lime as rusma, which is then diluted in a vessel with water." Thus, the rusma of Bellon is not of itself a depilatory; but it contains some caustic matter, which being mixed with lime, gives it that property. This presumption is confirmed by M. Velmont de Bomare, who, having received from Constantinople some small pieces of mineral rusma, perceived, that on throwing it upon hot coals, there immediately exhaled from it a vapour, which gives reason for suspecting that it is a "colchitis" mineralized by sulphur and arsenic. This mixture is the true rusma of the Turks, and the nouret of the Arabs. There are different names of the same substance, or rather of the same composition. It is, in fact, with arsenic or orpiment, mixed with quick-lime, that the drug for taking off the hair is prepared in the Egyptian baths. The proportion is seven parts of lime to three of orpiment. It is necessary for the person who desires to use it, to keep in a very warm place, such as the hot baths of the East, in which a profuse sweat exudes from all parts of the body. The mixture is diluted with water, and lightly rubbed on the parts from which the hair is to be taken off. After a few moments, it will be seen if the hair be loosened; it can then be plucked out without pain, and the skin is afterwards washed with hot water. Care must be taken, however, that this liniment does not remain on too long, because it would burn the skin. This does not prevent the hair from growing again, and at the end of some time the operation must be repeated.

Mr. Boyle tells us, he made a fine powder of equal parts of rusma and quick-lime, and letting them soak a little time in water, they became a soft paste, which he spread on the part he would free from hair; and after letting this paste lie on about three minutes, he wiped it off with a wet cloth, and found the hair taken away by the roots without any inconvenience to the part.

RUSOER, in *Geography*. See RISOER.

RUSOOLPOUR, a town of Hindoostan, in Allahabad; 35 miles N. of Gazypour.

RUSPACH, a town of Austria; five miles S. of Sonneberg.

RUSPÆ, SHE-AH, in *Ancient Geography*, a town of Africa, on the gulf of Numidia, according to Ptolemy, situated between Achola and Brachodes Exterma; six miles S. of Achola. Some ruins still remain.

RUSPEN, in *Geography*. See ROSZWEIN.

RUSPINA, SAHALEEL, in *Ancient Geography*, a town of Africa, on the gulf of Numidia, between Leptis Minor and Adrumettium, according to Ptolemy. It was situated on the declivity of an eminence about a mile from the sea, S.E. of Adrumettium. It is known by some ancient remains.

RUSPONO, in *Commerce*, a gold coin of Tuscany, which is a piece of 3 sequins, weighing 8 denari 21 grani, Florence weight, and passing for 40 lire or 60 paoli. In gold and silver weight, the pound contains 12 ounces; the ounce, 24 denari or 576 grani. This pound weighs 11 oz. 2 deniers 8 grains, French poids de Marc, or 5241 English grains; so that 100lbs. of this weight answer to 91lbs. English troy weight. The assay and value of the ruspono are as follow: compared, as to fineness, with the English standard of 22 carats, and as to value with the mint price of gold in England, *i. e.* 3*l.* 17*s.* 10½*d.* *per* oz. standard, *viz.*

	Assay.	Weight.	Contents in pure Gold.	Value in Sterling.
	car. gr.	oz. dwt. gr.	grains.	*L. s. d.*
Ruspono - -	B. 1 3¾	0 6 17¼	160.8	1 8 5½
Zecchino, or sequin	B. 1 3¾	0 2 5¾	53.6	0 9 5¾
Ruspono of Etruria	B. 1 3⅞	0 6 17¼	161.6	1 8 6

The impressions on the ruspono are a lily, with the name and title of the reigning prince, thus: FERDINANDUS III. D. G. A. A. M. D. ETR. that is, *Dei Gratia Archidux Austriæ, Magnus Dux Etruriæ*, (Ferdinand III. by the grace of God, archduke of Austria, grand duke of Tuscany); reverse, a figure representing St. John the Baptist; legend, S. JOANNES BAPTISTA. Some pieces, coined about the year 1738, bear the head of the reigning prince; legend, FRANCISCUS III. D. G. LOTH. BAR. ET M. ET. D. REX HIER. (Francis III. by the grace of God, duke of Lorraine and Bar, grand duke of Tuscany, king of Jerusalem); reverse, arms of the prince; legend, IN TE DOMINE SPERAVI, (in thee, O Lord, have I hoped).

The new ruspono of the kingdom of Etruria bears the same impressions as above; legend in those coined in 1803, LUDOVICUS I. D. G. HISP. INF. REX ETRURIÆ, (Louis I. by the grace of God, infant of Spain, king of Etruria); and in those struck in 1804, CAROLUS I. D. C. REX ET M. ALOYSIA R. RECTRIX, (Charles I. by the grace of God, king of Etruria, and Maria Louisa queen regent).

The sequin of Tuscany has the same impression as the ruspono.

RUSS, in *Geography*, a town of Prussian Lithuania, and principal place of a district, situated at the mouth of the river Russe; 20 miles N.W. of Tilsit.—Also, a small island in the East Indian sea, near the W. coast of Nassau. S. lat. 2° 53′. E. long. 99° 48′.

RUSSE, a river of Prussia, one of the branches of the Memmel, which runs into the Curisch Haff.

RUSSELE'E, a town of Asiatic Turkey, in the province of Diarbekir; 58 miles S. of Mosul.

RUSSELIA, in *Botany*, received that name from Jacquin, in honour of Dr. Alexander Russel, for many years physician to the English factory at Aleppo, and author of a "Natural History" of that place, published in 1756; which was subsequently re-edited by his brother, the late worthy Dr. Patrick Russell, so well known by his works on the Plague, and on Indian Serpents. (See RUSSELL.) This original *Russelia* was neglected by Linnæus; but in the *Supplementum*, printed in

in 1781, his ſon gave that appellation to another genus, now eſtabliſhed under the name of VAHLIA, as will hereafter be ſhewn when we come to that article. The younger Linnæus appears to have puzzled himſelf between the words *Ruſſelia* and *Rouſſea*; for the latter was what his father had intended; ſee ROUSSEA. The reſult of all this confuſion is, that Jacquin's *Ruſſelia* is now finally reſtored to its due rank.—Jacq. Amer. 178. Schreb. 419. Willd. Sp. Pl. v. 3. 344. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. Epit. 373. Juſſ. 118. Lamarck Illuſtr. t. 539.—Claſs and order, *Didynamia Angioſpermia*. Nat. Ord. *Perſonatæ*, Linn. *Scrophulariæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, ovate, concave, acute, taper-pointed, erect, ſmall, permanent ſegments. *Cor.* of one petal, ringent; tube cylindrical, ſomewhat compreſſed, erect, ſeveral times longer than the calyx, hairy at the lower ſide internally; limb two-lipped; the upper lip roundiſh, flat, cloven, ſpreading, reflexed at the ſummit; lower rather the longeſt, in three deep, oblong, obtuſe, flat, widely ſpreading ſegments. *Stam.* Filaments four, thread-ſhaped, erect, rather ſhorter than the tube, two of them longeſt; anthers ovate. *Piſt.* Germen ſuperior, ovate; ſtyle thread-ſhaped, erect, the length of the ſhorter ſtamens; ſtigma globoſe, undivided. *Peric.* Capſule roundiſh, beaked with the permanent baſe of the ſtyle, of two cells and two valves, about as long as the calyx. *Seeds* numerous, minute.

Eſſ. Ch. Calyx in five deep taper-pointed ſegments. Upper lip of the corolla emarginate; lower in three deep ſegments; tube much longer than the calyx, hairy within. Stigma globoſe. Capſule of two cells, and two valves, with many ſmall ſeeds.

1. R. *ſarmentoſa*. Trailing Ruſſelia. Jacq. Amer. 178. t. 113. Willd. n. 1.—Leaves ovate, nearly ſeſſile. Stalks axillary, three-flowered. Gathered by Jacquin in woods and buſhy places about the Havannah. The *ſtem* is ſhrubby, with numerous long, weak, ſquare, ſmooth, leafy *branches*, ſupporting themſelves againſt the neighbouring buſhes, and pendulous at the ends. *Leaves* oppoſite, on very ſhort ſtalks, ovate, acute, ſerrated; rather hairy on the margin and upper ſurface; ſmooth at the back. *Flowers* about an inch long, inodorous, of a fine red, growing two or three together on axillary ſtalks, not ſo long as the leaves. The partitions of the *capſule*, being formed of the inflexed valves, probably ſeparate from the central column as the fruit ripens, and led Jacquin to deſcribe the *capſule* as of one cell. The ſame thing is obſervable in *Verbaſcum*.

2. R. *rotundifolia*. Round-leaved Ruſſelia. Cavan. Ic. v. 5. 9. t. 415.—Leaves ſeſſile, heart-ſhaped, roundiſh. Cluſters many-flowered, axillary and terminal, in pairs. Gathered by Louis Née, near Acapulco, flowering and ſeeding in February, March, and April. The *ſtem* is erect, ſhrubby, four feet high, with obſcurely quadrangular, downy *branches*. *Leaves* about two inches in diameter, almoſt orbicular, though ſomewhat pointed, reticulated with veins, downy, eſpecially when young, broadly ſerrated. *Flowers* ſcarlet, ſmaller than the preceding, in twin *cluſters*, with ſmall *bracteas* under each pair of partial ſtalks. Central column of the *capſule* hairy. *Seeds* minute, black. *Cavan.*

3. R. *multiflora*. Many-flowered Ruſſelia. Sims in Curt. Mag. t. 1528.—Leaves ovate, pointed, ſtalked. Cluſter terminal, whorled, compound; the ſtalks cymoſe. Found by Mr. Cowan, in the mountainous tract of South America, between Vera Cruz and Mexico. Mr. Lambert raiſed the plant from ſeed, and it flowered in his ſtove at Boyton in the autumn of 1812. The *ſtems* and *branches* are weak and trailing, as in the firſt ſpecies; but the *leaves* are larger, and the *flowers* much more numerous, compoſing denſe whorled *cluſters* at the ends of each branch. *Corolla* ſcarlet, about the ſize of *R. ſarmentoſa*, but the points of the *calyx* are longer.

RUSSELL, *Lord* WILLIAM, in *Biography*, a diſtinguiſhed patriot and martyr to the cauſe of liberty, was the third ſon of William, the firſt duke of Bedford, by a daughter of the earl of Somerſet. He was born about the year 1641, and was brought up in thoſe principles of liberty of which his father was an aſſertor, and which are congenial to the ſpirit of the Engliſh conſtitution. Being in the fervour of youth at the time of the reſtoration of Charles II. he joined in the gaieties of the court; till his marriage in 1667, with Rachel, ſecond daughter and co-heireſs of the earl of Southampton, reclaimed him from any irregularities into which he had fallen, and from this time he bore a moſt unblemiſhed character. In four parliaments he repreſented the county of Bedford, highly eſteemed for his patriotiſm and independent ſpirit. He was looked up to as one of the heads of the Whig party.

"A political intrigue of this period," ſays one of his lordſhip's biographers, "has brought an imputation on his memory, from which different methods have been taken to clear it. Charles II., one of the moſt profligate of public characters, had been exaſperated againſt the court of France, by the withdrawing, on account of the marriage of the duke of York's daughter to the prince of Orange, that penſion which he had hitherto been mean enough to receive, and he appeared deſirous of joining the continental confederacy againſt Lewis XIV. A French war being always popular in England, the parliament voted a large ſupply of men and money for the purpoſe. The patriots, however, knowing that Charles was not to be truſted, and being at the ſame time full of alarms reſpecting popery and arbitrary power, were very unwilling to give him the diſpoſal of an army, which might as probably be employed againſt the liberties of the country, as againſt France. In this point, therefore, their wiſhes coincided with thoſe of Lewis, in raiſing an oppoſition to the meaſures of the Engliſh court: and by means of a M. de Rouvigny, who was a relation of lady Ruſſell, they intrigued with Barillon, the French ambaſſador in England. From that miniſter's private diſpatches, ſir John Dalrymple copied, and publiſhed in his 'Memoirs of Great Britain,' his negotiations on this head, and alſo a liſt of members of parliament whom he had actually bribed." Lord W. Ruſſell is not charged with being one of the number bribed; he and lord Hollis, it is aſſerted, poſitively refuſed to accept of money. There ſeems, however, little reaſon to doubt that he took a part in the intrigue. His intentions, no doubt, were perfectly upright: he was zealouſly inclined to defend the Proteſtant intereſt, which he ſaw was in imminent danger, and he hoped, by the courſe which was now taken, the blow might be warded off. To his good intentions, therefore, his biographers muſt appeal for the juſtification of a ſtep confeſſedly of a ſuſpicious nature, and not conſiſtent with correct policy.

In the year 1679, the king found it expedient to ingratiate himſelf with the Whigs, by the appointment of a new privy council, of which lord Shaftesbury was preſident, and lord William Ruſſell was a member. They ſoon found that they did not enjoy the king's confidence, who engaged in ſome important meaſures without their concurrence, among which was the recall of the duke of York; ſeveral of them reſigned, and lord Ruſſell among the number. His ſenſe of the danger to the Proteſtant religion from a Catholic ſucceſſor, induced

induced him to take a moſt deciſive part in the attempt for the excluſion of the duke of York. He went publicly to Weſtminſter-hall, and at the court of king's bench preſented the duke as a recuſant: this was in June 1680, and in the following November, he carried up the Excluſion-bill to the houſe of lords, at the head of 200 members of the houſe of commons. The lead which he took in this matter, as it was highly diſpleaſing to the court, ſo it carried a great influence with the public, he being a perſon of high reputation for integrity, a man of very great fortune, and wholly deſtitute of private ambition. The king diſſolved the parliament, and ſeemed determined to govern without one. Arbitrary principles were openly avowed by the friends of the king, and the cauſe of liberty, civil and religious, was brought into the greateſt hazard.

This ſtate of affairs inſpired deſperate councils into ſome of the Whig leaders, and a conſpiracy was formed for an inſurrection, conducted by a council, conſiſting of the duke of Monmouth, lords Ruſſell, Eſſex, and Howard, Algernon Sydney, and Hampden, who were to act in concert with the duke of Argyle, and the Scotch malcontents. Among theſe leaders different deſigns prevailed; but it is admitted, that the ſubject of this article had no other views than to procure the excluſion of the duke of York from the throne, and a redreſs of grievances. While theſe ſchemes were agitating, a minor plot was laid by ſome inferior conſpirators, which conſiſted of a plan for aſſaſſinating the king on his return from Newmarket, at a farm called the Rye-houſe, and which has given name to this plot. Although it is known that this conſpiracy was entirely apart from the ſcheme of an inſurrection, yet two of the perſons engaged in the Rye-houſe plot had acceſs to ſome of the leaders in the other plan, and the detection of the one plot, led to the diſcovery of the other, and orders were inſtantly iſſued for the apprehenſion of thoſe engaged in it. Lord William Ruſſell was in conſequence committed to the Tower, and after ſome of the Rye-houſe conſpirators had been condemned and executed, and the nation was fully impreſſed with horror of a plot ſuppoſed to be connected throughout with a deſign of aſſaſſination, he was brought to trial in July 1683. A jury of zealous royaliſts was packed for the purpoſe of convicting the priſoner: in the indictment, the noble lord was charged with the treaſonable purpoſe of killing the king, which was made an inference from his being engaged in a plan of inſurrection. "On the whole," ſays Hume, "having deſcribed the nature of the evidence produced on the trial, it was undoubtedly proved, that the inſurrection had been deliberated on by the priſoner, and fully reſolved; the ſurpriſal of the guards deliberated on, but not fully reſolved, and that an aſſaſſination had not been once mentioned or imagined by him. So far the matter of fact ſeems certain: but ſtill, with regard to the law, there remained a difficulty, and that an important one. The Engliſh laws of treaſon, both in the manner of defining that crime, and in the proof required, are the mildeſt and moſt indulgent, and conſequently the moſt equitable, that are any where to be found. The two chief ſpecies of treaſon contained in the ſtatute of Edw. III. are the compaſſing and intending of the king's death, and the actually laying of war againſt him; and by the law of Mary, the crime muſt be proved by the concurring teſtimony of two witneſſes, to ſome overt act, tending to theſe purpoſes. But the lawyers, partly deſirous of paying court to the ſovereign, partly convinced of ill conſequences which might attend ſuch narrow limitations, had introduced a greater latitude, both in the proof and definition of the crime. It was not required that the two witneſſes ſhould teſtify the ſame preciſe overt act. It was ſufficient that they both teſtified ſome overt act of the ſame treaſon; and though this evaſion may ſeem a ſubtilty, it had long prevailed in the courts of judicature, and had at laſt been ſolemnly fixed by parliament at the trial of lord Strafford. The lawyers had uſed the ſame freedom with the law of Edward III. They had obſerved, that, by that ſtatute, if a man ſhould enter into a conſpiracy for a rebellion, ſhould even fix a correſpondence with foreign powers for that purpoſe, ſhould provide arms and money, yet, if he were detected, and no rebellion enſued, he could not be tried for treaſon. To prevent this inconvenience, which it had been better to remedy by a new law, they had commonly laid their indictment for intending the death of the king, and produced the intention of rebellion as a proof of that other intention. But though this form of indictment and trial was very frequent, and many perſons had been convicted and executed upon it, it was unqueſtionably irregular, and plainly confounded, by a ſophiſm, two ſpecies of treaſon, which the ſtatute not only had diſtinguiſhed, but meant accurately to diſtinguiſh. What made this refinement more exceptionable was, that a law had paſſed ſoon after the Reſtoration; in which the conſulting or the intending of a rebellion was, during Charles's life-time, declared treaſon, and it was required, that the proſecution ſhould be commenced within ſix months after the crime was committed. Lord Ruſſell's crime fell within the ſtatute of Charles II., but the facts ſworn to by two witneſſes, were beyond the ſix months required by law, and to the other facts there was only a ſingle witneſs, and he an accomplice. Lord Ruſſell perceived this irregularity, and deſired to have the point argued by counſel. The chief juſtice told him, that could not be granted, unleſs he previouſly confeſſed the facts charged upon him." The artificial confounding of two ſpecies of treaſon, though a practice ſupported by many precedents, is the chief, but not the only, hardſhip of which the noble lord had to complain on his trial. His defence was feeble, contenting himſelf with proteſting that he never had entertained any deſign againſt the life of the king. The jury, after a very ſhort deliberation, found the priſoner guilty. Such a victim was too deſirable to the court, and too agreeable to the vindictive feelings of the duke of York, for him to expect the royal mercy; and though his father, whoſe only ſon he now was, offered a large ſum, a hundred thouſand pounds, to the ducheſs of Portſmouth, for his life; and his excellent wife, the daughter of a moſt diſtinguiſhed royaliſt, implored forgiveneſs in the moſt pathetic manner, his doom was irrevocable, and he obtained the remiſſion only of the moſt ignominious part of the ſentence. After his ſentence, he was attended by Tillotſon and Burnet, who, though afterwards favourers of the revolution, now urged upon the noble victim an acquieſcence in the doctrine of non-reſiſtance. This point, however, he was too firm and honeſt to concede, though a declaration to that purpoſe offered the only chance of a pardon. It was not quite creditable to the nobleneſs of his nature, that he ſhould condeſcend, even to ſave his life, to write a petitionary and rather humiliating letter to the duke of York, promiſing to forbear all future oppoſition to him, ſhould his life be ſpared. He alſo wrote a letter to the king, which was not to be delivered to him till after his death; this, though ſubmiſſive, was not at all abject. It is almoſt certain he muſt have taken theſe ſteps in compliance with the ſolicitations of his friends, rather than from the deſire of ſaving his own life; for he refuſed the generous offer of lord Cavendiſh to favour his eſcape, by changing

clothes with him in prison; and he also declined the duke of Monmouth's proposal of surrendering himself, should lord William Russell think it might contribute to his safety. "It will be no advantage to me," he said, "to have my friends die with me." Conjugal affection was the feeling that clung closest to his heart; and when he had taken his last farewel of his wife, he said, "The bitterness of death is now over." He suffered the sentence of his judges with resignation and composure. Some of his expressions imply much good humour in this last extremity. The day before his execution he was seized with a bleeding at the nose: "I shall not now let blood to divert this distemper," said he to Burnet, who was present; "that will be done to-morrow." A little before the sheriffs conducted him to his carriage, that was to convey him to the scaffold, he wound up his watch, "Now I have done," said he, "with time, and henceforth must think solely of eternity."

The execution was performed July 21st, not on Tower-hill, the common place of execution for men of high rank, but in Lincoln's-Inn-Fields, in order that the citizens might be humbled by the spectacle of their once triumphant leader, carried in his coach through the city; a device which, like most others of the kind, produced an effect contrary to what was intended. The multitude imagined they beheld virtue and liberty sitting by his side. As he was the most popular among his own party, so was he the least obnoxious to the opposite faction; and his melancholy fate united every heart, sensible of humanity, in a tender compassion for him. Without the least change of countenance, he laid his head on the block, and at two strokes it was severed from his body. He was, at the time of his death, only 42 years of age. To his character for probity, sincerity, and private worth, even the enemies to his public principles bear testimony. Of his understanding, bishop Burnet says "that he was slow, and of little discourse, and had a true judgment, when he considered things at his own leisure." At Wooburn Abbey is preserved, in gold letters, the speech of lord Russell to the sheriffs, together with the paper delivered by his lordship to them at the place of execution.

Mr. Calamy, in speaking of lord Russell, says, "that an age would not repair the loss to the nation, and whose name should never be mentioned by Englishmen without singular respect." He passed through and left this world, with as great and general a reputation as any one of the age, and his memory will be had in grateful and everlasting remembrance. Honour and friendship attended lord Russell beyond the grave. Lord Cavendish married his eldest son to one of the daughters of his deceased, his *murdered* friend; for so the deed was described in the act of 1688-9, for reversing the attainder. The house of commons, at the same time, appointed a committee to examine who were the advisers and promoters of the *murder* of lord Russell. In May 1694 his father, the earl of Bedford, was created marquis of Tavistock and duke of Bedford; and the reasons for bestowing these honours upon him are in part as follow: "That this was not the least, that he was the father to lord Russell, the ornament of his age, whose great merits it was not enough to transmit by history to posterity, but they (the king and queen) were willing to record them in their royal patent, to remain in the family as a monument consecrated to his consummate virtue, whose name could never be forgotten, so long as men preserved any esteem for sanctity of manners, greatness of mind, and a love to their country, constant even to death. Therefore, to solace his excellent father for so great a loss, to celebrate the memory of so noble a son, and to excite his worthy grandson, the heir of such mighty hopes, more cheerfully to emulate and follow the example of his illustrious father, they entailed this high dignity upon the earl and his posterity."

Russel, *Lady* Rachel, the worthy wife of the subject of the foregoing article, distinguished herself equally by the affectionate zeal with which she served her husband, and by the magnanimity with which she bore her loss, and the reverence she cherished for his memory. Upon his trial, she accompanied him into court; and when he was refused a counsel, and permitted only to employ an amanuensis, she stood forth as that assistant, exciting the sympathy and admiration of all the spectators. After his death, she wrote an affecting letter to the king, asserting that the paper delivered by him to the sheriffs was of his own composition, and not dictated by any other person, as had been suspected. She was the faithful guardian of her husband's fame. A few days after the defeat and death of the duke of Monmouth, with whom lord Russell had an intimate connection, she made use of the opportunity for declaring her conviction that his grace's late attempt was a new project, and not at all depending on any former design, if there was any real one, which, she said, she was satisfied, was no more than her lord admitted, *viz.* talk; and it is possible that conversation might have proceeded so far as to consider, if a remedy for supposed evils might be sought, how it could be formed. "He had," continues her ladyship, "so just a soul, so firm, so good, that he could not warp from such principles that were so, unless misguided by his understanding, and that his own and not another's: for I dare say, as far as he could discern, he never went into any thing considerable upon the mere submission to any one's particular judgment." Lady Russell also, in the same affectionate regard to her lord's memory, after the revolution, made use of her interest in favour of his chaplain, Mr. Samuel Johnson, and was instrumental in procuring him a pension. As she had promised her lord to take care of her own life, for the sake of his children, she was religiously mindful in keeping her promise, and continued his widow to the end of her life, which did not happen till Michaelmas day 1723, at the age of 87. Biog. Brit. Hume. Letters of Lady Rachel Russell.

Russell, Alexander, a physician, who resided several years in the English factory at Aleppo, was a native of Edinburgh, and at an early period of his life was devoted by his father to the profession of medicine. His education was, of course, obtained in his native university; and on coming to London, he was induced to embark for Turkey, and settled at Aleppo, with the appointment of physician to the English factory there. He applied himself assiduously to the acquisition of the language of the country, and to form an acquaintance with the most experienced practitioners, in order to learn their modes of practice. But he soon obtained a proud pre-eminence above all the physicians there, and was consulted by all nations, ranks, and professions, by Franks, Greeks, Armenians, Jews, and even Turks themselves. The pacha of Aleppo particularly distinguished him by his friendship, and this intimacy enabled Dr. Russell to render the most important services to the factory. The pacha, indeed, did not fail to consult him respecting every act of importance; and many criminals, who were natives, owed their lives to the doctor's interposition. The pacha carried his esteem for Dr. Russell so far, that he sent some valuable presents to his aged father, saying to him, "I am obliged for your friendship and assistance."

In 1755 Dr. Russell published his "Natural History of

Aleppo," a valuable and interesting work, containing especially some important observations relative to the plague, which have been found useful in Europe, and possibly have tended to check the progress of that dreadful scourge. This work has been translated into different European languages.

On his return to England, in 1759, he fixed his residence in the metropolis, and was elected physician to St. Thomas's hospital, a situation which he held to the time of his death, which occurred in 1770. The Royal Society were obliged to Dr. Russell for several valuable communications, and he presented many important papers to the Medical Society.

Russell, Patrick, brother of the preceding, and his successor as physician to the English factory at Aleppo. He published a copious "Treatise on the Plague," having had ample opportunities of treating that pestilential disease during the years 1760, 1761, and 1762. In this work, besides a journal of the progress, and a medical history of the plague, Dr. P. Russell has inserted a full discussion of the subjects of quarantine, lazarettoes, and of the police to be adopted in times of pestilence. He likewise published a new edition of his brother's "Natural History of Aleppo," upon a very enlarged scale.

Russell, a mysterious character in London, about the middle of the last century. He was regarded as a parasite among people of fashion; seems to have been in Italy, sung in good taste, and composed some very elegant and pleasing English ballads: such as, "Can Love be controlled by Advice;" "At setting Day and rising Morn;" "Young Daphne, brightest Creature;" "If Truth can fix thy wavering Mind;" "Soft God of Sleep;" "Sweet were once the Joys I tasted;" "To curb our Will," &c.

Russell, in *Geography*, a county of Virginia, bounded N. by Greenbriar, and S. by Lee county; containing 6816 inhabitants.—Also, a township in Hampshire county, Massachusetts; 15 miles W. of Springfield; incorporated in 1792, and containing 422 inhabitants.—Also, a township in the county of Leeds, Upper Canada, lying to the northward of Kitley.

RUSSELLÆ, Roselle, in *Ancient Geography*, a town of Italy, in Etruria, S.E. of Populonium and Vetulonii, situated on the right of Umbro, and at a small distance from it. It engaged with some other towns in succouring the Latins against the Romans, according to the report of Dionysius Halicarnassus. Pliny says, it became a Roman colony. Some vestiges of it appear at Roselle.

RUSSELLED, in *Rural Economy*, a term signifying withered or shrivelled, as an apple.

RUSSELSHEIM, in *Geography*, a town of Hesse-Dermstadt, on the Maine; 6 miles E. of Mentz.

RUSSELVILLE, a town in Logan county, in the southern part of Kentucky, in a populous part of the state, about 40 miles from Nashville.

RUSSET, a country word for a dark brown colour.

RUSSEY, Le, in *Geography*, a town of France, in the department of the Doubs, and chief place of a canton, in the district of St. Hippolyte; 9 miles S. of it. The place contains 910, and the canton 5455 inhabitants, on a territory of 240 kiliometres, in 22 communes.

RUSSGANGENUM, in *Natural History*, a name given by the people of the East Indies to a yellow and brass-like fossile substance, found in many places there; it resembles the marcasites, only that on trial it is found to contain very little sulphur: it is probably an ore of zinc.

RUSSI, in *Geography*, a town of Italy, in the department of the Amona; 8 miles N.E. of Faenza.

RUSSIA comprehends, in its most general acceptation, the whole Russian empire; but in a more limited sense, it properly includes those principalities and provinces, which for many past ages, *i. e.* for about 1300 or 1400 years, have been inhabited by Russians. In this latter sense its divisions are as follow: *viz.* 1. Great Russia, to which the name of Russia, in the strictest import, has been applied, and which comprises those large tracts of country, under different denominations, that have, without interruptions, composed the Russian dominion, such as Moscow, Vladimir, Novgorod, &c. &c. 2. Little Russia, comprehending the Ukraine, *i. e.* "the borders," or, in general, the three present governments of Kief, Tchernigof, and Novgorod-Sieverskoi; long separated from Russia, but again united to it in the year 1654. 3. White Russia, formerly denoting the present government of Smolensk, to which have been added the two governments of Polotsk and Mohilef, sometimes called the White Russian territory. 4. New Russia, denoting the large tracts of country near the Ukraine, towards Poland and the Turkish dominion, *viz.* New Servia and the province of St. Elizabeth, now belonging to the government of Ekaterinoslaf. But the Russian empire, in a more extended sense, includes not only the countries abovementioned, but other regions, added to it by conquests and appropriations: such as, the kingdom of *Kazan*, the kingdom of *Astrakhan*, and the vast country of *Siberia*, which see respectively: the provinces on the shores of the Baltic, captured from the Swedes by Peter I. and for ever incorporated with the Russian empire by two treaties of peace, *viz.* Livonia, Esthonia, Finland, and Ingria, or the present governments of Riga, Revel, Vyborg, and St. Petersburg: the countries taken from Poland, now the governments of Polotsk and Mohilef, united to the empire by Catharine II.: the territory annexed by her to Russia in the peace concluded with the Turks in 1774: the Krim and the Cuban, or the province of Taurida and the government of Caucasus, united to the empire by that sovereign in 1783: the tributary islands in the eastern ocean, now added to Russia: the countries that have more recently submitted to the Russian supremacy, *viz.* Kartuelia or Kartalinia, &c.: the possessions in America, consisting partly of the islands, and partly of the continent of California, in which the principal establishment is called Donalesk: and some other countries, incorporated with the empire at various periods, as the Kirghis-Kozaks, of the middle and little horde, who submitted themselves in 1731, and several others. From this survey it appears, that the amplitude of the Russian empire is far greater than that of the largest monarchy in ancient or modern times. Of its extent the empress, in 1783, thus expresses herself: "The Russian empire is distinguished on the globe by the extent of its territory, which reaches from the eastern borders of Kamtschatka to beyond the river Duna, which falls into the Baltic at Riga, comprising within its limits 165 degrees of longitude; extending from the mouths of the rivers Volga, Kuban, Don, and Dnieper, which fall into the Caspian, the Palus Mæotis, and the Euxine, as far as the frozen ocean, over 32° of latitude." If we take into the account some islands, which the empress has not mentioned, the Russian empire, says Mr. Tooke, according to the newest and best charts, will be found to extend from about the 43d to the 78th degree of N. latitude, and from the 39th to the 215th degree of longitude, thus including the islands lying in the eastern ocean. Without reckoning the islands, the empire extends in length above 9200 English miles, and in breadth 2400. The writer now cited gives the following comparison between the Roman empire, at the

the height of its grandeur, with that of Ruſſia. The Roman empire contained about 1,600,000 ſquare miles; or exactly as much as only the European part of Ruſſia. Its greateſt length, from the Euphrates to the weſtern ocean, amounted to 3000 miles, and the greateſt breadth, from the wall of Antoninus to the pillars of Hercules, 2000 miles; but if we take the length of the Ruſſian empire, we ſhall find it to be, from Riga to Anadyrſkoioſtrog, 9684 miles, and thence to the haven of Peter and Paul, in Kamtſchatka, 1750 more. Moreover, the poſſeſſions of the Romans extended ſomewhat ſhort of 32 degrees of latitude; whereas Ruſſia compriſes 35½. The Ruſſian empire received a freſh augmentation at the treaty of peace concluded with the Porte the 29th of December 1791; that is, the whole territory of Ochakof or Otchakov on the Bogue, as far as the Dnieſter, which laſt-mentioned river is now ſettled to be the boundary for ever.

Ruſſia has various frontiers: on the N. and E., omitting the eſtabliſhment on the continent of America, it is bounded by ſeas; on the other ſides, its limits are partly terra firma, partly ſeas, and here and there rivers, *viz.* to the W. Denmark, Sweden, and the Baltic; to the S. Courland, Poland, Turkey, the Euxine and the Caſpian, Perſia, China, and various tribes of almoſt ſavage, nomadic, or uncivilized nations. Other frontiers are fixed by treaty; as, with Denmark, concerning Lapland and Finland, in 1602; with China and the Mongoles in 1727; with Perſia in 1732, the river Terek being in ſome reſpects now regarded as the line of limitation; with Poland by various treaties, finally adjuſted in 1795; with Sweden in 1721 and 1743; with the Turks by ſeveral treaties from 1739 to 1791; with Courland in 1783, which finally ſurrendered its independence in 1796. From Tchutzkaia Zemlia, northwards over Kamtſchatka, the empire borders very nearly on America; being, by the lateſt obſervations, only ſeparated from it by a ſtrait of the ſea, called Behring's or Cook's ſtraits, not more than 175 Engliſh miles in breadth.

With regard to climate and temperature, the Ruſſian empire has been divided into three large regions, *viz.* the region lying above the 60th degree, and extending to the 78th degree of N. latitude; that lying between 50° and 60°; and that lying to the S. of 50° and reaching to 43°. The firſt is the rudeſt and coldeſt, and contains the greater part of the governments of Irkutſk, Tobolſk, and Vologda, the entire governments of Archangel, Olonetz, and Vyborg, with part of thoſe of Perm, Novgorod, and St. Peterſburg. The ſecond region, with regard to fertility, may be called temperate; and it comprehends the governments of St. Peterſburg, Revel, Riga, Polotſk, Mohilef, Smolenſk, Pſcove, Novgorod, Tver, Yaroſlaf, Koſtroma, Viætka, Permia, Kolyvan, a good portion of Irkutſk and Ufa, the governments of Moſcow, Vladimir, Niſhnei-Novgorod, Kazan, Kaluga, Tula, Riazan, Voronetch, Tambof, Penza, Simbirſk, Kurſk, Orel, Novgorod-Sieverſkoi, Tchernigof, and the greater part of Kief, Kharkof, and Saratof. The third region is the hot climate, yielding products, *e. g.* wine and ſilk, which the two former do not: in this lie Taurida, Ekaterinoſlaf, the greater part of Caucaſia, and a part of Kief, Kharkof, Voronetch, Saratof, Kolyvan, and Irkutſk. Mr. Hermann divides the empire more accurately by its climates into four regions; the firſt is the very cold region, from 60° to 78° N. lat., including Vyborg, Olonetz, Archangel, the greater part of Irkutſk, Tobolſk, and Vologda, and a part of Perm, Novgorod, and St. Peterſburg; the ſecond being the cold region from 55° to 60° N. lat., comprehending Revel, Riga, Polotſk, Pſcove, Tver, Moſcow, Yaroſlaf, Vladimir, Koſtroma, Viætka, the greater part of Perm and Kazan, and a part of Irkutſk, Kolyvan, Ufa, Simbirſk, Niſhnei-Novgorod, Kaluga, and Smolenſk: the third and moderate region extends from 50° to 55° N. lat. and includes Mohilef, Tchernigof, Orel, Kurſk, Tula, Tambof, Penza, the greater part of Kief, Kharkof, Voronetch, Riazan, Saratof, Kaluga, Simbirſk, Ufa, Kolyvan, and a part of Irkutſk, Kazan, Niſhnei-Novgorod, and Smolenſk. The fourth or hot region reaches from 43° to 50° N. lat. and contains Taurida, Ekaterinoſlaf, the greater part of Caucaſia, and a part of Kief, Kharkof, Voronetch, Saratof, Ufa, Kolyvan, and Irkutſk. In many diſtricts of the firſt region there is hardly any ſummer; the ſpring has in general much froſt, ſnow, and rain; the winter is always ſevere. In the ſecond region the ſummer is in many parts ſhort, and yet in moſt of them ſo warm and the days ſo long, that the fruits of the earth uſually come to perfect maturity, in a much ſhorter ſpace of time than elſewhere; the winter too, particularly in the governments of Irkutſk, Tobolſk, Perm, Viætka, &c. is for the moſt part very ſevere. In the third region there are very extenſive diſtricts, *e. g.* in the governments of Irkutſk, Kolyvan, and Ufa, where the winter is alſo long and cold, which is chiefly owing to the lofty mountains with which they abound; but the governments in the European diviſion of Ruſſia, lying under this meridian, moſtly enjoy a ſhort and tolerably temperate winter, and a fine warm ſummer. In the fourth region the winter is ſhort, the ſummer warm, often hot, and in many parts very dry.

The whole Ruſſian territory conſiſts at preſent of fifty alike-organized provinces, called governments or viceroyalties. Each government is again divided into ſeveral circles; and ſome of the largeſt are farther diſtributed into diſtricts. In each circle is a circle-town, where the circle-adminiſtration has its ſeat, and one of theſe circle-towns is at the ſame time the government-town, in which the governor-general and the principal officers reſide, and by which the whole government is uſually denominated. Beſides theſe fifty governments, there are two more countries, having a military civil conſtitution, *viz.* the country of the Donſkoy-Kozaks, and the country of the Euxine-Kozaks. (See Cossacks.) The whole number of provinces is therefore fifty-two: and, moreover, the Georgian ſtates Karduelia and Kakhetty, ſeveral petty diſtricts in the parts of Caucaſus, together with the country of the Kirghis-Kozaks, are to be reckoned among the countries under the protection and in the dependance of Ruſſia.

Hiſtory of the Ruſſian Empire.—Although no other European empire has been ſo frequently and ſo well deſcribed in the three laſt centuries by foreign travellers as the Ruſſian; yet neither did any other remain ſo long unknown to the civilized nations of our quarter of the globe. This fact may juſtly excite our ſurprize, if we conſider, that ſo early as the thirteenth century, the adventurers and ambaſſadors, who either viſited for private purpoſes, or were diſpatched by their ſuperiors to the courts and territories of the Tſchingiſkanides, partly took their route through Ruſſia (for inſtance, Carpin and his attendants: ſee Voyage de Jean du Plan Carpin, chap. 1. in the Recueil de Bergeron): that in the ſame century the Hanſe towns eſtabliſhed numerous factories and a flouriſhing commerce, both at Novgorod and Pleſco, and the Teutonic knights had founded a powerful ſtate on the borders of Ruſſia: that about the ſame period the Genoeſe, Venetians, and other Italian republics, occupied with colonies the coaſts of the Euxine, and the rivers that flow into that ſea, or at leaſt navigated them, and from theſe colonies and coaſts carried on an extenſive trade with all the countries far and near: that even long before this, enterpriſing

priſing Danes and Normanni, for the purpoſes either of traffic or depredation, explored the harbours of the White ſea, and even the deſart ſhores of the great northern ocean, abounding in coſtly furs: and that finally, Ivan the Threatening, and his ſon Vaſſilli Ivanovitch, waged frequent wars with the Poles, the Swedes, and the Teutonic knights, and had frequent correſpondence by embaſſies, not only with their neighbours, but likewiſe with diſtant princes and populations. Whether the warriors, merchants, and artiſts who had a view of Ruſſia, neglected to write down their obſervations, or their written remarks were never publiſhed; the fact is, that as far down as the commencement of the ſixteenth century, the learned of Europe knew much leſs of Ruſſia than we at preſent know of New Holland. It is likewiſe often difficult to diſcover from the earlieſt writers on Ruſſia, when it was they wrote, or when their writings were firſt committed to the preſs; and though we ſhould happily find out both the one and the other, we are not unfrequently at a loſs, whether to arrange theſe ancient journaliſts and geographers according to the time when they wrote, or that in which their works were publiſhed.

The firſt particular accounts of Ruſſia are found in the "Viaggio di Meſſer Joſafa Barbaro alla Tana," and in the "Viaggio del magnifico M. Ambroſio Contarini," both in the ſecond volume of the "Raccolta" of Ramuſio. It is ſcarcely probable that theſe travels were printed earlier than the collection of Ramuſio, ſince they are quoted by no author prior to the middle of the ſixteenth century. Barbaro travelled in 1436, as a merchant alla Tana, or to the Crimea, and remained there ſixteen years. He ſpeaks only in the two laſt chapters of Ruſſia, and of the Tartarian countries which lay to the ſouth and to the eaſt of Ruſſia; particularly of Citracan, or Aſtrachan; and of Caſan, which city he deſcribes as the principal mart of the trade in furs, which in his opinion were brought thither from Zagatai and Moxia. Barbaro muſt have wrote his journey long after his return from the Crim, as he remarks that the Ruſſians had conquered Caſan and Novgorod. Contarini travelled, in 1483, in quality of ambaſſador from his republic, through Poland and the Ukraine to the court of Perſia, and returned, in 1487, acroſs the Caſpian, by Aſtrachan, and through Ruſſia proper. It is curious enough that he ſpeaks of a *Roſſia baſſa* and *alta*, and of a *gran Roſſia bianca*. Of Novgorod he ſays: "la qual confina quaſi con la Francia, et con la Almagna alta."

A great part of the Ruſſian empire was anciently inhabited towards the N.E. and N. by a people of Finniſh origin, perhaps deſcended from the ancient Scythians. Towards the N.W. were tribes conſiſting of a motley race of Sauromates and Grecian coloniſts; and from them are deſcended the modern Lithuanians, Lettovians, Livonians, and Courlanders; as were alſo the ancient Pruſſians. The whole ſouthern part of Ruſſia, even to the Krimea or Crimea, was for ſome time inhabited by Goths; and between the Volga, the Don, and mount Caucaſus, was a nation deſcended from the Medes, called Sauromates, that is, the northern Medes. In proceſs of time, when barbarian nations iſſued in ſwarms from the E., and ſome of the different tribes of Goths had, ſince the middle of the third century, penetrated into the weſtern regions of the Roman empire; ſome of the Sauromates were under the neceſſity of retiring farther towards the N. and the W. The ſame political conſtitution which is now prevalent, exiſted at that remote period. Each individual of the nation was either maſter or ſlave. The various tribes which occupied the country derived their appellation from ſome river, town, or diſtrict; and from the more modern Varagian Roſſi, the Ruſſians, it is ſaid, about the year 862, received their name. No country in the globe contains ſuch a mixture and diverſity of inhabitants: each diſtinct nation having its own language, in ſome caſes debaſed and corrupted, and retaining, more or leſs, its own religion and manners; while the generality of the main ſtems bear in their bodily ſtructure, and in the features of their faces, the diſtinctive impreſſion of their deſcent, which neither time nor commixture with other nations has been able altogether to efface.

The aborigines of Ruſſia were *Finns* and *Slavonians*, ſee each reſpectively. Of the Slavonians, who inhabited the country about the Dnieper and the Upper Don, ſome, oppreſſed by the Bulgarians, ſpread themſelves farther northward on the Dnieper, and conſtructed Kief, while another colony penetrated up the Volkhof, and laid the foundation of Novgorod. After a dark period of more than 100 years, the Slavonians appear again among the Finns, and at this time the Ruſſian ſtate received its origin from the Scandinavians or Northmanni. The Slavonian ſettlers, both on the Volkhof and the Dnieper, were oppreſſed by two hoſtile nations, *viz.* the Khazares from the Euxine, and the Varagians, Varingians, or Northmanni from the Baltic. (See KHAZARES and VARAGIANS.) In the ninth century, the Varagians conquered from the Ruſſians, who were a kindred north-gothic people, firſt mentioned in the year 839, and belonging to the Varagian race, and of courſe originally Normanns or Scandinavians, the modern diſtricts of Revel, St. Peterſburg, and Archangel, and ſubjected the Slavonians, Krivitſches, Tſchudes, Veſſenians and Merænes, various tribes, partly Slavonians and partly Finns, to a tribute. The Ruſſians retired to Finland and Karelia; but at length the Slavonians, aided by the other tribes juſt mentioned, expelled the Varagians, and formed themſelves at the lake Ilmen, near Novgorod, into a federative democratical republic. After experience of the imperfection of this conſtitution, and finding it productive of internal diſturbances, the five united nations reſolved to call in the Ruſſians for the purpoſe of reſtoring tranquillity, and affording them protection; and with this view they voluntarily offered to reſign the ſovereignty to them. The Ruſſian prince Rurik, with his brothers Sineus and Truvor, accepted the invitation. Rurik, having collected together all his people, came in the year 862 to the mouth of the Volkhof, and aſſumed the government of the newly erected ſtate; which, from its firſt formation, conſiſted of ſix ſeveral tribes, *viz.* Slavonian, Finniſh, and Varagian, extending over the regions of the preſent governments of Riga, Revel, Polotſk, Pſcove, Vyborg, St. Peterſburg, Novgorod, Smolenſk, Olonetz, Archangel, Vladimir, Yaroſlaf, Koſtroma, and Vologda. Whilſt the Varagians, under Rurik, compoſed the predominant part, the Slavonians and Ruſſians were ſoon blended into one nation; and though the name of the latter was transferred to the whole nation, yet the Slavonian language and manners retained the ſuperiority, that people being conſidered as the moſt prevalent, both with regard to number and civilization. Rurik, fixing his reſidence at Staraya Ladoga, aſſumed the title of grand-prince; and when both his brothers died childleſs, he reunited their territories with his own, and in the fourth year of his reign, removed his reſidence from Old Ladoga to Novgorod, which from that time became the capital of the Ruſſian monarchy. Soon after the elevation and eſtabliſhment of Rurik, the Slavonians on the Dnieper, being oppreſſed by the Khazares, beſought Rurik to give them a prince of his own race; and he accordingly ſent his ſtep-ſon Oſkold, who ſubdued the Khazares, and founded at Kief the ſecond Slavo-Ruſſian dominion, dependent on the Novgorodian empire. Oleg, the immediate

immediate ſucceſſor of Rurik, united Kief with the Ruſſian territory, and appointed this ſecond Slavonian family ſeat to be his reſidence and the capital of the country. Under the following reigns, the power of the empire rapidly increaſed. Ruſſian armies appeared before the gates of Conſtantinople; many nations were rendered tributary; the Ruſſians carried on a regular commerce to the coaſts of the Euxine; they built cities, and not only embelliſhed but gave laws to ſuch as already exiſted. On the death of Vladimir the Great, in the year 1015, who embraced the Chriſtian religion, and introduced it into Ruſſia, the progreſs of the nation was checked by the partition of its territory among his twelve ſons. This was followed by a variety of ſanguinary contentions, till at length there aroſe a third ſtate, *viz.* White Ruſſia, or Vladimir. Of theſe three ſtates, *viz.* Vladimir, Kief, and Novgorod, the principal was Vladimir, and Suſdal was its capital. This diſtinction afterwards devolved on Vladimir; and finally on Moſcow, a city which was founded in the year 1147, by George I. In the year 1237, the Mongoles and Tartars, who under their khan Tſchingis had united themſelves into a powerful ſtate at the beginning of the 13th century, and ſubjected the greater part of Aſia, put themſelves under the conduct of his deſcendant Batu, khan of Kaptſchak, and fell upon Southern Ruſſia, where they founded a formal ſovereignty. The Tartars, having effected their conqueſt, numbered the people in the principalities, impoſed on them a heavy tribute, and thus riveted the oppreſſive yoke of foreign ſovereignty which the Ruſſians endured for upwards of 200 years.

Whoever has ſtudied the Ruſſian hiſtory with attention, muſt naturally be ſurprized that the nation, in conſequence of the numerous and formidable revolutions which it underwent, was not utterly demoliſhed or diſperſed, their dominion entirely ſubverted, and their very name, as has been the caſe with ſo many other nations, totally effaced. The Ruſſian nation, however, not only weathered out all the ſtorms, which ſo frequently menaced its diſſolution, but roſe, as if refreſhed with juvenile vigour, extended its gigantic arms on every ſide, vanquiſhed all its hoſtile neighbours, and at a very early period of its greatneſs croſſed the mountains, which for immemorial ages had been ſtyled by their inhabitants the girdle of the globe, and there, as in a new world, progreſſively made conqueſts, no leſs for geography and natural hiſtory, than for their immenſe domain.

In 1462, Ivan Vaſſillievitch I. aſcended the throne of Moſcow, and after a reign of fourteen years, refuſed obedience to the Tartars, and by a ſeries of victories, gained poſſeſſion of the Tartarian kingdom of Kazan, and reduced its ſovereign to a ſtate of tributary vaſſalage. In 1477, the republic of Novgorod ſubmitted to the force of his arms, and a ſimilar fate befel the principalities of Pſcove and Tver. Lithuania loſt a conſiderable part of its territory. The princes of Severia voluntarily ſurrendered; and the increaſing power of Ivan was withſtood only by the Teutonic order in Livonia. Under his ſucceſſor Kazan was loſt for a ſhort time; but Smolenſk was incorporated into the Ruſſian ſtate. Ivan Vaſſilievitch II. at length burſt the laſt ſhackles of the Mongole-Tartarian ſovereignty. The entire conqueſt of Kazan was completed in ſeven years, the capital of the kingdom ſurrendering in 1552. Two years afterwards, Aſtrachan became a Ruſſian province: and Ivan advanced into Caucaſus, and ſubdued the whole Kabardey. Although the Ottoman Turks, aided by the Tartars of the Krim, ravaged the capital of Ruſſia, this diſaſter was amply counterbalanced by the channel opened for maritime commerce by way of Archangel, and by the conqueſt of Siberia, events which date their commencement from the reign of Ivan, but which owed their completion to his ſucceſſors. As others ſtate theſe events, Ivan III., ſurnamed the Threatening, was the firſt who, towards the latter end of the fifteenth century, began to demoliſh this baneful oligarchy, and to throw off the yoke of the Tartars. The moſt conſiderable annexation he procured to his empire conſiſted in the reduction of Novgorod, and the northern provinces, which ages ago had been conquered by the Novgorodians, and retained under their dominion. His ſon and his grandſon Vaſſillie Ivanovitch and Ivan Vaſſillievitch the Terrible, completed the grand project, which the father and grandfather had left for their ſucceſſors. Under the reign of Vaſſillie Ivanovitch, baron Herberſtein laid down the firſt perſpicuous geography of the Ruſſian empire, according to which we ſhall deſcribe the boundaries of it towards the latter end of the fifteenth, and the commencement of the ſixteenth centuries.

Herberſtein uſes the term Ruſſia in a two-fold acceptation. By the one he underſtands all thoſe countries that were inhabited by Ruſſians; and in this larger ſenſe he even comprehends the king of Poland and the grand duke of Lithuania among the Ruſſian princes, ſince both of them poſſeſſed territories that were occupied by Ruſſians. In the more contracted import, that author compriſes ſimply the countries ſubject to the grand prince of Moſcow. In the deſcription of this proper Ruſſia, taking his departure from Moſcow, he firſt mentions the eaſtern and ſouthern, and then the weſtern and northern provinces.

Eaſtward, therefore, of the province of Moſcow, the grand prince of Ruſſia poſſeſſed the provinces of Vladimir, Niſhnei-Novgorod, and Riazan; the river Sura forming the boundary between the Ruſſian and Caſanian territories. (Sura fluvius Moſci, et Caſanenſis regis dominium dividit, page 65.) Towards the ſouth-eaſt, during the reign of Ivan III. the Ruſſian confines reached only about a day's journey from the city of Riazan; for Contarini arrived at the city Riazan the day after he entered the Ruſſian territory. (Ramuſ. ii. 122. fol. b.) To the ſouth, Tula was the laſt Ruſſian city towards the Tartarian ſteppes (Herberſt. p. 66. Tulla—eſt ultimum oppidum ad campeſtria deſerta); and ſomewhat farther to the weſt was Kaluga, the fortified city, where the grand prince annually aſſembled his troops againſt the incurſions of the Crimean Tartars. (Ibid. p. 68.) Towards the ſouth-weſt, Vaſſillie Ivanovitch firſt conquered the principality of Novgorod Sieverſkoi, which at that time comprehended alſo Tchernigof, and a part of the preſent government of Orel. (Ibid. 68—70.) Towards the weſt, Smolenſk, which province Vaſſillie Ivanovitch, in 1514, ſevered from Poland or Lithuania, Pſcove, and a part of the preſent Peterſburg government, to the mouth of the Narova, formed the boundary. To the north of Moſcow lay, laſtly, the provinces Tver, Great Novgorod, Yaroſlaf, Koſtroma, and the provinces formerly ſubject to the Novgorodians, namely, Vologda, Uſtiug, Viætka, Perm, and Dvina.

Reckoning the principalities ſpecified by Herberſtein to the diviſion of the governments and viceroyalties made by Catharine II. then the empire ſubject to the grand prince Vaſſillie Ivanovitch, excepting Moſcow and a part of the Peterſburg government, compriſed only thoſe of Pſcove, Tver, Novgorod, Archangel, Vologda, Yaroſlaf, Koſtroma, Viætka, Perm, Smolenſk, Tchernigof, Novgorod Sieverſkoi, Orel, Kaluga, Tula, Riazan, Vladimir, and Niſhnei-Novgorod. Short of the preſent number of viceroyalties by thoſe of Peterſburg almoſt entirely, then thoſe of Viborg, Revel, Riga, Olonetz, at leaſt in part, Tobolſk, Polotſk, Mohilef, Kharkof, Kurſk,

Kurſk, Kazan, Simbirſk, Penza, Tambof, Voronetz, Saratof, Ufa, Kolyvan, Irkutſk, Minſk, Iſiaſlaf, Brazlau, Kief, Ekaterinoſlaf, Caucaſus, and Taurida, together with the country of the Don Coſſacks, and the provinces which fell to Ruſſia on the laſt partition of Poland.

Ivan the Terrible continued the aggrandizement of the empire, of which his father and grandfather had laid the foundation, with equal zeal and ſucceſs. He conquered, in 1552 and 1554, Kazan and Aſtrachan, and united the countries dependent on thoſe cities for ever with his empire. It was during his reign that a band of Don Coſſacks, whom he had driven as robbers from the inferior Volga, forced their paſſage acroſs the Uralian mountains, overturned the dominion of the Tartars on the Tobol and Irtiſch, and, unknown to the grand prince, conquered the north-weſtern diſtricts of Siberia to the laſt-mentioned river. Though it cannot be ſaid that the Ruſſian tzars had neglected to make conqueſts in the northern Aſia; it may, nevertheleſs, be affirmed, in a certain ſenſe, that the conqueſt of Siberia was completed of itſelf in nearly the ſame manner in which it was begun. The court of Moſcow undoubtedly liſtened with encouraging atttention to the advantageous propoſals that were made reſpecting the extenſion and fortification of the Siberian diſtricts, and royally rewarded the perſons who, by their prudence and bravery, had deſerved ſo well of the empire. The tzar ſent, or at leaſt agreed to the reinforcements that were wanted for the farther proſecution, or the defence of the acquiſitions, now that they were made. Theſe reinforcements were, however, generally ſo ſmall, that in Moſcow, much leſs abroad, they were ſcarcely remarked. The hopes of obtaining riches either by a fortunate chace, or by extortions practiſed on the unarmed tribes that were found inhabiting the ſteppes and wilds of Siberia, annually allured thouſands of bold hunters and warriors into thoſe parts; and theſe adventurers, ſpurred on by their inſatiable avarice and unbounded licentiouſneſs, were perpetually exploring new regions and populations, which were not yet exhauſted and plundered of their all. Thus it happened, that about a century after Yermak had deſtroyed the empire of the Tartars upon the Irtiſch, almoſt the whole of that prodigious tract of country was ſubdued at a far leſs expence of blood and treaſure than the ſmalleſt of the weſtern and northern provinces which had hitherto been conquered had coſt, or, as was afterwards ſeen, thoſe which then remained to be ſubdued.

Feodor, the ſon and immediate ſucceſſor of Ivan the Terrible, abandoned his claim to Eſthonia, and in return forced from Sweden in 1594, the ceſſion of Ingria and Karelia. By Feodor's death, in 1598, the dynaſty of Rurik became extinct; and during the ſubſequent interregnum, many pretenders, under the name of Demetrius, involved the empire in confuſion, till, in 1613, Mikhaila Romanof, or Michael Feodorowitz, of the dynaſty of Romanow, deſcended in the female line from Ivan IV. was elected ſovereign, and by large ſacrifices purchaſed the repoſe of his empire. To the Swedes he was obliged to relinquiſh Ingria and Karelia, and to the Poles, Smolenſk, Severia, and Tchernigof, and to make a formal renunciation of all claims upon Livonia, Eſthonia, and Courland. From that period to the preſent day, Ruſſia has not only been gaining its ancient poſſeſſions, but ſo far extending and enlarging them, that the preſent circumference of the empire has no parallel in the hiſtory of the world. Alexey, or Alexis, the ſon and ſucceſſor of Michael, not only reconquered the countries ceded by his father to the Poles, but alſo reduced Kief and the Ukraine on the E. ſide of the Dnieper, in 1655, to a re-union with the parent ſtate of the Slavo-Ruſſian nation. His ſon, Peter I., "the creator of modern Ruſſia," acquired to his empire in 1721, by a twenty years' war with Sweden, the provinces on the ſhores of the Baltic, which had occaſioned bloody contentions among the northern powers for many centuries: Livonia, Eſthonia, Ingria, and a part of Kexholm and Karelia, were ſubjected to the Ruſſian ſceptre, thus adding to the Ruſſian empire great advantages for commerce, and a reſpectable rank among the principal European powers. Catharine II. aggrandized Ruſſia both within and without, by a reform of its government, and by ſeveral ſucceſsful wars. She obtained from the Porte, in 1774, the poſſeſſion of the city of Azof, with its territory; and for the ſecurity of the Ruſſian navigation on the Euxine, the forts of Kinburn, Kertſch, and Yenicaly in the peninſula of the Krimea. In 1783 the whole province became, by treaty, a Ruſſian government; and recovered its ancient name of the Tauridan Cherſoneſe. Ruſſia alſo, by the ſame convention, enlarged her borders to the ſouth by the Kuban, where at preſent the Caucaſian mountains form the boundary of the Ruſſian dominion. Afterwards the Porte was compelled to ſurrender a conſiderable tract of country on the ſhores of the Euxine, between the Bogue and the Dnieſter. In the diſgraceful partition of Poland, Catharine obtained for her ſhare, in 1773, the four Lithuanian voivodeſhips of Smolenſk, Vitepſk, Miſtiſlaf, and Poliſh Livonia, with a part of the voivodeſhips of Polotſk and Minſk. An unproſperous war terminated in 1793, with the loſs of the fertile provinces of the Leſſer Poland and Lithuania; and at length the capital of the kingdom fell into the hands of the Ruſſians; its political exiſtence was annihilated, and in 1796 the laſt veſtiges of it were loſt in the confines of the bordering ſtates. One conſequence of the annihilation of Poland was the acquiſition of the duchies of Courland and Semigallia, including the circle of Pilten, which, on the diſſolution of their feudal connection with the republic, by a reſolution of the ſtates of the country, ſubmitted themſelves unconditionally in 1795 to the ſceptre of the empreſs.

Catharine extended her territory, by the mild authority of her laws, and the methods of civilization which ſhe adopted, as well as by her conqueſts and treaties. Accordingly the tzar of Kartuelia and Kakhetty put himſelf under the protection of the Ruſſian empire, by acknowledging, in 1783, the ſupremacy of its monarch. She alſo invited people from all countries to ſettle in her dominions, and thus eſtabliſhed numerous colonies. She reduced a multitude of tributary nations dwelling in the interior of Siberia to ſubmit to her laws. She ſet on foot and encouraged ſeveral voyages of diſcovery, which obtained for the Ruſſian empire a new ſovereignty in the eaſtern ocean, and on the weſtern coaſt of America.

The brilliant conqueſts of Catharine may, indeed, immortalize her fame as a conqueror; but they alone will never render the memory of that accompliſhed and ſagacious monarch beloved and bleſſed. Cordial affection and admiration are the proper tribute both of contemporaries and poſterity, due only to her as the wiſe and benign legiſlatrix, inſtructreſs, and patroneſs of her numerous populations and countries. Thouſands of perſons, to whoſe judgment even upright and excellent ſovereigns cannot be indifferent, lament at preſent, and will lament to lateſt ages, that the emotions of affection and admiration, ſo congenial to the heart with which the exalted legiſlatrix, inſtructreſs, and patroneſs of the nations obedient to the Ruſſian ſceptre has inſpired, and ever will inſpire them, are painfully diſturbed

turbed and abated, either by the recollection of the blood which one half of her conquests cost, or the maxims that were followed in obtaining possession of the other.

Researches respecting the extent and dimensions of countries would be of far greater value than can at present be allowed them, if the internal strength of empires increased in equal ratio with their extension, or the real happiness of their inhabitants with both. Russia affords the most convincing proof that this is not the case. No European nation ever ruled over countries of such vast extent as the Russian; and yet there have been, and still are in Europe, several nations exceeding the Russian in population, or at least in power and well-being. The statements of the magnitude of the Russian empire lose greatly of their interest by differing so widely from each other. Le Clerc gives to the Russian empire a superficial content of 949,375 leagues, and censures the historian l'Evêque for having erred in his statement by at least 424,375 leagues. The German geographers have not so great a discrepancy in their account as the French. In the mean time, between those who set it down at the least, and those who assign to it the greatest number, there is a prodigious interval, an interval which Germany and France together could not fill up. We mean France before the revolution. Three hundred thousand square geographic miles compose the least, three hundred and thirty thousand the greatest extension which German authors have assigned to the Russian empire.

Of those tribes called Kozaks or Cossacks, which are of Russian origin, we have given a brief account under the article Cossacks. Of the three Slavonian nations, properly so called, that are inhabitants of the Russian empire, next to the principal nation, the *Poles* are the most numerous. These, it is said, at the same time with the Russian Slavi, and on the same occasion, came from the Danube to the Vistula. Their state, now nearly extinct, was probably founded in the ninth century; and they sprung from the same stock with the Russians. According to the present state of the Russian empire, the Poles form a very considerable part of the aggregate population. They may be found, in an immense multitude, in the governments of Polotsk, Mohilef, Minsk, Brazlau, Vosnesensk, Podolia, Volhynia, Vilna, and Slonimsk; and in smaller numbers, as colonists, in the circle of Selenghinsk, on the Irtisch, and in various other parts of the empire. The third Slavonian nation within the borders of Russia is composed of the people called *Servians* or *Serbes*. (See Servians.) Besides those tribes which we have already enumerated, there are two others in the Russian empire, who are supposed to be related to the Slavi: these are the Lithuanians and the Lettish. (See Lithuania and Lettes.) For an account of the *Kalmucks*, *Mandshures*, *Mongoles*, and *Tartars*, as composing primitive stocks of the nations dwelling in Russia; see these several articles respectively. In the Russian empire there are also some nations whose origin is utterly uncertain. Mr. Tooke reduces them to two classes, one comprising the *Samoyedian*, and the other the eastern *Siberian* nations. (See Samoyedes and Siberia.) Of the European nations, some bodies of which are dispersed through the Russian empire, the most numerous are the German. In the governments of Riga, Revel, and Courland, they form the most considerable, though not the most numerous, part of the inhabitants. The Germans residing in the government of Riga amount, according to the latest enumeration, to 30,000, and those in that of Revel to 15,000; and in Courland they are thought to be still more numerous. In Moscow and St. Petersburg they live by thousands; in the latter alone they are known to be upwards of 17,000. As colonists, properly so called, many thousand German families came, in 1763, into the governments of St. Petersburg, Saratof, Voronetch, and Tchernigof, as settlers, the number of whom, since the year 1783, is much increased by new settlements in the government of Ekaterinoslaf, and in the province of Taurida. All these, and the multitude of such as live separately about the empire, taken together, may, as Mr. Tooke suggests, probably far exceed 100,000. Of the other European nations, there are only detached colonies, especially in the large towns. In the governments of Vyborg and Revel, and in some of the islands of the Baltic, there are Swedes, but not amounting to a very considerable number. The islands Vorms and Rugen, in the Baltic, are partly inhabited by Danes, but they are most numerous in Moscow and St. Petersburg, and some of the large towns. In most of the sea-ports there are Englishmen, who make no long stay, but return to their native country as soon as their affairs permit. French and Italians are also dispersed over the whole empire. In Little Russia, at Neshin, in the government of Tchernigof, in that of Ekaterinoslaf, and in Taurida, the Greeks form some respectable colonies. In the government of Ekaterinoslaf there are also Albanians, Moldavians, Valakhians, and Arnauts, though their number is not great. The Ottoman Turks are, in a great degree, dispersed; but they are found together in small numbers at Orenburg, in the former Otchakof steppe, and in some other places. In the districts of Astrachan and Orenburg there are many Persians, and on the Kamma there is a colony of Persians and Arabs. The Armenians are numerous in the towns of Orenburg, Kitzliar, Mosdok, St. Petersburg, and Moscow; but in the governments of Caucasus and Ekaterinoslaf they compose a colony consisting of some thousands. The town Nachitschevan, on the Don, is almost wholly inhabited by them. In Astrachan and Kitzliar are settlements of Indians. The Jews are numerous in some of the provinces, particularly those of Poland, now annexed to the Russian empire, and in Taurida, where they are partly fixed as ancient inhabitants. Gypsies are found strolling in large companies in the provinces both of Great and Little Russia. Upon the whole, Mr. Tooke observes, that the inhabitants of the Russian empire form at least 80 distinct nations, differing essentially in lineage, and also in manners and language.

Climate, Weather, and natural Qualities of the Soil of Russia.—As to the *soil* as well as the *climate*, there is a great diversity in the different provinces of the Russian empire. Some tracts of land in Great and Little Russia, in the provinces bordering on the Baltic, and many others, are kept in constant cultivation and tillage. In other districts, *e. g.* in Little Russia, about the Don, &c. the land is only cultivated occasionally; and again in other parts of the empire, lands fit for agriculture are left wholly unemployed, for want of labourers. The quality of the soil is very different in different tracts; in Livonia and Esthonia, good fields yield 8, 10, and 12-fold, and, in some cases, 16, or more than 20-fold; but in different ground about 3. The harvests about the Don are commonly 10-fold; but towards Tomsk, on the Tshumush, and in the whole region between the Oby and the Tom, many fields afford an increase of 25 to 30-fold; and at Krasnoiarsk a crop has not been known to fail: of winter corn they reap 8, of barley 12, and of oats 20-fold. In Little Russia, on the Don, and in many other places, the soil is sufficiently fertile, without manure. This is also the case in a great part of Siberia, *e. g.* on the Samara; on the Ufa, in the country of the Bashkirs; here and there in the Baraba; and also on the Kamma, in the government of Isetsk; on the Oby near Barnaul, at Krasnoiarsk, and on the Selenga.

All travellers agree in praiſing the ſalubrity of the atmoſphere in Ruſſia, and the abſence or infrequency of ſeveral diſeaſes with which the other countries of Europe are viſited, ariſing from it. Herberſtein and his followers, from the general healthineſs of the Ruſſian climate, have explained this remarkable fact: that, from time immemorial, the plague has never communicated itſelf from the ſources of the Don to the north and eaſt; which opinion, however, has been confuted, even in ancient times, by ſeveral dreadful peſtilences, and likewiſe in the laſt century, by the formidable plague which, in 1770—1772, raged in the city and territory of Moſcow. Since the diſtricts of the Lower Don and Dnieper, and thoſe between the Dnieper and the Dnieſter, have been incorporated with the Ruſſian empire; the country of the Don Coſſacks, and what was formerly called Poliſh Ukraine, form an exception to the juſtly boaſted ſalubrity of the climate of European Ruſſia. Almoſt every year thouſands of perſons are carried off by all kinds of ardent and putrid fevers, dyſenteries, inflammations of the cheſt, pleuriſies, &c. from July to the beginning of winter, eſpecially in thoſe parts which are ſurrounded with fetid moraſſes, or have no other than ſtagnant and putrefcent water.

While, upon the whole, they extol the ſalubrity of the Ruſſian climate, they, in general, complain of the intenſe cold of the winter, and the equally exceſſive heat of the ſummer, which, in the northern and central Ruſſia, very often prove deſtructive to men and beaſts, no leſs than to the fruits of the earth. Almoſt all travellers adduce the ſame allegations, or inſtances of the inſufferable heats and froſts of the Ruſſian empire. The winter, ſay Herberſtein and his followers, laſts from ſix to eight months. During that ſeaſon, all the rivers and lakes are covered with ell-thick ice, and the ground with ell-deep ſnow. Where the ground is not covered, it is rent in wide and deep chaps by the winter cold, as in the milder parts of Europe by long continued ſummer drought and heat. In the coldeſt days, on firſt going out of the warm apartments into the open air, the breath is taken away, or contracted almoſt to ſuffocation. Spittle ejected is converted into ice before it reaches the earth; and if we touch metal with moiſt hands, the ſkin is left adheſive to it, as though the metal were glowing hot, and the ſame ſenſation is experienced from the contact. With the utmoſt precaution it nevertheleſs frequently happens, that thoſe who take only a ſhort walk, in a few minutes have their noſe, ears, or fingers frozen. Men and cattle bringing proviſions to town are often frozen to death. Ravenous and other birds fall dead to the ground, and fruit-trees are riven by the piercing froſt. It is affirmed by Gœteeris, pp. 88, 89, that it ſometimes happens that fleſh and fiſh, which have been boiling and roaſting more than an hour, on being cut up on table, were ſtill frozen within. The ſame author relates that the beards of himſelf and others were hard frozen to the bed-clothes while aſleep. The greateſt advantage ariſing from long and ſevere winters in Ruſſia is this; that it levels all roads, and opens them in every direction, ſo that travelling from one place to another is incredibly rapid and cheap; therefore, even in ancient times, when many canals were not yet dug, many roads and bridges not conſtructed, and many ſwamps not drained, the winter, ſtill more than at preſent, was the proper ſeaſon for commerce and the tranſport of commodities. Whereas, no ſooner has the vernal ſun diſſolved the incruſtation of the waters and the land, but at once the rivers and ſtreams overflow their banks, converting the lower plains and vallies into lakes or moraſſes. Within a few days after the ſnow has diſappeared, the foreſts and trees are clothed with beautiful foliage, and the ploughed lands, meads, and paſture-grounds, with the moſt luxuriant corn and herbage, which, owing to the humidity of the ſoil, and the rapidly increaſing ardours, ſhoot upwards with an almoſt viſible growth. The times of ſowing and reaping, therefore, border on each other in Ruſſia much nearer than in other European countries. Violent rains, boiſterous winds, and continued fogs, are more frequent than thunder-ſtorms, as immoderate, or late froſts, are oftener injurious than long droughts. Sometimes, however, Ruſſia experiences ſuch hot and dry ſummers, that fields of ſtanding corn and foreſts take fire, ſo that entire provinces are filled with noxious ſmoke, and in ſome ſort darkened by it. Among the principal annoyances of the hot ſeaſons, are the innumerable ſwarms of muſquitos, from which no reſt is to be had night or day, and the cold nights that not unfrequently ſucceed to ſultry days.

Ruſſia being generally a level country, or at moſt only riſing to moderate hills, it is ſomewhat curious that, though deſtitute of mountains, it contains more foreſts, lakes, and rivers, more brooks and running ſprings, than any other territory in Europe.

The north-eaſtern provinces, from the Volga to the Ural, are deſcribed by former travellers as a country for the moſt part covered with inexplorable foreſts, and that even where it is cultivated, it ſtrikes the eye as having been not very long ſince clothed with wood. Herberſtein, p. 61, ſpeaks thus even of the province of Moſcow: "Totam porro regionem non ita diu admodum ſylvoſam fuiſſe, ex magnis arborum truncis, qui etiamnum extant, apparet." "Il eſt vrai," ſays Miége, "qu'il eſt tellement plein de forêts, que dans l'éſpace de 500 lieuës, que nous fimes à travers ce pays là, nous en eumes toujours en vue, quoique ce fut la partie la mieux peuplée du pays." Ruſſia is, even at preſent, far more woody than any other European countries. The Volchonſkoi foreſt, through which the road lies from Viæſma to Moſcow, extends on all ſides to unknown diſtances; and in this foreſt it is ſaid, that, even in the laſt century, numerous colonies were diſcovered, which, from their origin, had been utterly unknown, not only to the government, but even to the neareſt inhabitants. Of ſuch colonies ſeveral may probably ſtill exiſt in the prodigious foreſts with which the diſtricts of Olonetz, Archangel, Perm, and other northern diſtricts are covered. Even the road between Moſcow and Peterſburg runs moſtly through an uninterrupted ſucceſſion of woodland, in which villages are rarely ſeen. The foreſts of Ruſſia conſiſt chiefly of cedars, pines, firs, linden, and birch; and the ſhores of the Volga, the Occa, the Don and its tributary rivers, are adorned with vaſt foreſts of oak, from which the ſhip-timber is conveyed to the ports of the Baltic, and to the wharfs of the Don and the Euxine. The regions between the inferior Volga, between the Don and Dneiper and Dnieſter, have fewer or even no woods at all, and the inhabitants are obliged, in many places, to dreſs their victuals with dried cow-dung.

It would be in vain to attempt at particularizing the lakes, pools, and marſhes, the rivers, brooks, and ſprings which are ſaid by the ancient travellers to be innumerable even to the inhabitants themſelves. Thoſe who came from Poland, or Livonia, repreſent travelling through Ruſſia as extremely perilous, not only on account of wolves and robbers, but from the badneſs of the roads, and the miſerable ſtate of the bridges. When people of quality were going a journey, orders were previouſly ſent to the country-folks of the parts adjacent, to make the roads and bridges in ſome degree paſſable. The high roads are now, in many parts of Ruſſia, as fine as in other European countries. If the wooden bridges are in ſome places badly maintained, and from the defect of here or there a balk are inconvenient and troubleſome to the traveller; they do not, however, ſo often endanger his neck. The roads are at leaſt ſufficiently wide, and every where provided

vided with verſt-poſts. See Coxe's Travels, vol. i. where the road between Peterſburg and Moſcow is deſcribed.

Thoſe who have gone from Archangel up the Dwina and the Yug by ſhip, and then generally in ſledges from Vologda to Moſcow, unanimouſly affirm, that nowhere is more convenient and pleaſant travelling than in Ruſſia; the eye being inceſſantly delighted by the alternation of magnificent foreſts, rich paſtures and corn-fields, but principally by the inexpreſſible abundance of running waters. (Fletcher, pp. 414, 415.) This latter commendation is, however, more fitly applicable to the northern than to the midland and ſouthern parts of Ruſſia, ſince in theſe the rivers have a ſlow current, and in ſummer are nearly ſtagnant; ſo that from Moſcow quite to the Crimea ſcarcely any other than bad or indifferent ſpring-water is found. Suyef, p. 7.

On no topic are travellers more agreed, than in extolling the fertility of moſt of the Ruſſian provinces. The ſoil, they inform us, conſiſts generally of a black, fat mould, which produces all kinds of corn and grain, orchard fruits and garden vegetables, as alſo hemp and flax, in the greateſt abundance; and, in many places, even without needing manure. The meadows and paſture-grounds feed incredible droves and herds both of large and ſmall cattle: the foreſts are the haunts of an unſpeakable quantity of not only the choiceſt ſpecies of game, but likewiſe of ſuch animals as yield furs, which are every where eagerly ſought after: the lakes, ponds, rivers, and brooks, in ſhort, nouriſh a far greater variety of the moſt delicious kinds of fiſh, than all the other countries of our quarter of the globe taken together.

With reſpect to fertility of ſoil, the preference is generally given to the province of Vladimir, or ſomewhat rather, perhaps, to that of Riazan. The ſoil is, in the former of theſe provinces, of ſuch fecundity, that not unfrequently from one buſhel of ſowing a produce of from twenty to thirty buſhels is obtained. Still more prolific is the province of Riazan; where, according to report, very often one ſingle grain of wheat will ſhoot out two or more ſtraws, and they ſo thick and ſtrongly grown together, that a horſe cannot eaſily break his way through, and growſe can with difficulty riſe from among them. Theſe provinces likewiſe produce honey, wax, fiſh, fowl, and all ſorts of game, in the greateſt profuſion, and of the beſt quality; even the human inhabitants of them are bolder and more warlike than other Ruſſians. If any one ſhould think proper to put the Ukraine and the country of the Don Coſſacks in competition with theſe two provinces, we have only to allege againſt it, that, indeed, in many parts of the Ukraine no manure at all is uſed; becauſe if it were, it would either burn up the farina fecundans of the ſeed, or only produce enormous ſtraws and foliage, deſtitute of ears and fruits. The ſtalks of the Ukraine corn are ſo tall and thick, that they are more like reed-ſtems than corn-ſtraws.

Honey and wax are ſought for in hollow trees, where the wild bees depoſite their treaſures, or in trunks of trees excavated for the purpoſe of ſerving as hives, which the boors fence with wires, to preſerve them from the depredations of the bears. Several authors repeat the ſtory, which Jovius heard of the ambaſſador Demetrius; that a boor once looking for honey in the foreſt, fell up to the neck in a hoard of it in a large hollow tree, whence, after paſſing a couple of days in that ſweet ſituation, he was extricated at laſt by catching hold of the hind legs of a huge bear.

No country of Europe abounds ſo much as Ruſſia in fiſh and game, particularly in the choiceſt wild-fowl, *viz.* the woodcock, the heath-cock, the pheaſant, the partridge, the buſtard, the ſnipe, &c. Cavear was already a principal article of commerce in the 16th century, and was exported by the French, Dutch, and Engliſh to Italy and France, having been firſt brought hither by Capt. Chancellor, in the reign of queen Elizabeth. It is mentioned by Shakſpeare in his Hamlet: "Cavear to the multitude." But we muſt break off. To enter into details of wild and tame animals, of mines and metals, of edible roots and vegetables, of orchard fruits, of flowers and graſſes, of wild herbs and berries, of the cheapneſs of the ſeveral neceſſaries of life, and the gradual increaſe of their prices, would ſwell this article beyond all proper bounds. We muſt, therefore, content ourſelves with referring the reader for theſe and other particulars to the travellers who have given their obſervations to the public; ſuch as Herberſtein, Jovius, Olearius, Petreius, Margaret, Dr. Fletcher, Muller, the two Gmelins, Le Bruyn, Gœteeris, Cook, Korb, Tanner, Kupel, Herrmann, Hammard, Guagnino, Coxe, and more eſpecially our inquiſitive and laborious countryman Mr. Tooke; who have all treated not only of the climate, but alſo of the ſoil and produce.

It is eaſily conceivable, that in a country of ſuch vaſt extent as Ruſſia the climate muſt be extremely various, and this difference may even be reckoned, in ſome reſpects, among its advantages. In ſeveral provinces the winter is of long duration, and extremely cold; the ſhort ſummer is, however, on that account, the hotter. And in theſe regions, for inſtance about Kolmogor, Archangel, ſeveral diſtricts of Siberia, &c. the alternations of cold and heat are uncommonly rapid and frequent. The agreeable introduction to ſummer and winter, which we call ſpring and autumn, is here ſcarcely known. Amidſt the burning heats of ſummer in theſe parts, you have frequently to contend with piercing cold. A ſimple change of the wind is able to produce this ſudden alteration. In a place not quite 60° N. lat. it frequently happens that, after a ſultry day, towards evening, if the wind veers to the north, ſuch a cold enſues as to render a fur cloak not inconvenient. The formidable ſeverity of the froſt makes it neceſſary to adopt the practice of caulking the windows and covering the outſide of the doors of the apartments with a felt made of cow-hair, called by the Ruſſians *voilok*. To the ſame extremity of froſt it is owing, that, in ſome parts of Ruſſia, they have no orchard fruits.

In general the governments of Moſcow, Niſhnei-Novgorod, and Kazan, together with Aſtrachan, the Ukraine and Livonia, are the moſt temperate parts of the Ruſſian empire. Upon the whole, the climate of Ruſſia is not unfriendly to health and longevity. Proofs of this may be drawn from the unfrequency of diſeaſes among the common people comparatively with other countries, notwithſtanding their intemperate manner of life, from the conſiderable number of aged perſons ſeen in Ruſſia, though there are few phyſicians, excepting in St. Peterſburg and Moſcow, which ſwarm with doctors and ſurgeons (and where it is remarkable that deaths are earlier), and from the great fertility of the women. The ſudden tranſitions from cold to heat, and *vice verſâ*, which are occaſionally experienced in Ruſſia, are held unwholeſome by many; and it muſt be confeſſed, that this is true reſpecting foreigners, yet only for a few years, till they are enured to theſe changes. For afterwards, ſtrangers as well as natives, in ſpite of theſe viciſſitudes, generally enjoy a good ſtate of health in thoſe provinces.

The Ruſſian climate has, moreover, even in thoſe regions where it is very rigorous and cold, its peculiar advantages and comforts, among which are the following: the winter, however rude and auſtere, is in ſome reſpects more pleaſant than the winter of countries that boaſt of equable temperature. From the middle of November till April, nay, in ſome places from September till May, it ſcarcely ever rains. The roads are, therefore, in winter not ſo

mirey and the ſtreets not ſo ſloppy as with us. The ſnow generally falls from November to January, or from Auguſt and September to December. Afterwards the ſky is almoſt conſtantly ſerene. It is likewiſe a well-known fact, that in Ruſſia far leſs hardſhip is ſuffered from the cold, than in countries where the climate is incomparably milder: for there proper precautions are taken againſt the cold, becauſe it is known for certain that it will be intenſe.

How comes it then, it will be aſked, that ſo many people are in Ruſſia annually frozen to death? That, for inſtance, in one winter, no fewer than two hundred perſons in Moſcow alone were found to have thus miſerably periſhed? In a country like Ruſſia, it may indeed unfortunately happen that perſons are frozen to death, eſpecially ſuch as have their buſineſs out of doors. Such diſaſters would, however, be very rarely heard of, if the people were more prudent. It is not ſo much the cold, as the brandy which the labouring claſs gulp down in ſuch quantities during the winter, that kills ſo many. From the years 1759 or 1795, no general concluſion can juſtly be drawn. The winter was then, in ſeveral countries, but particularly in Ruſſia, uncommonly ſevere. In ordinary years, the number of theſe caſualties throughout the empire is not ſo conſiderable.

One of the moſt important benefits of the Ruſſian climate is, that in winter (as we have already hinted) the public ways and roads are in excellent order. The quantity of ſnow renders them perfectly level and commodious for travelling. No ſeaſon is, therefore, more ſtudiouſly choſen for that purpoſe than the depth of winter; not only for the ſake of greater expedition, but many of the highways, being laid with balks or trunks of trees in all other parts of the year, are extremely rough and unpleaſant.

Travelling in Ruſſia is performed either with poſt-horſes and *yemſhiks*, or with hired horſes and *iſvoſchiks*. At the poſt ſtations only horſes are to be had; the carriage muſt be the traveller's. The expence of poſting is trifling, in compariſon of what is paid the extra poſt in Germany. When we travel with hired horſes and iſvoſchiks, it is not neceſſary to have one's own carriage. We agree with the iſvoſchik or driver for horſes, carriage, and proviſions for the whole journey, whether fifty, a hundred, or a thouſand verſts. This method of travelling is ſomewhat more tedious than with poſt-horſes, becauſe the ſame horſes being continued throughout, it is neceſſary to ſtop at nights; but it is very cheap. Of theſe iſvoſchiks, in St. Peterſburg alone are at leaſt five thouſand. The greater part of them gain their livelihood by letting out carioles and ſledges for going about the town. Each of them has a number ſtamped on a tin-plate at his back, which is renewed or changed every year. For long journies coaches are rarely uſed, but either *ſchlafwagens* or *kibitkis*. Both are half covered, and made nearly in the ſame form; only the former are better and more commodious than the latter. In both the paſſenger lies upon a bed; and they are ſo conſtructed, that he can eaſily change his poſition either by lying at length or ſitting upright. Both may be raiſed upon either wheels or ſledges, as the ſeaſon requires. Portmanteaus and deep trunks are not ſuitable to theſe carriages; but inſtead of them, flat boxes are placed beneath the bed. *Kozokes*, or ſledges entirely cloſe, having a door and a ſmall pane of glaſs for a window, are likewiſe not uncommon.

The traveller muſt provide himſelf with wine and various other articles of diet for the whole journey; as in all Ruſſia, to the exception of St. Peterſburg, Moſcow, and a few other towns, no regular inns are found, and nothing is to be had upon the road but bread, milk, which often abounds with taracans (a ſpecies of beetle deemed ſacred by the vulgar Ruſſians, believing that they procure a bleſſing to the houſe), wretched quas, and ſtill more wretched brandy. The Ruſſian miles or verſts are in length about one-ſeventh of a German mile, or ſomewhat above three quarters of an Engliſh mile. In ſhort, $104\frac{1}{2}$ verſts are calculated to make one degree of the equator. A Livonian verſt is rather longer than a Ruſſian. In moſt parts, verſt-poſts are ſet up from verſt to verſt; which though by far not ſo handſome as the Saxon and Hanoverian mile-ſtones, yet completely anſwer the ſame purpoſe.

One very beneficial effect of the climate ought not to be omitted, which is, that ſome animals change their colour in the winter. This is particularly obſervable with the hares and ſquirrels; the former turning perfectly white, the latter grey; in Siberia of ſo dark a grey as to border upon black, in the other parts of Ruſſia only light grey. When the hares, however, are ſaid to become white, it is to be underſtood of the generality of the common Ruſſian hares, of the *ſaitzi*, which are ſomewhat ſmaller and not quite ſo well flavoured as the hares of Germany and England. Beyond Moſcow, and in ſome other parts, a larger kind of hares are caught, called *ruſſaki*: theſe retain their hue. It is certain, that this change of colour in ſome animals of Ruſſia is owing to the climate, to the ſeverity of the cold. As heat is known to expand bodies, cold muſt naturally have a contrary effect, and cauſe contraction. This effect is firſt and moſt remarkably perceptible on the ſurface of bodies, which in animals abounds with hair-tubes. Theſe, on becoming contracted, can admit only the fine aqueous particles, and not the earthy parts of the blood. On this, however, depends the colour. They are white or in general brighter, when but few earthy particles can enter theſe hair-tubes. Such animals, therefore, as are not very ſtrongly conſtituted for reſiſting the cold, muſt, in intenſe froſt, after ſhedding their original dark hair, neceſſarily become whiter. That the ſquirrels do not, like the Ruſſian hares, turn white, but only grey, is a proof that theſe animals are ſtronger than the ſaitzi, and probably proceeds from hence, that the colour of the ſquirrel is naturally darker, or at leaſt deeper, than that of the Ruſſian hare. It is no objection, that the Siberian ſquirrel becomes dark grey, bordering upon black. Nothing more can be deduced from thence, than that theſe creatures are of an incomparably more robuſt and hardy nature than the Ruſſian ſquirrels. However dark their hue, it is however not ſo deep as the red-brown which they put on in ſummer. The black ſtripe along the back they retain both in ſummer and winter. If this explanation of the change of colour in animals be admitted; it muſt follow of courſe, that all white animals, including the tame, are weaker than the brown, and this ſeems warranted by experience; at leaſt wild cattle, which are in general accounted ſtronger than the tame, are commonly of a darker hue. To conclude; in Ruſſia the ſaitzi and the ſquirrel in the houſe change their colour as completely as in the foreſt, fodder and nouriſh them how you will.

The greater part of Ruſſia is a flat country, like Poland, of a rich ſoil, marſhy here and there. If we except the great Verchoturian and the Ural chain of mountains, which divide Siberia from the reſt of Ruſſia, the ridge which ſeparates Siberia from the country of the Kalmucks and Mongoles, and the Altai between the Irtiſch and Ob, that between the Yeniſei and the Baikal, called the Sayane mountains, and the leſs conſiderable between the Yeniſei and the Lena; we ſcarcely find in all Ruſſia any elevations that properly deſerve the appellation of mountains.

The *mountains* are diſtributed by Mr. Tooke into eleven claſſes, or diviſions, of which the greater part conſiſts of principal chains of themſelves, whilſt others are only continuations

tinuations of huge ridges, extending for the moſt part into the bordering territories; theſe diviſions are the *Sieverniyagori*, or northern mountains, extending between the Baltic and the White ſea; the *Valday* mountains; the mountains of *Taurida*; the mountains of *Caucaſus*; the *Ural* mountains; the *Altay* mountains; the *Sayane* mountains; the *Baikal* mountains; the *Nerchinſkaia* mountains; the *Okhotſkoy* mountains; and the *Kamtſhatſkoy* mountains; an account of which occurs in appropriate parts of the Cyclopædia.

Foreſts rarely occur in ſome parts of the Ruſſian empire, but in others they abound even to ſuperfluity. Such is the caſe between St. Peterſburg and Moſcow, and between Vladimir and Arſamas: alſo in Siberia, about the Ural mountains, in the diſtrict of the river Tara, on the Ufa as far as the Kama, and between the provinces of Perm and Ufa. The foreſt of Aterſkoy is in extent 75 verſts.

For an account of the ſteppes of Ruſſia, ſee STEPPE. The *ſeas* forming the boundaries of the Ruſſian empire are the *Frozen*, or Northern ocean, the Eaſtern or *Pacific* ocean, the *Euxine* or Black ſea, the *Baltic* or Eaſt ſea: and the inland ſeas and lakes are the *Caſpian*, the *Baikal*, the *Ladoga* lake, the lake *Onega*, the lake *Peipus*, the *Ilmen* lake, the *Bielo-Ozero*, or White lake, the lake *Tſhany*, and the lake *Altin-nor*, which ſee reſpectively.

The chief navigable *rivers* that flow into the Baltic, are the *Duna* and the *Neva*; thoſe that fall into the White ſea are the *Dvina*, and the *Kuloi* and *Meſen*, both of which flow E. of the Dvina into the White ſea, not far from each other, in the diſtrict of the town of Meſenſk, the former taking its riſe in the government of Archangel, and the latter in that of Vologda. The rivers that fall into the Frozen ocean are the *Petſhora*, called alſo Bolſhaia, which takes its riſe in the weſtern ſide of the Ural mountains, in the government of Vologda, and following a N.W. courſe falls into the northern ocean, in the government of Archangel; the *Oby*, the *Irtyſh*, the *Tobol*, the *Yeniſſey*, the *Tunguſkis*, the *Khatanga*, the *Lena*, the *Yana*, the *Indighirka*, and the *Kolima*, which ſee. The rivers that flow into the Eaſtern or Pacific ocean are the *Anadyr*, the *Kamtſhatka*, and the Amoor or Amur, formed of the Argoon and the Shilka. The rivers that flow into the Caſpian are the *Yemba* or *Emba*, the *Ural*, formerly the Yaik, the *Volga*, which takes up the Kamma and the Okka, and the *Terek*. The rivers that fall into the Euxine are the *Kuban* or ancient Hypanis, the *Don* or Tanais, which takes up the Voronetz, the Khoper, the Donetz, and the Manitſh, the *Dnieper* or Boryſthenes, and the *Bogue*. See each reſpectively. For an account of the canals of Ruſſia, ſee CANAL.

Population of the Ruſſian Empire.—In adverting to the *population* and *populouſneſs* of the Ruſſian empire, Mr. Tooke, we obſerve, properly diſtinguiſhes between theſe two terms; meaning by the former the abſolute number of the inhabitants of a country, and by the latter, the relation which this number bears to the ſurface of ground on which they dwell. By a reviſion made, or at leaſt completed, in the year 1783, the 41 viceroyalties of which Ruſſia at that time conſiſted, contained of male inhabitants;

Merchants - - -	107,408
Burghers - - -	293,793
Odnodvortzi and free countrymen -	773,656
Exempt from taxes - -	310,830
Crown boors - - -	4,674,603
Private boors - - -	6,678,239
Total	12,838,529

By doubling the above total, we obtain for the whole number of males and females in the above mentioned viceroyalties, an amount of 25,677,000.

In order to obtain the augmented population ſince the year 1783, we have the following ſtatement:

The total for 1783 - - -	25,677,000
The amount of the Coſſacks of the Don and Euxine - -	220,000
Unnumbered tribes and claſſes at the reviſion in the year 1783 - -	1,500,000
Total for 1783	27,397,000
Annual increaſe of 250,000 in 12 years -	3,000,000
New acquiſitions ſince 1783, or the nine viceroyalties of Taurida, Minſk, Brazlau, Voſneſenſk, Podolia, Volhynia, Courland, Vilna, and Slonim - -	5,755,000
Grand Total	36,152,000

Whence, by the moſt moderate eſtimate, the whole population of the Ruſſian empire may be ſtated for the year 1795, in round numbers, at 36,000,000.

Of this maſs of population, the greateſt part belongs to European Ruſſia. The five governments of Perm, Ufa, Kolyvan, Tobolſk, and Irkutſk, comprehended under the general name of Siberia, contain, according to the reviſion-liſts, only 2,215,000, and allowing for the unnumbered claſſes and tribes, perhaps above $3\frac{1}{2}$ millions of inhabitants. Hence it appears, that the population of the European part is about fourteen times greater; and the Ruſſian empire, which, with regard to ſuperficial contents, moſtly belongs to Aſia, muſt in reſpect of population be reckoned as belonging to Europe. The population of the different governments is very various; the moſt populous being that of Moſcow, which contains upwards of 1,139,000 perſons, and the leaſt populous is that of Taurida, the inhabitants of which are computed at about 150,000.

But although the Ruſſian empire ranks high in *population*, with reſpect to *populouſneſs* its place is very ſubordinate. European Ruſſia has a population of 405, and Aſiatic Ruſſia of 11 perſons to a ſquare mile: and if we compare the governments with one another, the reſult will be, that of 45 (the five newly acquired not being reckoned), eight contain below 100; nine contain from 100 to 500; ſeventeen from 500 to 1000; ſeven from 1000 to 1500; three from 1500 to 2000; and only one above 2000, inhabitants, on a ſquare mile. This laſt honourable precedence is held by the government of Moſcow, which (including the metropolis) numbers 2403 perſons on the foreſaid ſuperficies. To the ſecond claſs belong the governments of Kaluga, Tula, and Tchernigof: and to the third, Riazan, Kurſk, Kief, Orel, Kharkof, Yaroſlaf, and Novgorod Sieverſk. The ſixth and pooreſt claſs compriſes, with the countries of the Coſſacks, the north European and Siberian deſerts, where the degree of population is ſo low, that the government of Tobolſk has but ſeven, and that of Irkutſk only three perſons in every ſquare geographical mile. In theſe countries, however, the unregiſtered tribes are the moſt numerous. The moſt populous diſtrict of the Ruſſian empire lies between the 49th and 58th degrees of N. lat.; and further both to the N. and S., as well as E. beyond the 65th degree of longitude, this populouſneſs is continually decreaſing. From a table of birth, deaths, and marriages in 1799, extracted by Mr. Tooke from a German publication, we may deduce the following concluſions. The overplus of

births,

births, unparallelled in the annals of political economy, forms a characteristic feature of the Russian empire; and shews, that if the same increase of population should proceed for 10 years, the number of Russian subjects will be augmented by 5,000,000. It also appears, that upwards of 23 boys were born to 20 girls, whereas 104 persons only of the former died to 100 of the latter; and this favourable proportion of the males to the females indicates the military grandeur to which the Russian empire is capable of attaining; unimpeded by such wasteful wars as that which has recently occurred. Moreover, it appears that the mortality in common years throughout all the Russian dominions is as 1 to 58; whence it may be calculated, that the number of Russian subjects of the Greek church would amount, exclusively of the inhabitants of the eparchy of Bruzlaw, to 31,339,620 souls. Adding to this number the inhabitants of the new possessions in Poland, which in 1795 contained 4,592,544 persons, and about 5,000,000 of Russian subjects of various Christian sects, and of the Jewish, Laman, and Schaman professions, the whole population of the Russian empire will appear to amount to upwards of 40,000,000 of souls.

Progress of Population in Russia.—The first census, namely that in 1722, gave 5,794,928 males; which, admitting an equal number of women, makes a population of 11,589,856 individuals. How much ought we to add for the new acquisitions, in which the census, or revision, as it is termed in Russia, did not take place?

According to Mr. Hermann, in his Statistic Journal, vol. i. part 2. p. 54, an enumeration made in Little Russia, in 1768, gave 955,228 inhabitants; another made in Finland, in 1755, gave 117,998; Esthonia, in 1773, had 176,000; Livonia, 447,360. All these make a sum total of 1,696,586 persons. These enumerations, however, being made 20, 30, 50 years after the first revision, it is possible that the population may have increased or diminished during the interval. If we compare these data with the enumeration made in 1805, we shall find that Finland, in 49 years, has gained 64,392 inhabitants; Esthonia, in 31 years, 36,948; and Livonia, 138,097: making a sum total of 239,437. The population in the provinces bordering the Baltic, then, has gained about one-fourth during the latter half of the 18th century. On comparing the population of Little Russia, as above stated, with that of the governments of Tchernigof and Pultava, a surplus will be found, in 1804, of 1,465,465 individuals above the enumeration of 1768. According to this statement, the population has more than doubled during the last 50 years. This result corresponds very well with the observations made on the registers of births and deaths, that the progress of population is very slow in the Baltic provinces, and very rapid in Little Russia. It has gained of late, especially by the commerce of Odessa; the price of land has risen considerably, and the fertile steppes have likewise been cultivated.

Admitting the like proportion in the progress of population in these provinces, during the former half of the 18th century, which is certainly a great admission, we must deduct from the above stated population of the Baltic provinces one-fourth, and there will remain 555,979; and one half of the population of Little Russia in 1768, leaving 477,614. Agreeably to this statement, the population of all the provinces acquired posterior to 1722, may be estimated at 1,033,533.

It remains now to compute what may have been the number of free persons not included in the revision. Seeing that, at the last revision of 1796, there were 16,000,000 of males included in the list of those who paid the regular obrok, for 1,000,000 that did not pay that tax, we may compute, that at the first revision, in which the number of revisionaries was 5,000,000, there were 300,000 male freemen, composing, together with their wives, the sum of 600,000.

In conformity with these calculations, the probable population of Russia, in 1722, will be,

Revisionaries - - -	11,589,859
Free individuals - - -	600,000
Conquered provinces - -	1,033,533
	13,223,392

Le Clerc, in his Essay on the Population of Russia, published in 1777, states it at 14,000,000; Benedict Francis John Hermann, at the same; which is probably accurate. But when Voltaire reckons the population during the last years of Peter the Great at 18,000,000, he confounds a later period with the era of that monarch. It appears to me, adds Mr. C. T. Hermann, that 14,000,000 would be the most probable amount, if we consider the imperfection inseparable from a first census, and the uncertainty of the calculations respecting the newly conquered provinces.

The second revision, in 1742, gives 6,673,167 males; and, supposing a like number of females, we have 13,346,334 for the inhabitants of Russia at that time. To this must be added the conquered provinces, and the free individuals. As we subtracted a fourth from the population of the Baltic provinces in 1722, the deduction of one-eighth will suffice for their population in 1742; the remainder is 648,689: and, subtracting a quarter from the population of Little Russia in 1768, there remains 706,421; making a total of 1,355,110 for the population of the conquered provinces. The number of revisionaries having augmented by 1,000,000 since 1722, we must increase the number of freemen at least by 50,000, considering the progress of industry, and the better regulations adopted by government. The population, therefore, in 1742, will be,

Revisionaries - - -	13,346,334
Free individuals - - -	700,000
Conquered provinces - -	1,335,110
	15,381,444

Hermann admits for 1742 the round number of 16,000,000. This is a very probable estimate, as the enumerations in Russia are always below the mark.

The third revision, in 1762, gives 7,363,548 males, which supposes a total of 14,727,096 individuals; and, by the proper ratio, we take the population of the conquered provinces at 1,696,586. The revisionaries being nearly one half what they are at present, we may compute the same to hold with the freemen, which would make their number 400,000. The probable population, therefore, of 1762 is as follows:

Revisionaries - - -	14,727,096
Free individuals - - -	300,000
Conquered provinces - -	1,696,586
	16,723,682

Marshal in 1768 and 1770, and Williams also in 1768, admit 18,000,000; l'Evêque in 1782, and le Clerc in 1783, 19,000,000; Schlœtzer and Busching, in 1765, 20,000,000;

20,000,000; and Mr. C. T. Hermann is of this laſt opinion. The real number, in 1762, apparently lies ſomewhere between 18 and 19,000,000.

The fourth general reviſion, in 1782, gives 12,838,529, and, with the females, 25,677,058; or, according to Hermann, 26,358,822. The two capital cities, the military and the nomadic tribes, are not included in this calculation. Theſe at preſent amount to 2,960,000: at that time we may ſuppoſe them to have amounted to 2,000,000. By this ſtatement, the population of Ruſſia, in 1782, would have been between 27 and 28,000,000. Crome, in 1785, admits 23,000,000; Suſmilch, 24,000,000; Pleſchtſcheëf (not reckoning the clergy, the civil eſtabliſhment, the military, and the Nomades) admits 26,617,698 in 43 governments; while Hupel in 1780 to 1790, and Hermann, compute 28,000,000.

The fifth reviſion, in 1796, gave 17,816,370 males, which, ſuppoſing an equal number of females, makes the population amount to 35,632,740; or, according to the datum 16,223,229, (which we conſider greatly below the truth,) 34,038,599. If we add the two capitals, the military, and the Nomades, computing them at 2,960,000, the population in 1796 will amount to 36,998,599. Buſching and Beauſobre make it 30,000,000; Schlœtzer, 33,000,000; Hermann, 33,250,000; Meuſel between 35 and 36,000,000; and Storck, 36,000,000.

Following theſe data, the progreſs of population in Ruſſia, brought on partly by the improvement of the interior, partly by new acquiſitions, has been as follows:

In 1722	-	14,000,000.
1742	-	16,000,000, after 20 years.
1762	-	19,000,000, after 20 years.
1782	-	28,000,000, after 20 years.
1796	-	36,000,000, after 14 years.
1806	-	41,000,000, after 10 years.

This aſtoniſhing increment has proceeded in a great meaſure from new acquiſitions. It would prove highly intereſting, were we able to aſcertain nearly the progreſs of the Ruſſian population, independent of the recent acquiſitions.

We ſhall admit for Little Ruſſia and the Baltic provinces the number exhibited by the enumerations of 1755, 1768, and 1772, which yields a total of 1,696,586; ſubjoining the new acquiſitions ſince 1773, according to the data publiſhed by general Oppermann on his map of 1796, conſtructed by order of government, for delineating the new limits. According to this author, Ruſſia acquired,

	Individuals.
By the firſt diſmemberment of Poland in 1773	1,226,966
By the peace with the Ottoman Porte in 1774 and 1783 - - - - - - -	171,610
By the peace with the ſame power in 1791 -	42,708
By the ſecond partition of Poland in 1793 -	3,745,663
By the annexation of Courland - - -	387,922
By the ſubſequent partition of Poland in 1795	1,407,402
Total of the acquiſitions ſince 1773 - -	6,982,271
Adding the Baltic provinces and Little Ruſſia, we get - - - - - - -	8,678,357

Here we have the total amount of the population of the countries conquered, down to 1795.

All this, however, was obtained by means of firſt enumerations, which were of courſe incorrect. Thoſe made down to 1804 ought to be more accurate. The adminiſtration muſt have acquired conſiderable influence, eſpecially after the organization of the governments in 1775. It will be of importance, therefore, to know the effect of these cauſes, as exhibited by the laſt cenſus, in 1804, which Mr. Hermann delivers to us in the following tables.

Little Ruſſia comprehends the governments of Kief, Tchernigof, Pultava, Ukrainſkoi-ſlobode, with a part of Ekaterinoſlaf and Kurſk; to which muſt be added the country of the Donſkoi Coſſacks, as peopled by the inhabitants of Little Ruſſia. The whole of this vaſt territory, called the Ukraine, formed the boundary between the Turks and Tartars. Its population, in 1804, was as follows:

	Males.	Females.
Kief - - -	574,217	538,404
Tchernigof - -	534,712	538,570
Pultava - -	713,772	732,639
Ukrainſkoi-ſlobode -	420,304	418,781
Ekaterinoſlaf - -	210,815	183,363
Coſſacks of the Don	161,100	194,521
	2,614,920	2,606,278

The Swediſh provinces are a part of Karelia and Ingria, conſtituting at preſent the governments of St. Peterſburg, Finland, Eſthonia, and Livonia. Their population, in 1804, was as follows:

	Males.	Females.
St. Peterſburg -	268,748	270,920
Finland - -	94,397	87,393
Eſthonia - -	107,357	105,591
Livonia - -	290,014	295,443
	760,516	759,947

So that the number of individuals in the Swediſh provinces and in Little Ruſſia is 6,741,661.

On comparing this number with the preceding enumerations, it will be ſeen that the Swediſh provinces have gained one-fourth, and that Little Ruſſia has nearly doubled; ſince it is certain that, in this laſt cenſus, the ſeveral provinces belonging to Little Ruſſia in its largeſt extent have not been included.

The Poliſh provinces annexed from 1773 to 1795, including Courland, are White Ruſſia, Lithuania, and the Poliſh Ukraine, or the governments of Minſk, Vitepſk and Mohilef, Grodno and Vilna, Podolia and Volhynia. The ſtate of their population, in 1784, was as under:

	Males.	Females.
Minſk - - -	431,586	426,940
Vitepſk - -	343,716	330,624
Mohilef - -	403,614	397,381
Grodno - -	300,278	290,782
Vilna - - -	465,224	460,046
Podolia - -	379,215	556,870
Volhynia - -	564,586	522,182
Courland - -	191,910	189,366
	3,080,129	3,174,191

According to general Oppermann, the population of theſe provinces, in 1796, amounted to 6,767,953; whence it appears that the population of Poland is ſtationary.

The Turkiſh provinces are Cherſon, Taurida, the country of the Coſſacks of the Euxine, and the reſidue of Ekate-

births, unparallelled in the annals of political economy, forms a characteriſtic feature of the Ruſſian empire; and ſhews, that if the ſame increaſe of population ſhould proceed for 10 years, the number of Ruſſian ſubjects will be augmented by 5,000,000. It alſo appears, that upwards of 23 boys were born to 20 girls, whereas 104 perſons only of the former died to 100 of the latter; and this favourable proportion of the males to the females indicates the military grandeur to which the Ruſſian empire is capable of attaining; unimpeded by ſuch waſteful wars as that which has recently occurred. Moreover, it appears that the mortality in common years throughout all the Ruſſian dominions is as 1 to 58; whence it may be calculated, that the number of Ruſſian ſubjects of the Greek church would amount, excluſively of the inhabitants of the eparchy of Bruzlaw, to 31,339,620 ſouls. Adding to this number the inhabitants of the new poſſeſſions in Poland, which in 1795 contained 4,592,544 perſons, and about 5,000,000 of Ruſſian ſubjects of various Chriſtian ſects, and of the Jewiſh, Laman, and Schaman profeſſions, the whole population of the Ruſſian empire will appear to amount to upwards of 40,000,000 of ſouls.

Progreſs of Population in Ruſſia.—The firſt cenſus, namely that in 1722, gave 5,794,928 males; which, admitting an equal number of women, makes a population of 11,589,856 individuals. How much ought we to add for the new acquiſitions, in which the cenſus, or reviſion, as it is termed in Ruſſia, did not take place?

According to Mr. Hermann, in his Statiſtic Journal, vol. i. part 2. p. 54, an enumeration made in Little Ruſſia, in 1768, gave 955,228 inhabitants; another made in Finland, in 1755, gave 117,998; Eſthonia, in 1773, had 176,000; Livonia, 447,360. All theſe make a ſum total of 1,696,586 perſons. Theſe enumerations, however, being made 20, 30, 50 years after the firſt reviſion, it is poſſible that the population may have increaſed or diminiſhed during the interval. If we compare theſe data with the enumeration made in 1805, we ſhall find that Finland, in 49 years, has gained 64,392 inhabitants; Eſthonia, in 31 years, 36,948; and Livonia, 138,097: making a ſum total of 239,437. The population in the provinces bordering the Baltic, then, has gained about one-fourth during the latter half of the 18th century. On comparing the population of Little Ruſſia, as above ſtated, with that of the governments of Tchernigof and Pultava, a ſurplus will be found, in 1804, of 1,465,465 individuals above the enumeration of 1768. According to this ſtatement, the population has more than doubled during the laſt 50 years. This reſult correſponds very well with the obſervations made on the regiſters of births and deaths, that the progreſs of population is very ſlow in the Baltic provinces, and very rapid in Little Ruſſia. It has gained of late, eſpecially by the commerce of Odeſſa; the price of land has riſen conſiderably, and the fertile ſteppes have likewiſe been cultivated.

Admitting the like proportion in the progreſs of population in theſe provinces, during the former half of the 18th century, which is certainly a great admiſſion, we muſt deduct from the above ſtated population of the Baltic provinces one-fourth, and there will remain 555,979; and one half of the population of Little Ruſſia in 1768, leaving 477,614. Agreeably to this ſtatement, the population of all the provinces acquired poſterior to 1722, may be eſtimated at 1,033,533.

It remains now to compute what may have been the number of free perſons not included in the reviſion. Seeing that, at the laſt reviſion of 1796, there were 16,000,000 of males included in the liſt of thoſe who paid the regular obrok, for 1,000,000 that did not pay that tax, we may compute, that at the firſt reviſion, in which the number of reviſionaries was 5,000,000, there were 300,000 male freemen, compoſing, together with their wives, the ſum of 600,000.

In conformity with theſe calculations, the probable population of Ruſſia, in 1722, will be,

Reviſionaries - - -	11,589,859
Free individuals - - -	600,000
Conquered provinces - -	1,033,533
	13,223,392

Le Clerc, in his Eſſay on the Population of Ruſſia, publiſhed in 1777, ſtates it at 14,000,000; Benedict Francis John Hermann, at the ſame; which is probably accurate. But when Voltaire reckons the population during the laſt years of Peter the Great at 18,000,000, he confounds a later period with the era of that monarch. It appears to me, adds Mr. C. T. Hermann, that 14,000,000 would be the moſt probable amount, if we conſider the imperfection inſeparable from a firſt cenſus, and the uncertainty of the calculations reſpecting the newly conquered provinces.

The ſecond reviſion, in 1742, gives 6,673,167 males; and, ſuppoſing a like number of females, we have 13,346,334 for the inhabitants of Ruſſia at that time. To this muſt be added the conquered provinces, and the free individuals. As we ſubtracted a fourth from the population of the Baltic provinces in 1722, the deduction of one-eighth will ſuffice for their population in 1742; the remainder is 648,689: and, ſubtracting a quarter from the population of Little Ruſſia in 1768, there remains 706,421; making a total of 1,355,110 for the population of the conquered provinces. The number of reviſionaries having augmented by 1,000,000 ſince 1722, we muſt increaſe the number of freemen at leaſt by 50,000, conſidering the progreſs of induſtry, and the better regulations adopted by government. The population, therefore, in 1742, will be,

Reviſionaries - - -	13,346,334
Free individuals - - -	700,000
Conquered provinces - -	1,335,110
	15,381,444

Hermann admits for 1742 the round number of 16,000,000. This is a very probable eſtimate, as the enumerations in Ruſſia are always below the mark.

The third reviſion, in 1762, gives 7,363,548 males, which ſuppoſes a total of 14,727,096 individuals; and, by the proper ratio, we take the population of the conquered provinces at 1,696,586. The reviſionaries being nearly one half what they are at preſent, we may compute the ſame to hold with the freemen, which would make their number 400,000. The probable population, therefore, of 1762 is as follows:

Reviſionaries - - -	14,727,096
Free individuals - - -	300,000
Conquered provinces - -	1,696,586
	16,723,682

Marſhal in 1768 and 1770, and Williams alſo in 1768, admit 18,000,000; l'Evêque in 1782, and le Clerc in 1783, 19,000,000; Schlœtzer and Buſching, in 1765, 20,000,000;

20,000,000; and Mr. C. T. Hermann is of this laſt opinion. The real number, in 1762, apparently lies ſomewhere between 18 and 19,000,000.

The fourth general reviſion, in 1782, gives 12,838,529, and, with the females, 25,677,058; or, according to Hermann, 26,358,822. The two capital cities, the military and the nomadic tribes, are not included in this calculation. Theſe at preſent amount to 2,960,000: at that time we may ſuppoſe them to have amounted to 2,000,000. By this ſtatement, the population of Ruſſia, in 1782, would have been between 27 and 28,000,000. Crome, in 1785, admits 23,000,000; Suſmilch, 24,000,000; Pleſchtſcheëf (not reckoning the clergy, the civil eſtabliſhment, the military, and the Nomades) admits 26,617,698 in 43 governments; while Hupel in 1780 to 1790, and Hermann, compute 28,000,000.

The fifth reviſion, in 1796, gave 17,816,370 males, which, ſuppoſing an equal number of females, makes the population amount to 35,632,740; or, according to the datum 16,223,229, (which we conſider greatly below the truth,) 34,038,599. If we add the two capitals, the military, and the Nomades, computing them at 2,960,000, the population in 1796 will amount to 36,998,599. Buſching and Beauſobre make it 30,000,000; Schlœtzer, 33,000,000; Hermann, 33,250,000; Meuſel between 35 and 36,000,000; and Storck, 36,000,000.

Following theſe data, the progreſs of population in Ruſſia, brought on partly by the improvement of the interior, partly by new acquiſitions, has been as follows:

In 1722	-	14,000,000.	
1742	-	16,000,000,	after 20 years.
1762	-	19,000,000,	after 20 years.
1782	-	28,000,000,	after 20 years.
1796	-	36,000,000,	after 14 years.
1806	-	41,000,000,	after 10 years.

This aſtoniſhing increment has proceeded in a great meaſure from new acquiſitions. It would prove highly intereſting, were we able to aſcertain nearly the progreſs of the Ruſſian population, independent of the recent acquiſitions.

We ſhall admit for Little Ruſſia and the Baltic provinces the number exhibited by the enumerations of 1755, 1768, and 1772, which yields a total of 1,696,586; ſubjoining the new acquiſitions ſince 1773, according to the data publiſhed by general Oppermann on his map of 1796, conſtructed by order of government, for delineating the new limits. According to this author, Ruſſia acquired,

	Individuals.
By the firſt diſmemberment of Poland in 1773	1,226,966
By the peace with the Ottoman Porte in 1774 and 1783 - - - - - - -	171,610
By the peace with the ſame power in 1791 -	42,708
By the ſecond partition of Poland in 1793 -	3,745,663
By the annexation of Courland - - -	387,922
By the ſubſequent partition of Poland in 1795	1,407,402
Total of the acquiſitions ſince 1773 - -	6,982,271
Adding the Baltic provinces and Little Ruſſia, we get - - - - - - -	8,678,357

Here we have the total amount of the population of the countries conquered, down to 1795.

All this, however, was obtained by means of firſt enumerations, which were of courſe incorrect. Thoſe made down to 1804 ought to be more accurate. The adminiſtration muſt have acquired conſiderable influence, eſpecially after the organization of the governments in 1775. It will be of importance, therefore, to know the effect of theſe cauſes, as exhibited by the laſt cenſus, in 1804, which Mr. Hermann delivers to us in the following tables.

Little Ruſſia comprehends the governments of Kief, Tchernigof, Pultava, Ukrainſkoi-ſlobode, with a part of Ekaterinoſlaf and Kurſk; to which muſt be added the country of the Donſkoi Coſſacks, as peopled by the inhabitants of Little Ruſſia. The whole of this vaſt territory, called the Ukraine, formed the boundary between the Turks and Tartars. Its population, in 1804, was as follows:

	Males.	Females.
Kief - - -	574,217	538,404
Tchernigof - -	534,712	538,570
Pultava - -	713,772	732,639
Ukrainſkoi-ſlobode -	420,304	418,781
Ekaterinoſlaf - -	210,815	183,363
Coſſacks of the Don	161,100	194,521
	2,614,920	2,606,278

The Swediſh provinces are a part of Karelia and Ingria, conſtituting at preſent the governments of St. Peterſburg, Finland, Eſthonia, and Livonia. Their population, in 1804, was as follows:

	Males.	Females.
St. Peterſburg -	268,748	270,920
Finland - -	94,397	87,393
Eſthonia - -	107,357	105,591
Livonia - -	290,014	295,443
	760,516	759,947

So that the number of individuals in the Swediſh provinces and in Little Ruſſia is 6,741,661.

On comparing this number with the preceding enumerations, it will be ſeen that the Swediſh provinces have gained one-fourth, and that Little Ruſſia has nearly doubled; ſince it is certain that, in this laſt cenſus, the ſeveral provinces belonging to Little Ruſſia in its largeſt extent have not been included.

The Poliſh provinces annexed from 1773 to 1795, including Courland, are White Ruſſia, Lithuania, and the Poliſh Ukraine, or the governments of Minſk, Vitepſk and Mohilef, Grodno and Vilna, Podolia and Volhynia. The ſtate of their population, in 1784, was as under:

	Males.	Females.
Minſk - - -	431,586	426,940
Vitepſk - -	343,716	330,624
Mohilef - -	403,614	397,381
Grodno - -	300,278	290,782
Vilna - - -	465,224	460,046
Podolia - -	379,215	556,870
Volhynia - -	564,586	522,182
Courland - -	191,910	189,366
	3,080,129	3,174,191

According to general Oppermann, the population of theſe provinces, in 1796, amounted to 6,767,953; whence it appears that the population of Poland is ſtationary.

The Turkiſh provinces are Cherſon, Taurida, the country of the Coſſacks of the Euxine, and the reſidue of Ekate-

Ekaterinoſlaf, to which may be added Caucaſia. The population of theſe provinces is,

	Males.	Females.
Cherſon - -	145,814	124,321
Taurida - -	102,826	88,864
Coſſacks of the Euxine	20,240	9,155
Caucaſia - -	34,849	29,240
	303,729	251,580

As the Coſſacks of the Euxine have very few women, and ſtill retain many cuſtoms derived from their anceſtors, the famous Zaporogian Coſſacks, ſo called from *za*, *trans*, beyond, and *parogi*, cataracts, (the Coſſacks beyond the cataracts,) the foregoing ſtatement is probably correct. We learn from general Oppermann, that in the Turkiſh provinces conquered in 1774, 1783, and 1791, there were 214,318 individuals of both ſexes. This ſmall population, in a tract of country ſo immenſe, has increaſed undoubtedly, in conſequence of a more regular adminiſtration; but not ſo much as would at firſt ſight appear, becauſe we muſt ſtrike off the Coſſacks of the Euxine, Caucaſia, and the Ruſſian and foreign colonies domiciliated in theſe regions. Beſides, if we conſider the incompletenſs of a firſt enumeration, it is but reaſonable to ſuppoſe that general Oppermann's eſtimate is too ſmall.

Thus it appears that the population of the territories acquired ſince 1773 was, in 1804,

Little Ruſſia - - -	5,221,198
Swediſh provinces - -	1,520,463
Poliſh provinces - - -	6,454,320
Turkiſh provinces - -	555,309
	13,751,290

According to the data above noticed, we are to ſubtract from the aggregate population of Ruſſia, for the provinces acquired,

From 14,000,000 in 1722		
1,033,533		
	-	12,966,467
From 16,000,000 in 1742		
1,355,110		
	-	14,644,890
From 19,000,000 in 1762		
1,696,586		
	-	17,303,414
From 28,000,000 in 1782		
8,678,857		
	-	19,321,143
From 36,000,000 in 1796		
13,751,290		
	-	22,248,710
From 41,000,000 in 1806		
13,751,290		
	-	27,248,710

The laſt column gives us the rate at which the population of Ruſſia proper has increaſed.

Whence it follows, that the population of Ruſſia, excluſive of the conqueſts ſince the reign of Peter I., gained in 20 years, between 1722 and 1742, 1,678,423, or 83,921 annually. In the 20 years between 1742 and 1762, 2,658,524, or 132,926 annually; that is to ſay, 49,005 more annually than during the firſt period. In the 20 years between 1762 and 1782, 1,676,253, or 88,812 annually; leſs by 49,114 than during the ſecond period. In the 14 years between 1782 and 1796, 2,927,567, or 146,378 annually; more by 62,566 than during the preceding period. In the 10 years between 1796 and 1806, 5,000,000, or 200,000 annually; more by 53,622 than during the antecedent period.

By the above table, it is obvious that the population of Old Ruſſia has more than doubled, or that it is at preſent to what it was in 1722, as 2$\frac{1}{2}$th to 1. It is apparent alſo that the progreſs of population has not been uniform, that it has had accelerations and retardations, that the moſt favourable periods were during the reign of the empreſs Elizabeth, between 1741 and 1761, and the years of the peace of Catharine II. between 1782 and 1796. The population ſtill advances in the later periods, but the rate is ſlower. What may be the cauſe of theſe phenomena?

The population of Ruſſia has more than doubled during the laſt century, though Smith ſuppoſes that the population in civilized countries only doubles once in 500 years. It has doubled in conſequence of a better regulated adminiſtration; of the ſecurity the government has afforded to the nation; of the capitals belonging to foreigners placed in the country, and which for a long time conſtituted the ſoul of the inland commerce; in conſequence of the progreſs of national induſtry, which was the reſult; of the increaſe of knowledge, by new commercial connections with other countries of Europe, and by the means of inſtruction furniſhed by government to the other inhabitants of Ruſſia; and, finally, in conſequence of the removal of ſeveral obſtacles which checked the progreſs of induſtry, as the abolition of the cuſtom-houſes of the interior, under the reigns of the empreſſes Elizabeth and Catharine II., the improvement of the roads, and the multiplication of canals.

What a diſmal picture does Ruſſia preſent to us in the fifteenth, ſixteenth, and ſeventeenth centuries! Joſafa Barbaro, in 1436, reports, that from Moſcow to the frontiers of Poland, the whole country was one vaſt deſart; the villages, burnt and abandoned, offered no other accommodation to ſtrangers than a place to kindle a fire. Contarini confirms this ſtatement in 1483. Meyerberg, in 1661, found between Viaſma and Moſaiſk, a diſtance of 130 verſts, only a ſingle village. The road between Smolenſk and Moſcow was dangerous, according to Lyſeck, in 1675, on account of the wolves that attacked travellers. Ulfeldt, the Daniſh ambaſſador, in 1625, found the country between Moſcow, Novgorod, and Pſcove, laid entirely waſte by the inteſtine wars under Ivan Vaſſillievitch II. Poſſevin, in 1581 and 1582, travelled whole days in the interior of Ruſſia without meeting a ſingle individual. The whole country between Kazan and Aſtrachan was a continued deſart. Even the cities had greatly ſuffered. Poſſevin eſtimates the population of Moſcow at 30,000; that of Novgorod was diminiſhed by the plague to 3000; and Kief, in the time of Herberſtein, in 1516, was almoſt in ruins. Beſides the davaſtations committed by the domeſtic feuds and foreign invaders, the number of impoſts, and the ſeverity of the commiſſioners who levied them, depopulated the northern provinces which had not ſuffered from thoſe diſaſters. We learn from Fletcher, that in the year 1588, 50 villages were abandoned between Vologda and Yaroſlaf. At Uſtiug bread was almoſt unknown, and the ſame deſtitution of that article of life was felt on the Dvina in the time of Herberſtein. Famine and peſtilence often committed their ravages among the melancholy remnants of this unfortunate population, as in 1525, in 1601, and in 1615. M. Meiner informs us, that the city of Novgorod loſt in one winter no fewer than 18,000 individuals, conſtituting nearly the whole of its population.

It

It is neither to the mildnefs of the climate, nor to the fertility of the foil, that we are to afcribe the rapid increafe of population during the eighteenth century; but to a better organized adminiftration, and the fecurity which refulted from it. An infant ftate, fuppofing it tolerably well governed, and connected with countries long civilized, ought to make prodigious progrefs in improvement and population.

That period of the reign of Catharine II., in which fhe took in hand the amelioration of the feveral governments, was particularly propitious to the progrefs of population. The organization of the governments in 1775 was the great political fcheme that procured the fubjects a greater degree of fecurity and happinefs. The ukafe of 1782, refpecting the liberty of working the mines, the eftablifhment of normal fchools in 1783, the rights granted to the nobility in 1785, the improvement of the high roads in 1786, and efpecially the erection of the bank in the fame year, were all calculated to promote the happinefs of the fubject, as far as it depended on the government. The bank, from its very commencement, had a furprifing effect upon the progrefs of agriculture. That patriotic fovereign removed feveral obftacles to the profperity of her fubjects, fuch as the want of liberty to be induftrious, the want of communications, the want of knowledge, and of a medium of circulation.

The population of Ruffia has more than doubled during the eighteenth century. Have we reafon to expect the fame progrefs during the nineteenth?

If we confider only the extent of the furface capable of cultivation, which is computed at 80,000,000 of fquare miles, we muft conclude that Ruffia is capable of fupporting 960,000,000 of inhabitants, or almoft as many as at prefent exift on the earth. If we confider the furplus of births as a total gain to the population, this furplus, amounting at leaft to 500,000 annually, would in 32 years amount to 60,000,000, in 56, to 80,000,000, &c.

Experience, however, fhews us that the progrefs of population does not depend folely upon the extent of foil capable of cultivation. There are fpots left uncultivated in the countries where agriculture has made the greateft advances, even in England, Flanders, and Lombardy. This progrefs depends ftill lefs on the furplus of births. Every where the number of births exeeeds that of deaths. The population is always proportionate to the ftate of national wealth. The moft decifive proof, therefore, of the profperity of a country, is the increafe of the number of its inhabitants. In Ruffia the population has more than doubled in 34 years. Whence we may infer, that its agriculture, the principal branch of its induftry, has alfo doubled. The increafe of Ruffian commerce depends upon peace, and upon the augmentation of knowledge. On thefe accounts we cannot expect fo rapid an increafe of national riches, and confequently of population, during the nineteenth century as obtained during the eighteenth.

Experience has demonftrated the accuracy of this mode of reafoning. The progrefs of the population has become flower fince the fifth revifion. The annual furplus of 60,000 has been reduced to 50,000 during the laft ten years.

To eftablifh this fact, M. Hermann has compared the ftatements refpecting the population of the governments of Mofcow, Tula, Kaluga, Yaroflaf, Orel, Kurfk, Vladimir, Riazan, Penza, Kazan, Tver, Smolenfk, Tambof, Nijegorod, Pfcove, Voronetch, Simbirfk, Koftroma, Viætka, Novgorod, Saratof, Perm, Orenburg, Vologda, Olonetz. The ftatements refpecting the population of thefe 25 governments, according to the fourth revifion of 1782, gives 9,939,790, males; that of the fifth revifion of 1796, fourteen years after, 10,228,672; that of the enumeration of 1804, eight years after, 9,989,531. So that the population gained during the firft period 867,873, and during the fecond period loft 239,141. In the firft period there are only three governments whofe population has diminifhed; *viz.* Kaluga, Koftroma, and Voronetch. All the others had increafed. But during the fecond period Mofcow alone gained confiderably, namely, 100,000 males; Voronetch, which had loft before, gained 150,000 males; and Viætka gained 37,000. Kurfk and Orel have gained a few thoufands; Tula, Yaroflaf, and Perm, fome hundreds. The other feventeen governments have loft, and feveral of them confiderably. In like manner, Tambof has loft 88,000 men, Nijegorod 55,000, and Simbirfk 110,000 men in eight years!

It is worthy of obfervation, that thofe governments which have been long in a high ftate of cultivation, as Tula, Yaroflaf, Kaluga, Tver, Pfcove, Koftroma, Smolenfk, Vladimir, have neither loft nor gained much. The population, and of courfe the induftry, is ftationary. The governments lefs improved, as Viætka and Voronetch, have gained confpicuoufly; whereas the governments richeft in corn, as Tambof, Nijegorod, Simbirfk, have loft the moft.

The rapid progrefs of population between the fourth and fifth revifions is the natural effect of the fenfible advances made by agriculture, in confequence of the many recent beneficial inftitutions, and efpecially the eftablifhment of the bank. Thefe inftitutions and new funds have already produced their effect. At prefent, the ancient fources of national wealth flow lefs abundantly, and it is not eafy to open new ones. It may be prefumed then, that the population of Ruffia will remain a long time between 41,000,000 and 43,000,000. Unforefeen circumftances, however, may give a confiderable population to the fouth of Ruffia. For inftance, the aftonifhing commerce of grain at Odeffa, between 1800 and 1805, increafed the value of all the lands as far as Kief, and even the fertile fteppes were brought into cultivation. Labourers were wanting; and even half the produce was offered to thofe who would gather in the other half. The commerce of Taganrok likewife furnifhes ground for hope: and agriculture appears to be making fome progrefs among the nomadic tribes.

A country is fufficiently peopled when the generality of the inhabitants are in eafy circumftances. Such a population alone is defirable, and ufeful to government. A country is not fufficiently peopled when the demand for labourers, and the means of maintaining them, are exceffive, as in fome of the fouthern provinces of Ruffia. A country fuffers from its population, when the thoufands of rich are obliged to maintain the millions of poor. Such a fallacious population muft either perifh, or emigrate, or occafion revolutions.

The nations inhabiting the Ruffian empire are; Ruffians, Coffacks, of whom are four denominations, Samoyedes, Morduanes, Cheremiffes, Chuvafhes, Votiaks, Vogules, Permiaks, Sirianes, Oftiaks, Barabinzes, Tungufes, divided into the Connei Tungufi, Olenni Tungufi, and Sabatfhi Tungufi, thus difcriminated becaufe fome Tungufes travel with horfes, fome with rein-deer, and others with large dogs, Kalmucks, Burats, Yakutes, Yukagiri, Korzaki, Kamtfhadales, Tartars, who are likewife divided into feveral kinds, Finns, Eftbonians, Lettes, Livonians, Armenians, Indians, befides the Germans and other Europeans. To thefe might be added the Chuktfhi, Tfhalatfhi, the Kurilli, and perhaps yet others. Thefe different tribes and populations are of as various manners, tempers, and habits of life: to fpecify them diftinctly would engage us in too wide a field of

Ekaterinoſlaf, to which may be added Caucaſia. The population of theſe provinces is,

	Males.	Females.
Cherſon - -	145,814	124,321
Taurida - -	102,826	88,864
Coſſacks of the Euxine	20,240	9,155
Caucaſia - -	34,849	29,240
	303,729	251,580

As the Coſſacks of the Euxine have very few women, and ſtill retain many cuſtoms derived from their anceſtors, the famous Zaporogian Coſſacks, ſo called from *za*, *trans*, beyond, and *parogi*, cataracts, (the Coſſacks beyond the cataracts,) the foregoing ſtatement is probably correct. We learn from general Oppermann, that in the Turkiſh provinces conquered in 1774, 1783, and 1791, there were 214,318 individuals of both ſexes. This ſmall population, in a tract of country ſo immenſe, has increaſed undoubtedly, in conſequence of a more regular adminiſtration; but not ſo much as would at firſt ſight appear, becauſe we muſt ſtrike off the Coſſacks of the Euxine, Caucaſia, and the Ruſſian and foreign colonies domiciliated in theſe regions. Beſides, if we conſider the incompleteneſs of a firſt enumeration, it is but reaſonable to ſuppoſe that general Oppermann's eſtimate is too ſmall.

Thus it appears that the population of the territories acquired ſince 1773 was, in 1804,

Little Ruſſia - - -	5,221,198
Swediſh provinces - -	1,520,463
Poliſh provinces - - -	6,454,320
Turkiſh provinces - -	555,309
	13,751,290

According to the data above noticed, we are to ſubtract from the aggregate population of Ruſſia, for the provinces acquired,

From 14,000,000 in 1722		
1,033,533	-	12,966,467
From 16,000,000 in 1742		
1,355,110	-	14,644,890
From 19,000,000 in 1762		
1,696,586	-	17,303,414
From 28,000,000 in 1782		
8,678,857	-	19,321,143
From 36,000,000 in 1796		
13,751,290	-	22,248,710
From 41,000,000 in 1806		
13,751,290	-	27,248,710

The laſt column gives us the rate at which the population of Ruſſia proper has increaſed.

Whence it follows, that the population of Ruſſia, excluſive of the conqueſts ſince the reign of Peter I., gained in 20 years, between 1722 and 1742, 1,678,423, or 83,921 annually. In the 20 years between 1742 and 1762, 2,658,524, or 132,926 annually; that is to ſay, 49,005 more annually than during the firſt period. In the 20 years between 1762 and 1782, 1,676,253, or 88,812 annually; leſs by 49,114 than during the ſecond period. In the 14 years between 1782 and 1796, 2,927,567, or 146,378 annually; more by 62,566 than during the preceding period. In the 10 years between 1796 and 1806, 5,000,000, or 200,000 annually; more by 53,622 than during the antecedent period.

By the above table, it is obvious that the population of Old Ruſſia has more than doubled, or that it is at preſent to what it was in 1722, as $2\frac{1}{6}$th to 1. It is apparent alſo that the progreſs of population has not been uniform, that it has had accelerations and retardations, that the moſt favourable periods were during the reign of the empreſs Elizabeth, between 1741 and 1761, and the years of the peace of Catharine II. between 1782 and 1796. The population ſtill advances in the later periods, but the rate is ſlower. What may be the cauſe of theſe phenomena?

The population of Ruſſia has more than doubled during the laſt century, though Smith ſuppoſes that the population in civilized countries only doubles once in 500 years. It has doubled in conſequence of a better regulated adminiſtration; of the ſecurity the government has afforded to the nation; of the capitals belonging to foreigners placed in the country, and which for a long time conſtituted the ſoul of the inland commerce; in conſequence of the progreſs of national induſtry, which was the reſult; of the increaſe of knowledge, by new commercial connections with other countries of Europe, and by the means of inſtruction furniſhed by government to the other inhabitants of Ruſſia; and, finally, in conſequence of the removal of ſeveral obſtacles which checked the progreſs of induſtry, as the abolition of the cuſtom-houſes of the interior, under the reigns of the empreſſes Elizabeth and Catharine II., the improvement of the roads, and the multiplication of canals.

What a diſmal picture does Ruſſia preſent to us in the fifteenth, ſixteenth, and ſeventeenth centuries! Joſafa Barbaro, in 1436, reports, that from Moſcow to the frontiers of Poland, the whole country was one vaſt deſart; the villages, burnt and abandoned, offered no other accommodation to ſtrangers than a place to kindle a fire. Contarini confirms this ſtatement in 1483. Meyerberg, in 1661, found between Viaſma and Moſaiſk, a diſtance of 130 verſts, only a ſingle village. The road between Smolenſk and Moſcow was dangerous, according to Lyſeck, in 1675, on account of the wolves that attacked travellers. Ulfeldt, the Daniſh ambaſſador, in 1625, found the country between Moſcow, Novgorod, and Pſcove, laid entirely waſte by the inteſtine wars under Ivan Vaſſillievitch II. Poſſevin, in 1581 and 1582, travelled whole days in the interior of Ruſſia without meeting a ſingle individual. The whole country between Kazan and Aſtrachan was a continued deſart. Even the cities had greatly ſuffered. Poſſevin eſtimates the population of Moſcow at 30,000; that of Novgorod was diminiſhed by the plague to 3000; and Kief, in the time of Herberſtein, in 1516, was almoſt in ruins. Beſides the davaſtations committed by the domeſtic feuds and foreign invaders, the number of impoſts, and the ſeverity of the commiſſioners who levied them, depopulated the northern provinces which had not ſuffered from thoſe diſaſters. We learn from Fletcher, that in the year 1588, 50 villages were abandoned between Vologda and Yaroſlaf. At Uſtiug bread was almoſt unknown, and the ſame deſtitution of that article of life was felt on the Dvina in the time of Herberſtein. Famine and peſtilence often committed their ravages among the melancholy remnants of this unfortunate population, as in 1525, in 1601, and in 1615. M. Meiner informs us, that the city of Novgorod loſt in one winter no fewer than 18,000 individuals, conſtituting nearly the whole of its population.

It

It is neither to the mildneſs of the climate, nor to the fertility of the ſoil, that we are to aſcribe the rapid increaſe of population during the eighteenth century; but to a better organized adminiſtration, and the ſecurity which reſulted from it. An infant ſtate, ſuppoſing it tolerably well governed, and connected with countries long civilized, ought to make prodigious progreſs in improvement and population.

That period of the reign of Catharine II., in which ſhe took in hand the amelioration of the ſeveral governments, was particularly propitious to the progreſs of population. The organization of the governments in 1775 was the great political ſcheme that procured the ſubjects a greater degree of ſecurity and happineſs. The ukaſe of 1782, reſpecting the liberty of working the mines, the eſtabliſhment of normal ſchools in 1783, the rights granted to the nobility in 1785, the improvement of the high roads in 1786, and eſpecially the erection of the bank in the ſame year, were all calculated to promote the happineſs of the ſubject, as far as it depended on the government. The bank, from its very commencement, had a ſurpriſing effect upon the progreſs of agriculture. That patriotic ſovereign removed ſeveral obſtacles to the proſperity of her ſubjects, ſuch as the want of liberty to be induſtrious, the want of communications, the want of knowledge, and of a medium of circulation.

The population of Ruſſia has more than doubled during the eighteenth century. Have we reaſon to expect the ſame progreſs during the nineteenth?

If we conſider only the extent of the ſurface capable of cultivation, which is computed at 80,000,000 of ſquare miles, we muſt conclude that Ruſſia is capable of ſupporting 960,000,000 of inhabitants, or almoſt as many as at preſent exiſt on the earth. If we conſider the ſurplus of births as a total gain to the population, this ſurplus, amounting at leaſt to 500,000 annually, would in 32 years amount to 60,000,000, in 56, to 80,000,000, &c.

Experience, however, ſhews us that the progreſs of population does not depend ſolely upon the extent of ſoil capable of cultivation. There are ſpots left uncultivated in the countries where agriculture has made the greateſt advances, even in England, Flanders, and Lombardy. This progreſs depends ſtill leſs on the ſurplus of births. Every where the number of births exceeds that of deaths. The population is always proportionate to the ſtate of national wealth. The moſt deciſive proof, therefore, of the proſperity of a country, is the increaſe of the number of its inhabitants. In Ruſſia the population has more than doubled in 34 years. Whence we may infer, that its agriculture, the principal branch of its induſtry, has alſo doubled. The increaſe of Ruſſian commerce depends upon peace, and upon the augmentation of knowledge. On theſe accounts we cannot expect ſo rapid an increaſe of national riches, and conſequently of population, during the nineteenth century as obtained during the eighteenth.

Experience has demonſtrated the accuracy of this mode of reaſoning. The progreſs of the population has become ſlower ſince the fifth reviſion. The annual ſurplus of 60,000 has been reduced to 50,000 during the laſt ten years.

To eſtabliſh this fact, M. Hermann has compared the ſtatements reſpecting the population of the governments of Moſcow, Tula, Kaluga, Yaroſlaf, Orel, Kurſk, Vladimir, Riazan, Penza, Kazan, Tver, Smolenſk, Tambof, Nijegorod, Pſcove, Voronetch, Simbirſk, Koſtroma, Viætka, Novgorod, Saratof, Perm, Orenburg, Vologda, Olonetz. The ſtatements reſpecting the population of theſe 25 governments, according to the fourth reviſion of 1782, gives 9,939,790, males; that of the fifth reviſion of 1796, fourteen years after, 10,228,672; that of the enumeration of 1804, eight years after, 9,989,531. So that the population gained during the firſt period 867,873, and during the ſecond period loſt 239,141. In the firſt period there are only three governments whoſe population has diminiſhed; *viz.* Kaluga, Koſtroma, and Voronetch. All the others had increaſed. But during the ſecond period Moſcow alone gained conſiderably, namely, 100,000 males; Voronetch, which had loſt before, gained 150,000 males; and Viætka gained 37,000. Kurſk and Orel have gained a few thouſands; Tula, Yaroſlaf, and Perm, ſome hundreds. The other ſeventeen governments have loſt, and ſeveral of them conſiderably. In like manner, Tambof has loſt 88,000 men, Nijegorod 55,000, and Simbirſk 110,000 men in eight years!

It is worthy of obſervation, that thoſe governments which have been long in a high ſtate of cultivation, as Tula, Yaroſlaf, Kaluga, Tver, Pſcove, Koſtroma, Smolenſk, Vladimir, have neither loſt nor gained much. The population, and of courſe the induſtry, is ſtationary. The governments leſs improved, as Viætka and Voronetch, have gained conſpicuouſly; whereas the governments richeſt in corn, as Tambof, Nijegorod, Simbirſk, have loſt the moſt.

The rapid progreſs of population between the fourth and fifth reviſions is the natural effect of the ſenſible advances made by agriculture, in conſequence of the many recent beneficial inſtitutions, and eſpecially the eſtabliſhment of the bank. Theſe inſtitutions and new funds have already produced their effect. At preſent, the ancient ſources of national wealth flow leſs abundantly, and it is not eaſy to open new ones. It may be preſumed then, that the population of Ruſſia will remain a long time between 41,000,000 and 43,000,000. Unforeſeen circumſtances, however, may give a conſiderable population to the ſouth of Ruſſia. For inſtance, the aſtoniſhing commerce of grain at Odeſſa, between 1800 and 1805, increaſed the value of all the lands as far as Kief, and even the fertile ſteppes were brought into cultivation. Labourers were wanting; and even half the produce was offered to thoſe who would gather in the other half. The commerce of Taganrok likewiſe furniſhes ground for hope: and agriculture appears to be making ſome progreſs among the nomadic tribes.

A country is ſufficiently peopled when the generality of the inhabitants are in eaſy circumſtances. Such a population alone is deſirable, and uſeful to government. A country is not ſufficiently peopled when the demand for labourers, and the means of maintaining them, are exceſſive, as in ſome of the ſouthern provinces of Ruſſia. A country ſuffers from its population, when the thouſands of rich are obliged to maintain the millions of poor. Such a fallacious population muſt either periſh, or emigrate, or occaſion revolutions.

The nations inhabiting the Ruſſian empire are; Ruſſians, Coſſacks, of whom are four denominations, Samoyedes, Morduanes, Cheremiſſes, Chuvaſhes, Votiaks, Vogules, Permiaks, Sirianes, Oſtiaks, Barabinzes, Tunguſes, divided into the Connei Tunguſi, Olenni Tunguſi, and Sabatſhi Tunguſi, thus diſcriminated becauſe ſome Tunguſes travel with horſes, ſome with rein-deer, and others with large dogs, Kalmucks, Burats, Yakutes, Yukagiri, Korzaki, Kamtſhadales, Tartars, who are likewiſe divided into ſeveral kinds, Finns, Eſthonians, Lettes, Livonians, Armenians, Indians, beſides the Germans and other Europeans. To theſe might be added the Chuktſhi, Tſhalatſhi, the Kurilli, and perhaps yet others. Theſe different tribes and populations are of as various manners, tempers, and habits of life: to ſpecify them diſtinctly would engage us in too wide a field of

of description. But of the principal nation, the Russians, it will be expected of us to make some observations.

Characteristics, &c. of the Inhabitants of Russia.—The Russians are described as a moderate-sized, vigorous, and durable race of men. Their growth and longevity, however, are different in different districts; but upon the whole they are rather large than small, commonly well-built, and very seldom deformed. Their common or discriminating features are, a small mouth, thin lips, white teeth, little eyes, low forehead, and nose often small and turned upwards; the beard almost always very bushy, and the hair varying from dark-brown to red; but seldom quite black. Their countenance expresses gravity and good nature or sagacity. Their senses of sight and hearing are very acute, and the gait or jestures of the body indicate a peculiar and often impassioned vivacity. As to the females, a delicate skin and ruddy complexion are in the vulgar opinion regarded as the first requisites of beauty. Young girls arrive at maturity in the 12th or 13th year, and this is ascribed to the frequent use of hot baths; but on the same account married women seldom retain the fresh complexion and the peculiar charms of youth beyond the first lying-in.

The character of the Russians is mixed, like that of most other nations, as well as of individuals; the Russian character is, however, composed of a very extraordinary mixture. The Russians are a people who, with a particular degree of pride, combine much submissiveness, levity, kindness, especially towards foreigners, prudence and cunning on one hand, but likewise fidelity and honesty on the other, a certain propensity to superstition and usury, and a great proportion of selfishness. The Russian easily runs from one extreme to the other. Prone as he is to superstition, so apt is he to be carried into the contrary failing. He hesitates long before he engages in friendship; but being then generally firm in his attachment, he is revengeful when, in spite of his caution, he is deceived in the choice of his friend: while he scolds, threatens, and rages, no harm is to be apprehended; but if he makes no noise when he thinks himself offended, he is a dangerous enemy. He is greatly swayed by self-interest, and surrenders himself entirely to the impetuosity of his passions. Gaming and drinking have an irresistible authority over him. Among the lower sort it is generally the men who give themselves up to these excesses; though, indeed, a drunken woman staggering along the streets is no uncommon sight. The Russians are remarkable for their comeliness of person, strength of body, courage and intrepidity in war, ingenuity, wit, and obedience to the commands of their superiors.

The insatiable greediness of the common people for spiritous liquors, especially in the *maslanitza*, or carnival season, is in a great measure ascribable to the rigorous fasts of the church, and the slender diet they live upon throughout the year. Their food chiefly consists of turnips, cabbages, pease, salt-cucumbers, onions, coarse fish, with oil and black bread. Their common beverage is quas, which is a kind of acidulated small beer.

The Russian women are excessively fond of paint, and look upon ruddy cheeks as the very essence of beauty; so that in the Russian language, red and beautiful are convertible terms. Even the village girls all over the country know how to prepare a particular herb to the purposes of rouge.

Persons of distinction dress after the German and French fashion, and are passionately addicted to state and splendour. The dress of the common people is coarse and simple, but they are neat and cleanly in their apparel. Both sexes wear a crucifix on their breasts, suspended round the neck by a string, which is put on at their baptism, and never afterwards put off; those of the peasants are of lead; but the better sort have them of silver or gold. The peasants let their beards grow to their full length. In Russia there are few peculiar diseases. The common Russians use but few medicines, their place being supplied by the sweating-bath; and indeed baths have been common in this country from time immemorial. In the bath-room the heat is usually from 32° to 40° of Reaumur; and by throwing water every five minutes on the glowing hot stones in the chamber of the oven the heat rises to 44°. The vapour-bath is habitually used by the Russians once or twice a week; for which purpose almost every house has the necessary apartment. They often sally forth naked from the bath, run about in the cold, and roll themselves in the snow, or in summer plunge into the water, and then rush again into the bath.

A particular air of grace and civility is observable in the salutations even of the common people to one another; but on entering a room, before they greet the company, the custom is to make repeatedly the sign of the cross, at the same time bowing as often to the picture of some saint, which is so placed in every room as to be seen immediately on coming in. In visits of ceremony, it is usual for both men and women to welcome each other with a kiss. Great deference, approaching to servility, is shewn to persons of superior rank.

The nation consists chiefly of the nobility and peasantry, to which we may add the burgesses and the Kozaks or Cossacks. The nobility formerly consisted solely of knæses or princes. Boyar is not a title of nobility, but anciently denoted the possessor of a post or office, as a privy counsellor, &c. To the former, Peter the Great added the titles of count and baron. The knæses are extremely numerous, and, therefore, unless very rich, or of illustrious races, not greatly honoured. This great multitude of knæses proceeded, among other causes, from the custom of giving that title to the baptized Tartarian murzas, in the idea that murza, among the Tartars, was of nearly the same import as knæs. Every knæs, as well as every count, even though no more than a common soldier, has, in virtue of his birth, the style of *vashe sjatelstvo*, which is commonly translated *your excellency*. The nobles may be proprietors of land and people, and hold the highest offices in the civil and military departments. The "Dvorianini" are a kind of city-nobles, and the "Odnodvortzoi" are the lowest class of noblesse. The burgher state, yeomanry, or commonalty, is composed of the "Possatski" and "Rasnotshintzi," who live in towns and villages, governed by their proper magistrates, whether as merchants or tradesmen. They are excluded from offices and posts of service of honour, and furnish head-money and recruits, but cannot be vassals. The peasants are vassals of the great, attached to the soil, *glebæ adscripti*, and groan under many oppressions: far, however, from being dull and stupid, they are remarkably ready witted, and are in no want of natural parts. Of the peasantry, such as belong to the crown and the monasteries pay taxes according to the laws of the land, and are liable to other duties imposed by the same authority; but they may be transferred as donatives from the crown. They may pursue trade, in connection with their rural concerns, if they think it beneficial or convenient. Noble boors are the vassals of their lord; from these recruits for the army are taken by lot. Cossacks form a particular class originating from the peasantry; they live exempt from taxes in villages, forts, and petty towns, on the produce of their fields and pastures, or the labour of their hands; they furnish no recruits, and are not given away as serfs, and they enjoy other privileges. But they all serve as light-horsemen, as early and as long as

as they are fit for it, providing themſelves with horſes, clothes, and accoutrements, and only receive pay when they are in actual ſervice. See COSSACKS.

The intercourſe between the ſexes is more free than in other countries, which is owing to the contracted ſpace of their habitations and ſleeping rooms, their baths, the ſimplicity of their converſation, and their artleſs ſongs. The behaviour of huſbands towards their wives is, in compariſon with that of more poliſhed nations, rough and auſtere. The marriage contract is made with mercantile punctuality; the betrothing is performed with eccleſiaſtical rites, generally eight days previous to the marriage, and is indiſſoluble. The marriage is ſolemnized in the church before the altar, to which they proceed with the figure of ſome ſaint carried before them; and during the ceremony a crown is put on each of the heads of the married pair. The prieſt, with due forms, changes their rings, admoniſhes them of their reciprocal duties, gives them a cup to drink, in token of the union of their fortunes, and diſmiſſes them with his bleſſing.

The national diverſions of the Ruſſians on holidays, at weddings, and on other occaſions of feſtivity, are very various, and much reſemble thoſe that are cuſtomary with the Perſians, Arabians, and Egyptians. Their muſic is more uſually vocal than inſtrumental. Their ſongs are ſimple recitations, ancient or modern, on the ſubjects of love, nature, and tales of chivalry, giants, and heroes, frequently lewd; and their melodies are uniform and monotonous, but ſometimes ſufficiently pleaſing. The little groups of girls, ſitting together in an evening and ſinging, afford much amuſement. The moſt complete vocal muſic is that which is heard in their churches, on Sundays and holidays; which, as the church allows of no inſtrumental muſic in divine worſhip, is performed by ſingers expreſsly taught and moſtly brought from the Ukraine. The ſubſtance is Slavonian poetry; the notes are expreſſed by points, after the very old faſhion, for four voices. The preſent choral muſic is moſtly by mottete. The moſt common inſtrument of the nation is the Cow-horn, which is a kind of cornet, of from one to four feet in length, made of wood or tree-bark. For a deſcription of the balalaika, ſee BALALAIKA. The gudak is a miſerable violin with three ſtrings: the dutka conſiſts of two parallel reed-pipes, each with three holes, differing in their notes up to an octave, ſo that the hearer conceives that two are played on it. The rilek is a common village lyre; and the valinka a diminutive pair of bagpipes. The guſli is a horizontal harp with wires, played on with the fingers, and capable of any kind of muſic: it is a pleaſing inſtrument and much uſed; and ſo is likewiſe the cornet among ſailors and boatmen: the ſailors alſo make a kind of jingling noiſe with two bunches of little bells, keeping time with their muſic. Dancing is a diverſion to which the Ruſſians are very much devoted; and they are no leſs attached to gymnaſtic paſtimes.

The dead are long and ſincerely lamented by their ſurviving relations; but, from a natural repugnance to the idea of death, they uſe little ceremony with the corpſe. They bring it to the grave in an open coffin, covered only with a pall, attended by prieſts, chanting hymns, and bearing croſſes and lighted tapers in their hands. At the place of interment they take leave of the body by a kiſs, then faſten up the coffin, and let it down into the grave. Perſons of the lower claſs bury their dead in their ordinary clothes. At the new year is annually held a feaſt of the dead, on which occaſion every body viſits the grave of his relations, lays ſome victuals upon it, and hears maſs, in payment for which the prieſts get the victuals.

The ancient orthodox Greek *religion* is univerſally acknowledged both in doctrine and diſcipline. (See *Greek* CHURCH.) The churches and ſacerdotal veſtments are very magnificent. The people are ſtrict in the obſervance of the outward forms of religion; attendance on maſs, keeping the faſts (which take up one-third of the year), performance of domeſtic devotions, confeſſion, receiving the ſacrament, &c. Paſſion week is obſerved with great apparent ſolemnity; but Eaſter week is paſſed much as in other countries, in various diverſions, drunkenneſs, and debauchery. The Ruſſians are ſuperſtitious, both in their notions and practices, believing in ghoſts, apparitions, and hobgoblins. Some ſpecimens of their ſuperſtitions we ſhall here ſubjoin. On the Thurſday before Whitſuntide, the girls celebrate the feſtival of the Slavonian goddeſs Lada and her ſon Dida, with ſinging, dancing, and decorating a birch-buſh with garlands of ribbons; which they afterwards throw with much ſolemnity into a river, and infer, from the figures aſſumed by the ribbons in the current, to whom they ſhall be married, and their ſubſequent condition. On the fifth of January they go by night into a croſs-ſtreet, or into a cellar, which is called "To go hearing," and fancy they hear, in every ſound, the prediction of their deſtiny. The day after Chriſtmas is ſolemnized by the midwives, becauſe the Virgin Mary's midwife had a great hand in the redemption of the world: but it is needleſs to enlarge in this way.

The *clergy* in Ruſſia enjoy peculiar privileges: they cannot ſuffer corporal puniſhment without being previouſly deſecrated, and they are exempt from taxes. The empire comprehends, according to the uſual enumeration, 18,350 pariſh churches and cathedrals of the orthodox Greek religion. The number of Ruſſian clergy is computed at 67,900 perſons, without including their families. Some authors aſſert, that the whole empire contains 480 monaſteries and 74 nunneries; the former including 7300 monks and the latter 5300 nuns; but theſe numbers are ſuppoſed to be exaggerated: Mr. Coxe ſtates the nuns at only 1300, and this is ſaid to be a juſt eſtimate. The monaſteries all follow the rule of St. Baſil. By the laws of Ruſſia no eccleſiaſtic can be brought before a temporal judge, unleſs commiſſaries of the clerical order be likewiſe on the bench. For the boors of Ruſſia, ſee BOORS.

Throughout the old provinces of Ruſſia not any beggars are to be ſeen. The inferior claſs of nobility, which is the moſt numerous, live at their eaſe in the country. They are the true Ruſſian farmers: their well-being depends on the progreſs of agriculture, and it proſpers in their hands. The peaſantry are very far from being unhappy. They are in general much more at their eaſe than the ſame order of men were in France, under the ancient government, when it was hardly poſſible for a carriage to ſtop, any where between Lyons and Paris for example, without being ſurrounded by a clamorous troop of beggars. Even the number of wealthy peaſants is by no means inconſiderable; and it muſt every day become greater, ſo long as they retain their ancient ſimplicity of manners. Their ſavings neceſſarily accumulate under the form of capitals, and theſe capitals by degrees become productive; for many peaſants have already abandoned agriculture, to engage in other branches of induſtry, as manufactures and trades, and even commerce. It is only in Finland and the Poliſh provinces that the peaſants are poor.

The power of a ſtate does not ſolely depend on the number of its inhabitants, but upon their wealth and activity. Ruſſia, in this reſpect, has no reaſon to complain. She is ſufficiently peopled for the actual ſtate of her national riches. What would not this empire become, if its population was more concentrated!

The Ruſſian *language* is an improved dialect of the Slavonian, which, with its characters, is ſtill uſed in the offices of religion. According to M. Schlœtzer, it is preferable to almoſt all the European languages. It is rich in words, ſoft, expreſſive, and requires great flexibility in the organs of utterance. It is, however, difficult of attainment by foreigners, on account of its innumerable peculiarities and anomalies. The Ruſſian grammarians themſelves are not agreed even concerning the number of letters contained in the alphabet. Some make it to be forty-one, and others thirty-one; whilſt Rodde, with greater propriety in the opinion of Mr. Tooke, fixes the number at thirty-eight. Some of theſe letters are merely notes of accent in pronunciation.

Government of the Ruſſian Empire.—As far as hiſtory reaches, Ruſſia has always been an hereditary empire. The throne was occupied by Rurik and his deſcendants, according to the uſual computation, from about the year 862 to 1598: and when Michael Feodor Romanow aſcended the throne in 1613, a charter was executed confirming it to him and all his poſterity, by which act Ruſſia was in a formal manner declared a real hereditary empire. His acceſſion to the throne was by unanimous election, "in a general aſſembly of the boyars and the other eſtates of the country," and partly by his relationſhip to the tzarian family now extinct in the male lineage, and alſo in virtue of nomination, by which his father had already been heir to the throne. On a vacancy the heir takes poſſeſſion of the throne, without any invitation or acts of homage. The oath of allegiance is uſually adminiſtered to all claſſes of ſubjects, though the ſovereign may diſpenſe with it. The coronation has for many centuries been cuſtomary in Ruſſia, and is ſtill continued, on which occaſion the ſovereign, who puts the crown on himſelf, is anointed with holy oil. Since the introduction of Chriſtianity, the ſovereigns have always profeſſed themſelves of the orthodox Greek church. As to the title of the ſovereign, we may obſerve, that Ivan Vaſſillievitch declared himſelf tzar in the year 1547, but it was expreſsly given to the ſovereigns of Ruſſia long before: this title in the Ruſſian Bible ſignifies a king. In 1721 Peter I. aſſumed the appellation of emperor; and this imperial title has been borne ever ſince by the ſovereigns of Ruſſia. The abridged title, uſual in ukaſes, ſentences, commands, petitions, &c. is "emperor and autocrator, or empreſs and autocratrix, of all Ruſſia, or of all the Ruſſias." It is beſide our purpoſe to diſcuſs the queſtion concerning the ancient origin, or even exiſtence of fundamental laws of the empire: it will be ſufficient to remark, that all the preſent laws of this kind may be reduced to two principal claſſes, as they aſcertain either the authority and prerogatives of the ſovereign, or the claims of the ſubjects. Thoſe that regard the ſovereign comprehend the hereditary ſucceſſion, the uncircumſcribed authority, including all the great and excluſive prerogatives of majeſty, and the principle that the ſovereign is an imperial majeſty and the dominion an empire: thoſe that regard the ſubjects include ſpecific obligations and rights, and they concern either the empire at large, or particular tribes, ranks, and claſſes; ſuch are ſecurity of perſon, of reputation, of property, the non-denial of juſtice, legal protection againſt violence and oppreſſion, unmoleſted enjoyment of all lawfully obtained immunities, privileges, and rights; the right, on the extinction of the reigning family, if no ſucceſſor be appointed, to elect one, &c. Accordingly, the nobility may juſtly demand the quiet enjoyment of all the privileges and immunities granted to them by letters of grace. The burghers may appeal to the privileges granted to them in the regulations for townſhips. The Don Coſſacks, and other nations of that kind, may juſtly expect that no invaſion be made on their diſtricts and poſſeſſions, or any infringement of their rights, &c.

The legiſlative authority is veſted ſolely in the monarch; neither the whole nation as a body, nor ſingle members or claſſes of it, can claim any part of it. The ſovereign is alſo the ſole diſpenſer of all ranks and dignities; to the higher he himſelf appoints the perſons, and ſigns with his own hand the inſtrument or patent. The inferior degrees are beſtowed in his name by the proper commiſſioners or boards, *e. g.* in the civil department by the ſenate, in the military by the college of war, in the navy by the admiralty, in the church by the ſynod, in the medical department by the college of medicine, &c. Formerly there were ſeveral monopolies of the crown; but the late empreſs, to the manifeſt advantage of her ſubjects, aboliſhed the greater part of them, reſerving only two, *viz.* ſalt and brandy. As to landed property in general, it belongs either to the crown, or to private owners, and that again either to individuals, or in common to a whole tribe. Another prerogative that adheres to the throne is that the ſovereign can appoint a regency during the minority of his ſucceſſor, and fix the period of his arriving at majority. The form of government in Ruſſia is unlimited monarchy; however, the free-born Ruſſian ſubjects are always treated as ſuch; and in general, it is permitted the ſubjects to utter their complaints and to make a repreſentation of them. From ſeveral ukaſes it appears, that the next ſucceſſor, his conſort, and all their children, are ſtyled grand dukes and grand ducheſſes, and that they all bear the title of imperial highneſs; that it is conferred upon them always by a ſigned decree of the monarch, and that, reſpecting the grand-daughters, the terms grand ducheſs and grand ducal princeſs are ſometimes ſynonimous. The rights of the grand duke, as heir apparent, do not ſeem to have been accurately defined; he is the firſt ſubject, but he has properly no functions ariſing from his high birth and appointment, theſe depending on the good pleaſure of the ſovereign. The princes and princeſſes of the reigning family have no ſettled eſtabliſhment; their houſehold depending on the pleaſure of the ſovereign. The annual allowance to the grand duke, it is ſaid, is uſually 220,000 rubles, and ſometimes more, to which are added many great preſents.

The arms in the middle ages were borrowed from Moſcow, at that time the imperial reſidence, and conſiſted of St. George on horſeback, killing a dragon with a ſpear. Ivan Vaſſillievitch made choice of a black ſpread eagle, with a crown on each head, a larger crown between them, in a golden field, and holding in one claw a ſceptre, and in the other an imperial mound, with the arms of Moſcow on the breaſt. Sometimes it is ſurrounded with a collar compoſed of the arms of ſome of the countries belonging to the Ruſſian empire, as Aſtrachan, Kazan, Siberia, &c. This is accordingly the imperial ſeal, and when the late empreſs uſed it for letters, it had an imperial mantle, and over it an imperial crown. The court is compoſed of the great officers of ſtate, of ſenators, actual privy-counſellors, princes, counts, barons, &c. On court-days acceſs is open to every ſubject. Six orders of knighthood form a part of the ſplendour of the court, with their peculiar inſignia. The firſt three were conſtituted by Peter I.; the two next by the late empreſs Catharine II., and the ſixth proceeds from Sleſwick-Holſtein. Of the former five the monarch is always grand-maſter; but of the ſixth, the grand duke, as duke of Sleſwick-Holſtein. To the fourth and fifth, penſions are annexed to a ſelect number of the eldeſt knights. Theſe orders take precedence according to the ſeniority of their

their institution. They are as follow, St. Andrew, St. Catharine, St. Alexander Neffsky, St. George, Vladimir, St. Anne of Holstein. See each respectively.

Of the imperial colleges, instituted for the government of the Russian empire, our limits will allow our mention only of the two principal and supreme, viz. the "Directing Senate," and the "Holy Synod." The former was constituted by Peter I., who raised it to the rank of the supreme or highest college of the empire. In 1763 the late empress new-modelled it, causing it to consist of six departments, four at Petersburg and two at Moscow. This supreme imperial college, styled by the empress the sanctuary of the laws, can issue orders to any other imperial college, and receive reports from them (the synod excepted); it publishes the laws and edicts received from the monarch, and provides for their execution; returns a decisive answer to the questions sent in by the courts or governors in doubtful cases; appoints to many considerable posts in the viceroyalties; advances, in the name of the sovereign, meritorious civil officers to higher rank, and is the highest tribunal to which appeal can be made, for none can either appeal from its decrees nor complain of them; but any one who is dissatisfied with its sentence has no other resource than to present his petition to the cabinet. The second supreme college is the "Holy Directing Synod," which is the highest spiritual court of the Russo-Greek church. In 1789 this college consisted of one metropolitan, one archbishop, one bishop, one proto-pope (the imperial confessor), one archimandrite, one proto-pope (of the seculars), one upper procureur, one chief secretary, one executor, three secretaries, one protocolist, and one staff-surgeon; the absent members were one metropolitan, two archbishops, and one bishop. At the synodal comptoir at Moscow, at that time, were one metropolitan, one arch-priest of the secular clergy, one procureur, and one secretary. In the spiritual commission, one metropolitan, one archbishop, one privy-counsellor, and one secretary, have their seats. Under the authority of the synod are all prelates, consistories, ecclesiastics, churches, religious books, &c. For the other subordinate imperial colleges, we refer to Mr. Tooke's account of them; as well as for other particulars relating to the laws, the constitution of the Russian government, and the condition of the Russian subjects. On this latter topic we shall select and subjoin a few particulars.

The nobleman, generally speaking, pays no tax for any part of his land which he occupies himself, nor even for his moveable property. If he possess no male vassals, his fields, forests, mines, mills, fisheries, &c. which he occupies with free or hired labourers, are as exempt from taxation as his person; but, on the other hand, the nobleman who has vassals must furnish recruits out of them. The clergy, in regard to their persons, are likewise exempt from taxes. Their stipends, which consist in money, and in the country of corn and pieces of land, are raised by them free of all deductions. Placemen, and officers of the crown, &c. pay no annual tax on their salaries. Literary men, who are not enrolled in any guild, and who, besides their learned profession, as physicians, lawyers, &c. are not engaged in trade, are entirely exempt from taxes; and this is also the case with artists, &c. People who live solely on the interest of their capital, and do not inscribe themselves in any guild, however large their income may be, pay no tax upon it whatever. All inhabitants of towns possess their immoveable property free of all taxation. As for the great body of the yeomanry or country-folk, their real necessaries are subject to no taxes, because in all Russia there is no such thing as excise; and in general the taxes are not oppressive. That both the nobility and burghers live in affluence is manifest from the luxury that every where prevails. The Russian boor, even the vassal of the nobleman, lives very decently in his house, has a sufficiency of wholesome food, is neatly dressed, puts commonly two or three dishes on his table, and even accumulates a trifling capital, though, as it is not secured to him, and may be taken from him, he frequently buries it in the ground. In some villages the boors display even an opulence. Among the very numerous nobility many possess fortunes of 100,000 or 500,000 rubles, and sometimes more; and the generality may have a fortune of between 30,000 and 100,000 rubles. In no country are the learned professions so well provided for as in some provinces of Russia, particularly Livonia and Esthonia. The preacher, even in the smallest country-pastorate, lives on a footing no less brilliant than the general superintendant in many of the provinces of Germany. Although his stipend is small, yet his presents for the discharge of his official duties from noblemen and burghers are numerous and large. His daily table is supplied with several dishes; he has men servants and maid servants; he is commonly the friend and confidant of the noblemen of his parish, and his house is the place of their usual resort. The case is similar with regard to law-advocates, physicians, surgeons, and private tutors. On account of the flourishing state of commerce in the maritime towns, there are many merchants who possess capitals of some hundred thousands of rubles. The condition of the boors is far from being contemptible and wretched. The Cossacks generally enjoy not only the necessaries but the accommodations and comforts of life. In the parts about the Don, ease and affluence are every where seen; and the Cossacks of the Ural pass their time in idleness and yet in plenty from the riches obtained by means of the productive fisheries on that river. Upon the whole, the writer now cited observes, that the moderate taxes, the cheap living, the excellent and numerous products, the contentedness of the people, and the good regulations adopted through the empire, afford to every one who conducts himself well in his state of life, sufficient means for acquiring a competency. The majority of the Russian subjects fare better in their way than the great multitudes in France, Germany, Sweden, and several other countries.

The social state of the inhabitants of the Russian empire is capable of great melioration, and productive of much actual comfort, from the opportunities that are afforded them for active and industrious exertions. The objects of the *chace*, in the most northern and eastern parts of Russia, and particularly on the islands between Kamtschatka and America, and also in the governments of Tobolsk, Perm, Ufa, Viætka, Archangel, Olonetz, Vologda, and some others, afford both an amusing and lucrative employment. The chace, for the sake of furs, is of primary importance in its relation to foreign commerce. The most valuable of all the animals that are sought for their skin is the "sable," the skin serving as a standard to the tribute, which is paid to the crown by the Siberian nation of hunters. This animal is found in Asiatic Russia, from the Aleutan islands and from Kamtschatka to the districts of the Petschora and of the Kama. The finest sables come from Yakutsk and Nertschinsk; and among these are likewise, though rarely, yellow, and very seldom, white sables. The Kamtschatka sables are the largest of all. As the sable is become scarce, the crown accepts of the skins of foxes, martens, squirrels, and fish-otters, from the inhabitants of Siberia, instead of the sable. Eastern Siberia, and particularly Kamtschatka, abound most in beautiful foxes. To the other objects of chace for the furs, we must add the bear, the wolf, the lynx, the

the glutton, the ferret, the pole-cat, &c. which, generally ſpeaking, are ſpread over the whole of North Ruſſia; and vaſt quantities of their ſkins are either conſumed at home or ſent abroad. But we have not room to enumerate all the animals that are profitable objects of chace to the Ruſſians. We ſhall obſerve in general, that peltry of all kinds may be conſidered as a remarkable and lucrative product of the Ruſſian empire. The principal ſpecies are: ſables, beavers, blue and white foxes, wolves, hyænas, lynxes, ermines, peſtzui or muſcovite dogs, ſquirrels, martens, hares, ſheep, wild cats, panthers, tigers, and bears. The Ruſſians have the art of dyeing the furs ſo ingeniouſly, that the Chineſe, and therefore others who are not good judges, are eaſily cheated.

Beavers are chiefly found in Kamtſchatka; they are principally uſed in trimming the caps and peliſſes of women of quality.

Foxes are every where met with in Ruſſia proper, in the conquered provinces, and in Siberia. Thoſe of Siberia are the beſt. Beſides the common croſs-blue fox, they have very dark, called black, and even white foxes, which laſt, however, are extremely rare, and, like the black, fetch a higher price than ſables. The ermine is a ſort of rat, and is employed for trimming peliſſes. All minever is ſquirrel-ſkin. The Siberian is incomparably darker, thicker, and more laſting, and accordingly much dearer than the ordinary Ruſſian. The Ruſſian hare-ſkin is of the hare peculiar to this country, which in winter becomes white. The ruſſaki cannot be uſed as fur, as they never change their colour. Common coarſe ſheep-ſkin affords a warm and durable peliſſe for the lower order of people; the finer is worn even by perſons of diſtinction. The Kalmuck and Bucharian ſheep-furs are rather ſcarce and dear, ſtill more ſo are the Kalmuck furs of unborn lambs. The genuine Bucharian ſheep-ſkins are watered, and the Kalmuckian by nature criſp and curly. But here likewiſe great frauds are practiſed, as the Ruſſians frequently curl the fine ſkins of the common ſort, in order to impoſe upon the unwary.

Bear-ſkins and tiger-ſkins are uſed only for covers to ſledges, and trappings for horſes, or, inſtead of beds, for ſervants to lie on. Boots are lined with the ordinary Ruſſian cat-ſkin; but the blue Siberian cats yield a very beautiful fur.

All theſe ſkins are ſold either by the piece or ſackwiſe. Two hundred ſkins of Ruſſian, and a hundred ſkins of Siberian minever, compoſe a ſack, and two hundred hare-ſkins are alſo reckoned a ſack. The Ruſſians are ſingularly induſtrious and ingenious in aſſorting their furs. Of one ſort of ſkin they make ſeveral deſcriptions of furs; as, for example, a particular fur is prepared of the ſmall dark ſtripe on the backs of ſquirrels, another of the ſides, again another of the bellies; and in like manner with the ſkins of other animals.

Beſides the chace, which has always been the excluſive occupation of particular nations of the Ruſſian empire, there are alſo tribes who maintain themſelves principally or wholly by the *fiſhery*, and with whom even the eſtabliſhment of this trade forms a part of their civil conſtitution. Some follow it for their own ſupport, while others, as the Coſſacks of the Don and the Ural, and the tribes on the ſhores of the Volga, carry on a lucrative traffic with the products of their fiſhery. The Frozen ocean, together with its bays and rivers, affords various ſpecies of ſea-animals, that are ſought after by ſeveral nations. To the inhabitants of the governments of Archangel and Olonetz the iſlands of Spitzbergen and Novaya Zemlia afford the chief ſcene of fiſhery at the proper ſeaſon. The animals that principally engage their attention are whales and morſes. Accordingly, every year a ſhip goes from Archangel to winter at Spitzbergen, and at leaſt one, frequently more, to Novaya Zemlia. The inhabitants of Meſen navigate theſe coaſts only in ſummer. From the morſe fiſhery the chief commercial products are the blubber and the ſkin; the blubber for its oil, and the ſkins, when dried, for horſe traces, and when cut, as ſize for the paper-manufactories. The teeth of the morſe likewiſe are tranſported to Peterſburg, Meſen, and Archangel, and are wrought up into the various works for which ivory can be uſed. The Frozen ocean alſo teems with the narwhal, the pott-fiſh, from whoſe brain ſpermaceti is prepared, the ſea-dog, dolphin, ſea-hog (delphinus phocæna), hay-fiſh (ſqualus carcharias), ſea-cow (trichecus manatus), the ſea-bear (phoca urſina), the ſea-lion (phoca leonina jubata), the ſea-otter (lutra marina), and many others, which are caught either for their ſkin or their blubber. Among the principal objects of the fiſhery on the coaſts of the White ſea, which ſkirt the government of Archangel, are the cod, the navaga (gadus callarias), plaiſe, ſoals, ſtock-fiſh, and herrings. The Dvina and the Petſhora abound in that excellent fiſh called by the Ruſſians ſighi and ſalmons, the latter being reckoned the fatteſt and beſt flavoured of all Northern Ruſſia, and they are therefore frozen or ſalted, in order to be tranſported to a great diſtance round the country. The Oby alſo affords an ample ſupply of ſturgeons, ſterlet, white ſalmon, pikes, muræna, quobbe or quappe (gadus lota), and a multitude of other fiſh. The Oby fiſhery is chiefly carried on by Oſtiaks and Samoyedes. The Irtiſch alſo contains almoſt all the fiſh that are found in the Oby; and here the fiſhery is very conſiderable. The Yeniſſei and Lena, and moſt of the rivers that fall into them, furniſh great variety and abundance of fiſh. The whale fiſhery we ſhall have occaſion to mention under another article. The Eaſtern ocean furniſhes, beſides the whale, the ſea-bear, ſea-lion, ſea-cow, and ſea-otter, which we ſhall elſewhere deſcribe. In a commercial view, there is not any of theſe marine animals ſo important as the ſea-otter, the beautiful fur of which is in high eſtimation. See Fur.

The fiſhery on the Caſpian, as Pallas obſerves, is in ſome reſpects as important to Ruſſia, as the herring, the cod, and the whale fiſhery to other maritime powers of Europe. Of the fiſh of the Volga, the ſeveral kinds of ſturgeon and the white ſalmon are the beſt. The Kamma, which falls into the Volga, alſo abounds with fiſh, which is held to be the beſt flavoured of any in Ruſſia, at leaſt its ſturgeon, ſterlet, and white ſalmon, are preferable to thoſe of the Volga. Beſides theſe three kinds, a principal fiſh of the Kamma is a ſmall ſalmon called in Ruſs kraſnaya reba, red or beautiful fiſh (ſalmo eriox, or ſalmo alpinus). For an account of the means for catching fiſh on the Volga, and on the confines of Aſtrachan, ſee Utsching. The fiſhery on the Ural is not leſs conſiderable than that of the Volga; and being under good regulation, it forms the principal ſupport and occupation of the Uralian Coſſacks. See Ural.

The fiſhery of the Euxine and the ſea of Azof, though neither ſo important nor extenſive as that of the Caſpian, affords numerous ſorts of ſturgeon. The whole northern coaſt of the ſea of Azof, from the Don to Perekop, is laid out in fiſheries, for which theſe diſtricts are extremely favourable. The moſt conſiderable fiſheries on the peninſula of Taurida are at Kertſh and Yenicaly, where the capture uſually begins in May, and continues till ſome time in October. On the coaſts of the Baltic, alſo, a conſiderable fiſhery is carried on. The gulfs of Riga and of Finland contain generally the ſame kinds of fiſh. In the waters of Livonia, ſays a naturaliſt of that country, are forty-nine different ſpecies of fiſh, among which the ſalmon, ſtreamlings, pike, and lampreys,

preys, for exportation if not for home consumption, are the most important. One species of fish peculiar to these waters is the kyllo streamling, caught in great numbers in autumn, near Revel and Roggervyk. They are pickled, and form a good substitute for anchovies and sardelles, and thus prepared, they are sent abroad to various parts. The potted lampreys from Narva are no less exquisite. The greatest store of the gulf of Finland consists of sterlets, salmon, and carp. Sturgeon are found in the gulf of Cronstadt, and likewise at times in the Neva. In winter, the transport of frozen fish from the remoter parts of the empire to St. Petersburg is very considerable. In Russia there are several lakes that afford an abundant supply of fish. The chief of these is the *Baikal*, which see. The Tschan, a Siberian lake, is particularly prolific in fish; and in this respect among the European lakes the Ladoga is the most remarkable. The Peipus and the Ilmen also yield a great variety of fish, and the smaller European lakes are proportionally productive. According to the calculations of Hermann, the whole value of the fishery in one year, may be estimated at 15,000,000 of rubles.

Another branch of productive industry in the Russian empire is the *breeding of cattle*. The nations of herdsmen in this empire are the Kirghises, the Kalmucks, the Baschkirs, the Burats, and several others less numerous: the breeding of cattle is a principal trade with the Cossacks of the Don, the Nogayans, the Barabinzes, and some others; with most of the nations of hunters it is a considerable means of profit, and as a profitable branch of trade it flourishes in many districts of proper Russia. The breeding of cattle affords to the inhabitants many, and in some districts all the means of subsistence, and yields besides to commerce a multitude of articles for exportation. Two of these are hides and tallow: of the latter, in the year 1793, 1,035,000 poods were exported; and the value of that quantity amounted to 4,279,000 rubles, not including the tallow candles, the exportation of which amounted in value to 170,000 rubles. Yufts and leather were in the same year shipped off to the amount of 2,249,000 rubles, and the other exports in the products arising from the breeding of horned cattle, made a sum of more than 163,000 rubles. The whole value of all these articles in one year was upwards of 6,862,000 rubles. The breeding of sheep is also an article of importance in the Russian empire. The Nomades are richer in sheep than in any other article, and even the boors and Cossacks in Southern Russia and Siberia possess flocks of hundreds and thousands. Through the whole country this branch of productive industry might be very much improved. Goats and hogs are also animals that yield to the Russian empire considerable profit, and with due attention might be rendered much more lucrative. Hog's bristles constitute an important article of exportation; in the year 1793, these, to the value of 742,000 rubles, were shipped off. The horse, the ass, the camel, the rein-deer, and the dog, are animals which are capable of being rendered profitable to this country in a much greater degree than they now are; though at present they are not unworthy of attention.

Another branch of productive industry in the Russian empire is *agriculture*. In Russia, agriculture is less the business of the peasantry than in other countries. Throughout the empire every village has its proper territory, and every estate its allotted inclosures and commons. In Siberia every man takes as much ground from the open steppes as he can manage; and when such a portion of ground is exhausted, he proceeds to another, &c. so that these little slips of land lie scattered at twenty, fifty, and even eighty versts distance from the village. In Russia and Siberia they cultivate winter rye and summer rye, winter wheat only in Russia as far as the Kama, summer wheat both in Russia and Siberia; barley, spelt-barley, or bear-barley plentifully in Russia; oats in Russia and Siberia; few pease, and still fewer vetches and beans; a great deal of buck-wheat; in Siberia, Tartarian buck-wheat, millet, and the grain called panicum germanicum, only in Russia. The villagers have hay-fields on the banks of lakes and rivers, in brakes and fens of the forests. The old withered grass, weeds, twigs, and light stuff they set on fire, and this occasions an appearance which at night is tremendous. Besides corn, they grow flax in large quantities, chiefly on the Volga, but most of all in the government of Yaroslaf, and also in the governments of Moscow and Kazan. Hemp is indigenous in all the south and middle of Russia and Siberia, and is propagated in great abundance, both for the material of linen, sail-cloth, &c. and for the oil expressed from its seed, of which a very great quantity is consumed for food during the fasts, and which, as well as the hemp, is exported annually to a great amount. Woad likewise grows wild in Southern Russia and Siberia; it is gathered in the Ukraine, and employed in staining and dyeing. It is also cultivated in the government of Penza, and about the Don. Tobacco is planted almost solely, but in great abundance, in the Ukraine. Hops are propagated by the villagers only, in small quantities, in the governments of Kazan, Nishnei-Novgorod, &c.; and in Siberia, in the province of Irkutsk, the wild sort is plentiful. Orchards are of little account, except in the chief towns. No fruit-trees thrive in Siberia. Water-melons are much cultivated in the south-eastern parts of Russia, from the Don to the Ural, especially on the Volga. In the breeding of cattle, the countryman is directed by climate and pasturage. In the south of Siberia a person often possesses 300 horses, as many sheep, about half the number of horned cattle, always a few swine, and much poultry, sometimes geese and ducks. The Russian horses are of a middling size, with large heads, long flabby ears, not very handsome, but spirited, strong, and hardy. The horned cattle are small and brisk: the cows give little milk, which is poor and thin. In Little Russia the oxen are used for draught. About Archangel there is a fine breed of large cows, originally brought from Holland, and they do not degenerate. The true Russian sheep are distinguished from the common sort by a short tail, about the length of seven inches. Hogs, dogs, and cats are of the ordinary kinds. The poultry are housed all the winter in the cottage, under the hearth and the sleeping benches, for the sake of having Easter eggs. The culture of bees is the principal concern of the Baschkirs in the Ural, and is also an object of attention in Southern Russia. In the northern districts of Russia and Siberia the chace is pursued as a trade, particularly for those animals whose skins are used as furs, especially sables and grey squirrels, for the wear of the Russian gentry in town and country. The carrier's trade is a source of great profit. The towns at the distance of from 500 to 1000 versts, serve as stations for changing the drivers and carriages, *e. g.* from Kiachta, Irkutsk, Krasnoiarsk, Tomsk, Tara, Ekaterinenburg, &c. The country market-towns and hamlets are commonly open, and mostly built in irregular streets, with little kitchen-gardens and large yards to the houses; they are situated on the banks of rivers, for the convenience of obtaining water. They contain many churches; and the monasteries in or near them, from their strong walls, massy gates, and numerous church towers, have the appearance of castles. The fortresses dispersed about the country have seldom earth-ramparts, but are mostly built like their houses, with a low palisade round them. The cannons stand on the gates and on the angles of the ramparts,

or

or batteries on wooden carriages. These are designed to keep the tributary tribes in awe, and the neighbouring Nomades from the borders. Ostrogs, or houses surrounded with a palisade of upright pointed bauks, are situated either in towns, where they serve as prisons for criminals, or solitarily, in various parts of the country, for the same purposes as the fortresses. The parishes, or church villages, are sometimes very extensive; containing 500 or even 1000 and more farms, and from three to seven churches, many of them brick buildings, markets, and trafficking places. Large villages are frequently called slobodes, but many slobodes are less than church villages; the houses are ranged in straight streets, and the streets mostly laid with timbers.

Of the nations, says Mr. Tooke, who have followed agriculture from time immemorial, though in various ways, and with different success, the principal are the Russians, the Poles, the Lithuanians, the Lettes, the Finns, and Esthonians. The state of agriculture in all countries must depend on the nature of the soil and climate, as well as on the industry of the inhabitants. With this view of Russia, the most northern and eastern districts of the empire, of the former, particularly in Siberia, are totally unfit for every kind of economical culture. The 60th degree of latitude may be regarded as the boundary beyond which no agriculture is practicable. The repeated attempts that have been made about Okhotsk (between 59° and 60° N. lat. and 160° E. long.), and Udskoy-ostrog (55° 20′ N. lat. and 150° 40′ E. long.), in the government of Irkutsk, shew, that the culture of corn will never be introduced to effect; and even in Kamtschatka, where the southernmost cape runs out to 51° N. lat. similar trials have been made with very poor and precarious effects. Admitting, therefore, the 60th degree of latitude to be the general boundary of the soil susceptible of culture to the north, we may infer, that the Russian empire contains about 162,000 square geographical miles of land totally unserviceable to the purposes of agriculture. Accordingly the circles in the governments of Olonetz and Archangel have no agriculture, and even in some districts of Vyborg, St. Petersburg, Novgorod, Vologda, Perm, and Viætka, it is attended with almost insuperable, or at least deterring difficulties. In some also of the southern districts of Caucasus, Saratof, Ufa, Kolyvan, Ekaterinoslaf, and Taurida, the soil is so poor, that the natural impediments can perhaps never be entirely surmounted. To the fertile regions belong most of the governments of the middle, and several of the northern tracts; but the best and most productive soils are chiefly found in Little Russia, Kazan, Simbirsk, Kharkof, Kursk, Orel, Nishnei-Novgorod, in the southern part of Taurida and Caucasus, in the newly-acquired portion of the Polish Ukraine, and particularly also in some of the Siberian provinces. The great fertility of the districts bordering on the Volga, the Kama, the Dnieper, the Terek, and the parts about the Euxine, has been long experienced. Moreover, in the territory of Krasnoiarsk, a circle-town of the government of Kolyvan, between the 55th and 56th degrees of N. lat., the fertility of the soil is such, that no instance has occurred of a general failure, and that it is a very ordinary harvest, when the summer rye yields 10-fold, the winter corn 8-fold, and the barley 12-fold. It is usual for the wheat only in bad years to yield the sixth grain, and the oats give an increase rarely short of 20-fold. In consequence of this exuberance, provisions are here in great plenty, and probably in no province of the empire at so low a price. When Pallas was at Krasnoiarsk, a pood of rye-meal sold for 2 or 3, and a pood of wheaten flour for $4\frac{1}{2}$ or 5 kopeeks; a whole ox was bought for $1\frac{1}{2}$ ruble, a cow for a ruble, and a good serviceable horse for 2 or 3 rubles at most; sheep and hogs fetched from 30 to 50 kopeeks a-piece. And though in 25 years that have elapsed since that period an alteration has taken place, yet this country is still one of the cheapest, as well as one of the richest and most plentiful of all.

The implements of husbandry, without which no great progress in the culture of the soil can be expected, are the most simple and artless that can be well imagined.

In such a state, and with such instruments, we need not wonder that agriculture is negligently and badly conducted, and yet we may well be surprised, that the country so managed should yield so considerable a produce; the bounty of nature supplying the work of skill in most of the provinces of middle and southern Russia. Moreover, in the provinces lying in the Baltic, in the White-Russian governments, in the Polish Ukraine, and even in proper Russia, on the estates of noblemen who carry on the farming business with some degree of care, much greater pains are bestowed, and in general more ingenious implements are used. It would lead us too far to give an account of the practice of husbandry either in the northern or southern provinces of Russia; yet, in spite of all the defects of Russian agriculture, its products are so numerous and important, that they not only supply the home consumption, but constitute by far the most considerable article of exportation. The corn most generally cultivated in Russia, and in those tracts of land that do not lie farther north than the 60th degree of latitude, is rye: wheat is more cultivated in the middle and southern governments; in the government of Ekaterinoslaf is cultivated the "Arnautan" wheat, which yields a yellowish flour, and which produces in good years 15 corns above the sowing. Turkish wheat, or maize, is raised on the confines of the Terek and in Taurida. Barley is also a considerable produce of governments in which wheat succeeds, and oats also are cultivated for the consumption of the people in meal for porridge.

Of the four kinds of corn now enumerated, Russia annually exports a considerable quantity, especially from the Livonian ports. The Livonian corn is said to keep longer than that of other countries, not to need such frequent turning, and likewise to yield more flour. In 1793 these exports amounted, in corn and meal, to the value in wheat, of 1,490,000; in rye, of 1,379,000; in barley, of 236,000; and in oats, of 17,000 rubles. The other corns cultivated for home consumption, but not for exportation, are millet, spelt or bear-barley, buck-wheat, manna, or festuca fluitans, growing almost every where in Russia, on meadow-grounds that are overflowed, particularly in the governments of Riga, Pscove, Polotsk, Novgorod, Tver, Smolensk, &c. and rice. Potatoes are cultivated only in a few governments, and chiefly among foreign colonists. Grasses, and fodder of all kinds, every where abound in the Russian empire; and vegetables, for the use of manufactures and commerce, are very abundant, such as hemp, of the produce of which the export, in 1793, amounted to upwards of 8,808,000 rubles; without including the hemp-oil. Flax of the best kind, and most in quantity, is cultivated in the governments of Vologda, Pscove, Novgorod, Riga, Mohilef, Tver, Polotsk, Viætka, the confines of the middle Volga, and in the parts about the Oka and Kama. Both the common and the Siberian flax are often found wild, the former in the steppes, about the northern Ural, the latter on the shores of the Volga, near Tzaritzin, and in other places. Among the plants growing wild, and yielding fibres like flax or hemp, is also the common and the Siberian stinging-nettle (urtica dioica and cannabina), which are found plentiful on the Uralian mountains.

mountains. The Baſchkirs, the Koibals, the Sagayan Tartars, &c. prepare yarn and weave linen of them. Of flax, in ſeeds and other products, excluſively of the oil, the exportation in 1793 amounted to 7,220,000 rubles. Cotton has hitherto been little cultivated; ſome attempts have been made about Aſtrachan and Kitzliar, on the Terek; but there are other climates and ſoils that would ſuit it. Some wild-growing ſilk-plants, yielding a material ſimilar to cotton, known among botaniſts by the name of "cynanchum acutum," and "apocynum maritimum," grow wild in the worſt ſoils, and might be cultivated and manufactured to advantage. There are alſo other plants of a ſimilar kind that might become objects of profitable attention. Ruſſia alſo furniſhes a variety of plants that would afford, if duly regarded, abundance of dyeing materials; ſuch as madder, which grows wild on the banks of the Oka, near Riazan and Arſamas, on the borders of the Volga, in the confines of Syſran and Saratof, and in great quantities, and of ſuperior quality, about the Samara, in Taurida, on the Terek, and in ſeveral diſtricts of the government of Caucaſus; woad (iſatis tinctoria), and a variety of it (iſatis luſitanica), which are ſeen wild in ſeveral of the ſouthern governments; ſaffron, which grows wild about the Terek, in the governments of Voronetch and Ekaterinoſlaf, in Taurida, and eſpecially in the Caucaſian mountains, around Moſdok; and ſafflower (carthamus tinctorius), which thrives perfectly well in the gardens at Toropetz, Moſcow, Tzaritzin, Poltava, and other places. Among the vegetables for fabrication and trade, we might enumerate hops and tobacco; the former grows wild in moſt diſtricts of Ruſſia and Siberia, and the latter is cultivated in the Malo-Ruſſian governments, and alſo about the Volga and the Samara, and particularly by the Coſſacks on the Orenburg and Siberian lines.

In 1793 the exportation from Ruſſia of hemp-oil and flax-oil exceeded in value 697,000 rubles.

Of medicinal plants of all kinds, Ruſſia poſſeſſes a great ſtore; ſuch are the rhubarb (rheum compactum), and the rhapontic, or Siberian rhubarb (rheum undulatum). Saſſafras (ſaxifraga craſſifolia) grows abundantly in the ſouthern and lofty ſnow-mountains of Kolyvan; and the polypodium fragrans, a beautiful and odoriferous fern, is gathered by the Buræts on the ſummits of rocks, and is taken as a wholeſome tea againſt ſcorbutic and colicky complaints. The culinary vegetables that are cultivated in Ruſſia are ſo numerous and various, that it is needleſs to mention them. Beſides thoſe ſhrubs and berries known to us, ſuch as raſpberries, currants, ſtrawberries, which grow in ſurpriſing quantities, gooſeberries, &c. Ruſſia produces in great abundance ſeveral which are here very rarely or never ſeen. Of theſe, for inſtance, are the berries called *pianitza*. In appearance they are much like the bilberry, but have a very different, exceedingly agreeable taſte, and intoxicate if taken in quantities. Hence it is they have their appellation, from *pian*, drunk. Muſhrooms are found in great plenty, and are very generally eaten, excepting the champignon, which, for what reaſon it is not eaſy to diſcover, is carefully avoided by the common people. Of the Ruſſian muſhrooms, the riſchicki or ritzgen are moſt famous. This ſort of muſhroom is likewiſe found in Courland and Pruſſia. Their name, riſchicki, is derived from their reddiſh-yellow hue; and they are eaten either raw, boiled or broiled, or pickled. We ſhall further ſelect ſome other vegetables that have engaged more than ordinary attention: ſuch are aſparagus, which in the government of Moſcow, and ſome others, is made an article of trade; ſuch are berries of various kinds, ſome of which are peculiar to the north of Ruſſia, as well as to the whole of Siberia; the hazle-buſh, found over all Ruſſia as far as the Kamma, and ſo plentiful in the regions between Simbirſk and Kazan, as to give riſe to a branch of conſiderable trade, as a great part of Ruſſia and all Siberia are hence ſupplied with a ſweet-meat in very general uſe, eaten in the faſts with nut-oil; ſugar-melons and water-melons, which thrive in the open air to the 52d degree of latitude; the common orchard fruits, which ſucceed every where in the middle and ſouthern parts of Ruſſia. Of all the ſpecies of fruit produced in the Ruſſian empire, apples and pears are the moſt abundant. All the villages on the Oka and Volga have their orchards, or more properly apple-gardens, ſo that many boors live here without huſbandry, merely by horticulture, in good circumſtances. Cherries are very frequently produced in orchards, but in Southern Ruſſia there are even whole foreſts of cherry-trees. Apricots and peaches ſucceed in moſt parts of Taurida and Caucaſus, and in the ſouthern circles of Kief, Ekaterinoſlaf, Voſneſenſk, and ſome other governments, without much attention. The quince-tree grows wild and plentifully in the foreſts about the Terek: cheſnut-trees are only found ſingly in Taurida, Kief, and Voronetch: walnut-trees are ſeen in moſt diſtricts of Southern Ruſſia, and in great abundance; but the almond-tree grows only in the provinces that lie moſt to the ſouth: figs and pomegranate-trees are ſeen ſingly near Kitzliar and in Taurida; but lemons and orange-trees are every where raiſed only in hot-houſes, though Pallas aſſures us, that they would very well bear the winter in Taurida with more attention. The culture of the vine is at preſent carried on in the governments of Caucaſus, Taurida, Ekaterinoſlaf, and Voſneſenſk, and the country of the Don Coſſacks. The whole region of the Ruſſian empire, from the ſouthernmoſt borders to the 48th degree of latitude, conſtitutes a ſuperficies of more than 12,000 ſquare geographical miles; but of this large tract, ſcarcely one-fourth part is proper for the culture of the vine.

The foreſts of Ruſſia amount to a ſuperfluous abundance in the governments of Archangel, Olonetz, Tobolſk, and Irkutſk: the governments of Perm, Kazan, Smolenſk, Mohilef, Minſk, Tchernigof, Voronetch, Ufa, Tula, Simbirſk, Orel, Kaluga, &c. are richly furniſhed with them, not only ſupplying moſt of the forges and metal founderies, but alſo ſending excellent ſhip-timber to the yards. Moſt of the other provinces have a ſufficiency for their own conſumption; but ſome few of the ſouthern governments, as Kief, Kharkof, Kurſk, Ekaterinoſlaf, and Taurida, are but ſcantily provided. Of trees, thoſe that have narrow-pointed leaves are chiefly indigenous in Northern Ruſſia, forming foreſts of prodigious extent, among which the fir, the pine, and the black pine, are the moſt common and moſt widely diffuſed. The Siberian cedar (pinus cembra) is found particularly in the Uralian mountains; the larch-tree grows in the north of European Ruſſia, and in moſt of the Siberian mountains. Among the umbrageous trees the birch is the moſt common, and its bark and wood are applied to various purpoſes. Next to the birch is the linden, from which Ruſſia derives great advantage. The oak is indigenous only in the European part: it is moſt frequently found in the governments of Kazan and Voronetch, where it is chiefly employed in ſhip-building; but alſo in Little and White Ruſſia it forms conſiderable foreſts. The aſh and the willow grow almoſt every where: but beech, elms, the maple, and the poplar, are chiefly the growth of the ſouthern regions. The foreſts ſupply an extraordinary number of products for home conſumption, and alſo very conſiderable articles of export. In 1793 the value of the latter in ſpecie amounted to upwards of $2\frac{1}{2}$ millions of rubles, when Ruſſia ſhipped off to the value of 1,744,000 rubles in maſts, balks, and deals; 394,000 in pot-aſhes and barilla;

or batteries on wooden carriages. These are designed to keep the tributary tribes in awe, and the neighbouring Nomades from the borders. Ostrogs, or houses surrounded with a palisade of upright pointed bauks, are situated either in towns, where they serve as prisons for criminals, or solitarily, in various parts of the country, for the same purposes as the fortresses. The parishes, or church villages, are sometimes very extensive; containing 500 or even 1000 and more farms, and from three to seven churches, many of them brick buildings, markets, and trafficking places. Large villages are frequently called slobodes, but many slobodes are less than church villages; the houses are ranged in straight streets, and the streets mostly laid with timbers.

Of the nations, says Mr. Tooke, who have followed agriculture from time immemorial, though in various ways, and with different success, the principal are the Russians, the Poles, the Lithuanians, the Lettes, the Finns, and Esthonians. The state of agriculture in all countries must depend on the nature of the soil and climate, as well as on the industry of the inhabitants. With this view of Russia, the most northern and eastern districts of the empire, of the former, particularly in Siberia, are totally unfit for every kind of economical culture. The 60th degree of latitude may be regarded as the boundary beyond which no agriculture is practicable. The repeated attempts that have been made about Okhotsk (between 59° and 60° N. lat. and 160° E. long.), and Udskoy-ostrog (55° 20′ N. lat. and 150° 40′ E. long.), in the government of Irkutsk, shew, that the culture of corn will never be introduced to effect; and even in Kamtschatka, where the southernmost cape runs out to 51° N. lat. similar trials have been made with very poor and precarious effects. Admitting, therefore, the 60th degree of latitude to be the general boundary of the soil susceptible of culture to the north, we may infer, that the Russian empire contains about 162,000 square geographical miles of land totally unserviceable to the purposes of agriculture. Accordingly the circles in the governments of Olonetz and Archangel have no agriculture, and even in some districts of Vyborg, St. Petersburg, Novgorod, Vologda, Perm, and Viætka, it is attended with almost insuperable, or at least deterring difficulties. In some also of the southern districts of Caucasus, Saratof, Ufa, Kolyvan, Ekaterinoslaf, and Taurida, the soil is so poor, that the natural impediments can perhaps never be entirely surmounted. To the fertile regions belong most of the governments of the middle, and several of the northern tracts; but the best and most productive soils are chiefly found in Little Russia, Kazan, Simbirsk, Kharkof, Kursk, Orel, Nishnei-Novgorod, in the southern part of Taurida and Caucasus, in the newly-acquired portion of the Polish Ukraine, and particularly also in some of the Siberian provinces. The great fertility of the districts bordering on the Volga, the Kama, the Dnieper, the Terek, and the parts about the Euxine, has been long experienced. Moreover, in the territory of Krasnoiarsk, a circle-town of the government of Kolyvan, between the 55th and 56th degrees of N. lat., the fertility of the soil is such, that no instance has occurred of a general failure, and that it is a very ordinary harvest, when the summer rye yields 10-fold, the winter corn 8-fold, and the barley 12-fold. It is usual for the wheat only in bad years to yield the sixth grain, and the oats give an increase rarely short of 20-fold. In consequence of this exuberance, provisions are here in great plenty, and probably in no province of the empire at so low a price. When Pallas was at Krasnoiarsk, a pood of rye-meal sold for 2 or 3, and a pood of wheaten flour for $4\frac{1}{2}$ or 5 kopeeks; a whole ox was bought for $1\frac{1}{2}$ ruble, a cow for a ruble, and a good serviceable horse for 2 or 3 rubles at most; sheep and hogs fetched from 30 to 50 kopeeks a-piece. And though in 25 years that have elapsed since that period an alteration has taken place, yet this country is still one of the cheapest, as well as one of the richest and most plentiful of all.

The implements of husbandry, without which no great progress in the culture of the soil can be expected, are the most simple and artless that can be well imagined.

In such a state, and with such instruments, we need not wonder that agriculture is negligently and badly conducted, and yet we may well be surprised, that the country so managed should yield so considerable a produce; the bounty of nature supplying the work of skill in most of the provinces of middle and southern Russia. Moreover, in the provinces lying in the Baltic, in the White-Russian governments, in the Polish Ukraine, and even in proper Russia, on the estates of noblemen who carry on the farming business with some degree of care, much greater pains are bestowed, and in general more ingenious implements are used. It would lead us too far to give an account of the practice of husbandry either in the northern or southern provinces of Russia; yet, in spite of all the defects of Russian agriculture, its products are so numerous and important, that they not only supply the home consumption, but constitute by far the most considerable article of exportation. The corn most generally cultivated in Russia, and in those tracts of land that do not lie farther north than the 60th degree of latitude, is rye: wheat is more cultivated in the middle and southern governments; in the government of Ekaterinoslaf is cultivated the "Arnautan" wheat, which yields a yellowish flour, and which produces in good years 15 corns above the sowing. Turkish wheat, or maize, is raised on the confines of the Terek and in Taurida. Barley is also a considerable produce of governments in which wheat succeeds, and oats also are cultivated for the consumption of the people in meal for porridge.

Of the four kinds of corn now enumerated, Russia annually exports a considerable quantity, especially from the Livonian ports. The Livonian corn is said to keep longer than that of other countries, not to need such frequent turning, and likewise to yield more flour. In 1793 these exports amounted, in corn and meal, to the value in wheat, of 1,490,000; in rye, of 1,379,000; in barley, of 236,000; and in oats, of 17,000 rubles. The other corns cultivated for home consumption, but not for exportation, are millet, spelt or bear-barley, buck-wheat, manna, or festuca fluitans, growing almost every where in Russia, on meadow-grounds that are overflowed, particularly in the governments of Riga, Pscove, Polotsk, Novgorod, Tver, Smolensk, &c. and rice. Potatoes are cultivated only in a few governments, and chiefly among foreign colonists. Grasses, and fodder of all kinds, every where abound in the Russian empire; and vegetables, for the use of manufactures and commerce, are very abundant, such as hemp, of the produce of which the export, in 1793, amounted to upwards of 8,808,000 rubles; without including the hemp-oil. Flax of the best kind, and most in quantity, is cultivated in the governments of Vologda, Pscove, Novgorod, Riga, Mohilef, Tver, Polotsk, Viætka, the confines of the middle Volga, and in the parts about the Oka and Kama. Both the common and the Siberian flax are often found wild, the former in the steppes, about the northern Ural, the latter on the shores of the Volga, near Tzaritzin, and in other places. Among the plants growing wild, and yielding fibres like flax or hemp, is also the common and the Siberian stinging-nettle (urtica dioica and cannabina), which are found plentiful on the Uralian mountains.

mountains. The Baſchkirs, the Koibals, the Sagayan Tartars, &c. prepare yarn and weave linen of them. Of flax, in ſeeds and other products, excluſively of the oil, the exportation in 1793 amounted to 7,220,000 rubles. Cotton has hitherto been little cultivated; ſome attempts have been made about Aſtrachan and Kitzliar, on the Terek; but there are other climates and ſoils that would ſuit it. Some wild-growing ſilk-plants, yielding a material ſimilar to cotton, known among botaniſts by the name of "cynanchum acutum," and "apocynum maritimum," grow wild in the worſt ſoils, and might be cultivated and manufactured to advantage. There are alſo other plants of a ſimilar kind that might become objects of profitable attention. Ruſſia alſo furniſhes a variety of plants that would afford, if duly regarded, abundance of dyeing materials; ſuch as madder, which grows wild on the banks of the Oka, near Riazan and Arſamas, on the borders of the Volga, in the confines of Syſran and Saratof, and in great quantities, and of ſuperior quality, about the Samara, in Taurida, on the Terek, and in ſeveral diſtricts of the government of Caucaſus; woad (iſatis tinctoria), and a variety of it (iſatis luſitanica), which are ſeen wild in ſeveral of the ſouthern governments; ſaffron, which grows wild about the Terek, in the governments of Voronetch and Ekaterinoſlaf, in Taurida, and eſpecially in the Caucaſian mountains, around Moſdok; and ſafflower (carthamus tinctorius), which thrives perfectly well in the gardens at Toropetz, Moſcow, Tzaritzin, Poltava, and other places. Among the vegetables for fabrication and trade, we might enumerate hops and tobacco; the former grows wild in moſt diſtricts of Ruſſia and Siberia, and the latter is cultivated in the Malo-Ruſſian governments, and alſo about the Volga and the Samara, and particularly by the Coſſacks on the Orenburg and Siberian lines.

In 1793 the exportation from Ruſſia of hemp-oil and flax-oil exceeded in value 697,000 rubles.

Of medicinal plants of all kinds, Ruſſia poſſeſſes a great ſtore; ſuch are the rhubarb (rheum compactum), and the rhapontic, or Siberian rhubarb (rheum undulatum). Saſſafras (ſaxifraga craſſifolia) grows abundantly in the ſouthern and lofty ſnow-mountains of Kolyvan; and the polypodium fragrans, a beautiful and odoriferous fern, is gathered by the Buræts on the ſummits of rocks, and is taken as a wholeſome tea againſt ſcorbutic and colicky complaints. The culinary vegetables that are cultivated in Ruſſia are ſo numerous and various, that it is needleſs to mention them. Beſides thoſe ſhrubs and berries known to us, ſuch as raſpberries, currants, ſtrawberries, which grow in ſurpriſing quantities, gooſeberries, &c. Ruſſia produces in great abundance ſeveral which are here very rarely or never ſeen. Of theſe, for inſtance, are the berries called *pianiza*. In appearance they are much like the bilberry, but have a very different, exceedingly agreeable taſte, and intoxicate if taken in quantities. Hence it is they have their appellation, from *pian*, drunk. Muſhrooms are found in great plenty, and are very generally eaten, excepting the champignon, which, for what reaſon it is not eaſy to diſcover, is carefully avoided by the common people. Of the Ruſſian muſhrooms, the riſchicki or ritzgen are moſt famous. This ſort of muſhroom is likewiſe found in Courland and Pruſſia. Their name, riſchicki, is derived from their reddiſh-yellow hue; and they are eaten either raw, boiled or broiled, or pickled. We ſhall further ſelect ſome other vegetables that have engaged more than ordinary attention: ſuch are aſparagus, which in the government of Moſcow, and ſome others, is made an article of trade; ſuch are berries of various kinds, ſome of which are peculiar to the north of Ruſſia, as well as to the whole of Siberia; the hazle-buſh, found over all Ruſſia as far as the Kamma, and ſo plentiful in the regions between Simbirſk and Kazan, as to give riſe to a branch of conſiderable trade, as a great part of Ruſſia and all Siberia are hence ſupplied with a ſweet-meat in very general uſe, eaten in the faſts with nut-oil; ſugar-melons and water-melons, which thrive in the open air to the 52d degree of latitude; the common orchard fruits, which ſucceed every where in the middle and ſouthern parts of Ruſſia. Of all the ſpecies of fruit produced in the Ruſſian empire, apples and pears are the moſt abundant. All the villages on the Oka and Volga have their orchards, or more properly apple-gardens, ſo that many boors live here without huſbandry, merely by horticulture, in good circumſtances. Cherries are very frequently produced in orchards, but in Southern Ruſſia there are even whole foreſts of cherry-trees. Apricots and peaches ſucceed in moſt parts of Taurida and Caucaſus, and in the ſouthern circles of Kief, Ekaterinoſlaf, Voſneſenſk, and ſome other governments, without much attention. The quince-tree grows wild and plentifully in the foreſts about the Terek: cheſnut-trees are only found ſingly in Taurida, Kief, and Voronetch: walnut-trees are ſeen in moſt diſtricts of Southern Ruſſia, and in great abundance; but the almond-tree grows only in the provinces that lie moſt to the ſouth: figs and pomegranate-trees are ſeen ſingly near Kitzliar and in Taurida; but lemons and orange-trees are every where raiſed only in hot-houſes, though Pallas aſſures us, that they would very well bear the winter in Taurida with more attention. The culture of the vine is at preſent carried on in the governments of Caucaſus, Taurida, Ekaterinoſlaf, and Voſneſenſk, and the country of the Don Coſſacks. The whole region of the Ruſſian empire, from the ſouthernmoſt borders to the 48th degree of latitude, conſtitutes a ſuperficies of more than 12,000 ſquare geographical miles; but of this large tract, ſcarcely one-fourth part is proper for the culture of the vine.

The foreſts of Ruſſia amount to a ſuperfluous abundance in the governments of Archangel, Olonetz, Tobolſk, and Irkutſk: the governments of Perm, Kazan, Smolenſk, Mohilef, Minſk, Tchernigof, Voronetch, Ufa, Tula, Simbirſk, Orel, Kaluga, &c. are richly furniſhed with them, not only ſupplying moſt of the forges and metal founderies, but alſo ſending excellent ſhip-timber to the yards. Moſt of the other provinces have a ſufficiency for their own conſumption; but ſome few of the ſouthern governments, as Kief, Kharkof, Kurſk, Ekaterinoſlaf, and Taurida, are but ſcantily provided. Of trees, thoſe that have narrow-pointed leaves are chiefly indigenous in Northern Ruſſia, forming foreſts of prodigious extent, among which the fir, the pine, and the black pine, are the moſt common and moſt widely diffuſed. The Siberian cedar (pinus cembra) is found particularly in the Uralian mountains; the larch-tree grows in the north of European Ruſſia, and in moſt of the Siberian mountains. Among the umbrageous trees the birch is the moſt common, and its bark and wood are applied to various purpoſes. Next to the birch is the linden, from which Ruſſia derives great advantage. The oak is indigenous only in the European part: it is moſt frequently found in the governments of Kazan and Voronetch, where it is chiefly employed in ſhip-building; but alſo in Little and White Ruſſia it forms conſiderable foreſts. The aſh and the willow grow almoſt every where: but beech, elms, the maple, and the poplar, are chiefly the growth of the ſouthern regions. The foreſts ſupply an extraordinary number of products for home conſumption, and alſo very conſiderable articles of export. In 1793 the value of the latter in ſpecie amounted to upwards of $2\frac{1}{2}$ millions of rubles, when Ruſſia ſhipped off to the value of 1,744,000 rubles in maſts, balks, and deals; 394,000 in pot-aſhes and barilla;

barilla; 249,000 rubles in mats, and 150,000 rubles in pitch, tar, and refin.

The Ruffian woods confift of limes, firs, pines, birch and larch-trees (larix), to which may be added fome cedars. The beech and the oak are rarely feen, excepting in Kazan, where the oaks appear pretty plentifully. For fhip-building the larch-tree is generally ufed, though fome veffels are conftructed of oak, which is brought at an almoft incredible expence from the territory of Kazan to the yard of St. Peterfburg. The larch, which in other countries is claffed among the evergreens, is deciduous in Siberia. Befides the aftonifhing quantity of wood that is confumed as fuel, Ruffia has ample fupplies of timber for conftruction. For, throughout the whole empire, excepting St. Peterfburg, and a very few other places, the houfes and churches are almoft all of timber. And even at St. Peterfburg great numbers of them are ftill feen, though, in purfuance of an exprefs imperial edict, no new ones are to be built. Thefe timber houfes are extremely well adapted to the Ruffian climate, as being much warmer than thofe conftructed of brick and ftone. Both in towns and villages the fame mode of building is uniformly practifed. One balk is laid upon another to the height intended. The roof is formed either of boards or oak fhingles; and the interftices between the balks are crammed with mofs. The Ruffian carpenters, in the whole conftruction of a houfe, employ no other tool than an axe, and a fharp circular iron, with which they fhave off the bark from the timber. With the axe alone they carve the ornamental comb or creft (*greben*), which is frequently wrought with exquifite ingenuity, and carried along the ridge of the roof. It appears ftrange to the foreigner that they never work without gloves, yet always, even in winter, go bareheaded. The generality of houfes are only of one ftory; if they have another, as is occafionally feen in towns, the ftaircafe is ufually run up on the outfide. In the houfes of the boors, as well as thofe of the citizens, unlefs they are in good circumftances, are fquare holes inftead of windows, provided with a wooden fhutter. Sometimes thefe apertures are furnifhed with a hog's bladder, through which the light enters. Only boors of property have windows of ifinglafs. The boors' houfes regularly confift of one room; which is at the fame time kitchen, cellar, hog-ftye, and the habitation of the whole family; together with the tutelary faints, who have their tabernacle in one corner of the upper part of the apartment, commonly however fo encrufted with fmoke as hardly to be cognizable. The boor, with all his inmates, cuftomarily during the winter lodges on the fhelves faftened to the walls about the ftove which heats his room, and which ferves alfo as an oven for dreffing his victuals. Here they conftantly fleep, winter and fummer, without beds or other accommodations. In all the boor-houfes the door of the room is uncommonly low. On account of the abundance of timber, and the cheapnefs of provifions, and confequently the moderate price of labour, building in Ruffia is not expenfive. For five hundred rubles the burgher builds himfelf a houfe of five rooms, with an ice-cellar, ftable, a bathing-room, and the neceffary offices. The burgher-houfes have withinfide a fomewhat better appearance than the houfes of the boors; the walls within, and frequently without, being chipped fmooth and whitened over with a fort of wafh ufed for fmearing their ftoves, and which dries much fafter than mortar. Houfes in Ruffia are reckoned among the moveables, and in every town there is a houfe-market, where a man bargains for a houfe, packs it upon fledges, and fets it up wherever he chufes. Such a houfe will laft thirty years, and often longer. Convenient, however, as thefe timber edifices are in feveral refpects, they are hazardous in another point of view; fince they may be confidered as the occafion of fuch frequent conflagrations as happen in no other country; for, notwithftanding that in towns the houfes ftand pretty diftant from each other, yet there never paffes a year in which a very confiderable number is not a prey to the flames. This is the lefs furprifing on being informed that the common people generally ftick a fir lath (luchine) into the wall, lighted at the projecting extremity, as a fubftitute for a candle, and that the precautions againft fires, in the Ruffian provinces, are none of the beft. Mr. Tooke fays, that he has himfelf feen, more than once, in a provincial town, on a calm day at high noon, above 130, and at one time, upwards of 200 houfes on fire. The number would certainly have been much fmaller, if the houfes had not been of wood, and proper precautions had been taken.

Befides the important advantages that Ruffia obtains from its wood, in regard of fuel and building, this product is profitable in feveral other ways, particularly in the preparation of potafh. The rind of the numerous lindens that grow in the diftricts of Kazan and Aftrachan is ufefully employed in the manufacture of bafket-work of all kinds; of which, as well as of mafts and deals, Ruffia annually exports to a great amount.

As the mines conftitute an object of great importance in the Ruffian empire, we fhall here fubjoin, from the work cited at the clofe of this article, an abridged account of them. The largeft works of this kind are at prefent carried on in the Uralian, the Altayan, and Nertfchinfkian mineral mountains; the iron and copper mines of Olonetz, and thofe in feveral other parts of the empire, being of comparatively lefs importance. In the Uralian mountains are gold, iron, and copper mines, which latter are fome of the moft important in the empire. The Altayan mountains contain the richeft gold and filver fhafts, alfo veins of lead, copper, and iron, impregnated with gold and filver. But in the Nertfchinfkian mountains are very rich mines of lead, containing gold and filver. The difcovery of thefe fhafts, as well as the origin of the proper mine-working in Ruffia, is of no older date than the beginning of the laft century. The art of mining, which had its rife in the reign of Peter the Great, was protected and encouraged in the year 1716 by a manifefto; and in 1719 he inftituted the college of mines. In the reign of the empref Anna, and under the empref Elizabeth, the Ruffian mines acquired increafing importance and value; but their moft brilliant era was the reign of Catharine II. The gold mines belonging to the Ruffian empire are properly two; *viz.* that of Berefof near Ekaterinenburg, on the Ural, which is by far the moft material, and the Voytzer gold mines in the mountains of Olonetz. The moft important filver mines are thofe of Kolyvan, in the mineral mountains of Altay. The filver, or rather the auriferous and argentiferous lead mines of Nertfchinfk, have been wrought ever fince the difcovery of them in 1704.

From ftatements, which we cannot here detail, it appears that in the interval between 1704 and 1788, there were gained at all the gold and filver mines about 1000 pood of gold, and about 36,000 pood of filver, amounting together in value to upwards of 45,000,000 of rubles, on which the expences were not more than 15,000,000 of rubles.

The moft important copper mines are principally in the Uralian, Altayan, and Olonetzian mountains. The entire annual amount of the copper obtained from them is about 200,000 pood; the value of which in money, reckoning the pood only at 10 rubles, makes a fum of 2,000,000 of rubles.

The iron mines form, next to the falt-works, the greateft portion

portion of all Russia's mineral wealth: the most numerous and rich of these are found in the Uralian mountains; and besides these there are two smelting-houses in the Altayan and Sayane mountains, and several in the governments of Olonetz, Vologda, Nishnei-Novgorod, Kostroma, Kursk, Tula, Tambof, &c. We may allow for the whole empire about 100 forges, and 800 hammers. In the whole empire about 5,000,000 pood of iron are annually produced, which in specie amounts at least to 4,500,000 of rubles.

By the present constitution, the mines belong either to the crown, to public institutions, or to private individuals. The first possesses all the before-mentioned gold and silver mines: the share it has in the copper and iron mines is not accurately ascertained, but, according to authentic statements, concluded to be about $\frac{1}{3}$th of the former, and $\frac{1}{4}$th part of the latter. The crown mines, which were formerly under the superintendance of the mine college, have, since the abolition of that college in 1784, belonged either to the cabinet or to the senate. The gold and silver mines of Kolyvan and Nertschinsk are under the direction of the former, and the rest of the crown mines are dependant on the senate. The only public institution hitherto in possession of mines is the "Imperial Assignation Bank," which purchased the copper and iron works in the government of Perm. The private mines have received so many grants by law, that it is not easy to assign to individuals their respective rights and immunities. The private owners of mines are mostly nobles, but some are burghers and merchants. The works at the mines of the crown, as well as those belonging to private persons, are partly carried on by master-workmen, partly by inrolled boors, partly by vassals, and partly also by free workmen. From these mines Russia obtains annually of gold about 40, and of silver about 1300 pood, amounting, according to the prices in 1789, to the value of 1,729,000 rubles. These metals are brought to St. Petersburg, and there mostly coined, having been previously separated at the imperial office for that purpose, and brought to the perfect standard. Of copper are annually gained about 200,000 pood, estimated in value at about 2,000,000 of rubles. The copper which the crown receives from its mines, as well as from the taxes of private proprietors, is wholly coined. The export of this metal is inconsiderable; as in 1793 it amounted, from all the sea-ports of the empire, only to 187 pood, equal in value to 2910 rubles. Of iron, about 5,000,000 of pood are obtained, the value of which, on account of the fluctuating price, cannot be accurately ascertained. Russia exports every year so great a quantity of this metal, that, next to hemp, it forms the most important article of exportation. In 1793 the export in bar and sort-iron, as well as in cast-iron goods, amounted to 3,033,249 pood, or in value of money by the custom-house books, to 5,204,125 rubles. Lead is found in all the mines, particularly in those of the Nertschinsk and the Altay; but Russia deriving little advantage from it, imported in 1793 at the port of St. Petersburg 36,000 pood, valued at 125,000 rubles. Tin has not as yet been discovered, nor have the semi-metals in general been produced. Russia has ample stores of noble, precious, and durable kinds of stone, which we shall not now record. Turf and coals are found in some parts, the argillaceous earths in great quantities, sulphur sufficient to prevent the necessity of importation, of salts inestimable stores, and of curious petrifactions and mineral waters, Russia has a sufficient quantity.

The salt-works of Russia are numerous, rich, and productive. The salt is obtained partly from salt-mines, partly from salt-lakes, in which it crystallizes spontaneously, and partly from salt-springs, by boiling the brine, and evaporation. But notwithstanding its inexhaustible sources of salt, Russia has not sufficient for the supply of all the provinces without importation. According to the facts above transiently stated, it may be admitted that there is produced annually in the Russian empire, of gold about 40 pood, of silver 1300, of lead 30,000, of copper 200,000, of iron 5,000,000, and of salt 12,000,000; the value of all which in money may be estimated, by the most moderate computation, at 13,000,000 rubles; and if we allow for the advance in the price of mineral products since 1788, and consider their present value, the said sum may be fixed, without exaggeration, at 15,000,000 rubles. According to the lists of exports in 1793, the total capital with which the productive industry of the Russian empire enriched it in that year amounted to 30,823,000 rubles; and this, it is said, is rated too low.

Manufactures and Trade of the Russian Empire.—Manufactories of wool, cotton, silk, flax, metals, &c. paper-mills, wax-bleacheries, salt-petre and glass-houses, tapestry and porcelain fabrics, with many similar establishments, belonging partly to the crown and partly to individuals, and especially the working of mines, employ an immense number of people, as well artists as tradesmen, both in town and country. Oils of various kinds, isinglass, caveat, soap, tallow-candles, beer and other liquors, brandy and spirits, vinegar, aqua-fortis and aqua-regia, potash, salt-petre, alum, vitriol, bitter salt, sugar, colours for dye-houses, dyeing, tobacco, paper, paper-hanging, play-cards, printing, sail-cloth and cordage, linen, cotton, silk, gold and silver lace, cloth and stuff, carpet, hat, Russia leather, or red and black yufts, which for colour, smell, and softness, cannot be equalled in any other part of the world, (see YUFTS,) shagreen, wax, cabinet and coach-making, glass, plate-glass, stone-cutting, earthenware and porcelain, feathers, pitch-drawing, charcoal, sulphur, powder, iron in various ways, and for various purposes, copper and brass, cannon, gold and silver, clocks, mammots' bones, the best of which are found about the rivers Katanga and Indighirka, &c. &c. are the subjects of manufacture, and of the operation of artists in the Russian empire. Siberia produces also a fossil which has the properties of asbestus. It is soaked, like hemp, in water, the threads are then drawn out, of which a linen is made which resists the action of fire.

The commerce of Russia is naturally divided into foreign and domestic: and these again into the maritime commerce on the Baltic and the White sea, on the Euxine and the Caspian; and the commerce by land with Poland, &c. with Persia, with the Kirghises, and with China. The inland commerce is small, and is mostly conducted by shop-keepers and monopolizers; and the chief transport of goods by land is by caravans. The petty merchants carry on their trade by travelling from place to place about the country, and this kind of traffic supports and even enriches many families. Formerly all traffic was confined to the annual fairs; but for a long time every city and town, and many villages, have a regular market, besides the annual fairs. Until about the close of the 15th century, the foreign commerce was trifling, and almost wholly confined to Novgorod. But since the time of Peter the Great, commerce has revived. With the merchants of Russia it is a general practice to be paid half the price before-hand of the inland commodities which they buy up and deliver to foreigners, according to contract, for exportation; but to take foreign goods upon a year's credit. The most considerable maritime commerce is at St. Petersburg and Riga, by way of the Baltic at Archangel, on the Northern ocean, &c., at Taganrok on the Euxine, at Astrachan on the Caspian, and at Kamtschatka on the Eastern ocean. The principal seats of the foreign commerce by land are the Ukraine, whence the

Ruſſian merchants viſit the markets of Poland, and the fairs of Germany; Orenburg, where a conſiderable trade is carried on with ſeveral Aſiatic nations; and Kiachta in Daouria, where a great mercantile intercourſe is held with China.

Hermann ſtates the Ruſſian commerce, in all the ports, which may generally be termed the Baltic trade, as amounting, in 1790, to a ſum of 35,750,000 rubles, of which the exports make 21,200,000, and the imports 14,550,000 rubles. From all the ports belonging to Ruſſia in the Euxine or Black ſea, the exportation is reckoned at about one million, and the importation at one million and a quarter. The principal articles that find a vent here are, cannon, furs, ſalted beef, butter, cordage, ſail-cloth, caviar, corn, and a variety of Ruſſian manufactures, eſpecially iron, linen, cotton ſtuffs, &c. The imports are, wine, fruit, coffee, ſilks, rice, and all kinds of Turkiſh commodities. The exports over the Caſpian are ſtated to be about 1,200,000, and the imports 1,000,000 rubles. The articles of exportation are nearly the ſame with thoſe that find purchaſers on the Euxine, and in return ſcarcely any thing is taken but ſilk. See CASPIAN.

The commerce by land with the Poles, Pruſſians, &c. is conſiderable. From theſe countries Ruſſia takes commodities for about 2,000,000 of rubles, and carries to them for ſcarcely 500,000. The principal objects of importation are ſcythes, cloths, linens, hemp, flax, &c. the two laſt of which products are ſent off again from Riga. The commerce by land with Perſia paſſes over Kitzliar and Moſdok, and Ruſſia receives principally, by the ſame courſe, ſilk. The exports amount to about 100,000, and the imports to 200,000 rubles. The commerce with the Kirghiſes is moſtly carried on in the way of barter, and chiefly in the Siberian fortreſſes of Orenburg, Troitzk, Peterpavlovſk, Yamiſheva, Semipalat, and Uſtkamenogorſk. Goods to about 1,500,000 of rubles are exported, and imported to the ſame amount. The Kirghiſes bring principally horſes, horn-cattle, ſheep, and very coſtly ſheep-ſkins, receiving in return from Ruſſia woollen cloths, iron, and a great quantity of houſehold goods and other European commodities. The Chineſe commerce is merely a barter, but very conſiderable. Ruſſia, it is ſaid, has of late years received thence articles for 2,000,000 of rubles, and returned them for nearly as much. The chief articles that come to Ruſſia from China are, tea, ſilk, and kitaika (nankeen), and of thoſe that are carried thither, the valuable Siberian furs. The total aggregate of the commerce of Ruſſia by land is ſtated at near 9,800,000 rubles, which gives a balance of about 1,600,000 rubles againſt the empire.

In 1790 the trade of Peterſburg and Riga amounted to as much as the trade of the whole empire in the year 1762, which was then more than twice as much. According to Hermann, the aggregate of the commerce of the empire then amounted to about 50,000,000 of rubles, by which Ruſſia gained near 5,000,000 annually. The returns thus made by the Ruſſian ſubjects, reckoning exports and imports together, amounted to 15,000,000, among which thoſe commodities are to be underſtood, which are imported and exported in ſhips either built or bought in Ruſſia. The ſubjects have accordingly a ſhare of nearly one-third. The total of the imports and exports of Kiachta may be fairly ſtated at 4,000,000 of rubles.

In an empire that has 30,000,000 of inhabitants, the *internal* trade muſt be much more important and valuable than the external commerce. The Siberian commerce, that is, the commerce of the governments of Irkutſk, Kolyvan, Tobolſk, Perm, and Ufa, is of great conſequence. All the products of theſe parts, not conſumed in the country, or not diſpoſed of to China, or to the Kirghiſes, go by the interior diſtricts and ports of Ruſſia. The major part at leaſt of the heavy commodities is brought almoſt entirely from the eaſtern regions of Siberia to St. Peterſburg. Moſt of the return or barter of European commodities againſt Siberian furs, and againſt Chineſe commodities, is carried on in the town of Irbit, in the government of Perm, where a famous fair is held in the months of January and February. The products carried every year from Siberia to Ruſſia are eſtimated at 12,000,000 of rubles, which are thus drawn annually by Ruſſia from Siberia; ſo that Siberia has not unjuſtly been called the Ruſſian Peru. The interior commerce of the Ruſſian provinces with one another, and their traffic in the ports and frontier places of the empire, are of ſtill greater importance. This kind of lucrative intercourſe is facilitated by the many large rivers with which the whole empire abounds. Several conſiderable fairs that are held in various towns and cities of the empire, contribute in a very great degree to aid the proſecution of traffic. The moſt conſiderable of theſe fairs is that at Makarief, a monaſtery and city in the government of Niſhnei-Novgorod, at which the Siberian and Ruſſian merchants aſſemble from all parts of the country. Among the trading cities of greateſt note, the principal are St. Peterſburg, Riga, and Moſcow. The latter is the central point at which all the affairs of the interior commerce of the empire flow together and unite, and it contains a numerous and opulent body of mercantile men. Mr. Tooke eſtimates the aggregate national wealth of Ruſſia in the following manner: 30,000,000 of inhabitants of both ſexes, making about 6,000,000 of families, each family conſiſting of five perſons, conſume monthly at leaſt 48,000,000, in the whole therefore 576,000,000 of poods of all kinds of meal, grits, &c. each pood, on an average, at 25 kopeeks, makes a ſum of

	Rubles.
	144,000,000
Conſumption of brandy, 5,000,000 of eymers, each at 3 rubles - - - -	15,000,000
Salt, 12,000,000 of poods, at 35 kopeeks -	4,200,000
Gold, ſilver, lead, copper, iron, &c. - -	8,750,000
Fine and coarſe furs - - - -	5,000,000
Hemp, flax, tobacco, linens, hemp-oil, linſeed-oil, &c. - - - - -	30,000,000
Fire-wood, timber, charcoal, ſhip-timber, tar, pitch, &c. - - - - -	20,000,000
Cattle, leather, wool, milk, pulſe, garden vegetables, &c. - - - - -	58,050,000
Product of the fiſheries - - - -	15,000,000
Total -	300,000,000

Of this capital, there comes to the annual ſhare of each individual 10 rubles.

By commerce, the annual exports of this capital are,

	Rubles.
In metal wares about - - - -	3,000,000
In hemp, flax, and articles prepared from them - - - - - - - -	10,000,000
In leather, tallow, furs, and all other products from the animal kingdom - - -	8,000,000
In corn, wood, and other petty articles -	4,500,000
Total -	25,500,000
To this add the tranſport at - - -	2,000,000
which together make out - - -	27,500,000

The

The quantity of money circulating in the empire in 1788, is ſtated as follows:

	Rubles.
In gold and ſilver coin - - - -	76,000,000
Copper coin - - - - - -	54,000,000
Paper money - - - - -	100,000,000
Total -	230,000,000

Add together this ſum, and the progreſſive value of the product, and there appears an annual political revenue of 530,000,000, or, to confine ourſelves to the loweſt, of at leaſt 500,000,000 of rubles. The quantity of ſpecie, from the above-mentioned period, is ſaid to be every year increaſed:

	Rubles.
By money ſtruck of Siberian gold and ſilver, about - - - - - -	1,700,000
By foreign coinage of various ſorts - -	1,300,000
By copper money - - - - -	2,000,000
Total -	5,000,000

Forces of the Ruſſian Empire.—The Ruſſian army conſiſts partly of regular infantry and cavalry, and partly of irregular troops. To the latter claſs belong the Kozaks or Coſſacks, who anſwer all the purpoſes of regular huſſars, and have acquired great military reputation. The moſt ſerviceable of this claſs of warriors are divided into thoſe of Ekaterinoſlaf and thoſe of the Euxine. It is impoſſible, from any documents before us, to aſcertain the preciſe number of the Ruſſian military; but from a ſtatement given by Mr. Tooke from the college of war in the year 1791, they amounted to about 600,000 men, of whom might be reckoned at leaſt 500,000 effective ſoldiers in actual ſervice. Some authors have degraded the value of the Ruſſian ſoldiers, but from ſome late memorable exploits their character muſt have riſen in general eſtimation. A circumſtance that diſtinguiſhes them is the ſmall pay, on which they are able to ſubſiſt. Frederic II. pronounced them to be excellent ſoldiers. Accordingly it is ſaid, that the Ruſſian ſoldiers will not fall back one ſtep, while his commander bravely keeps his ground; he contents himſelf with an extremely little pay, and with very ſlender diet, and is always cheerful; hungry and thirſty he traverſes the heavy ſands of the deſarts under the load of his accoutrements, without murmur or complaint; executes every command; reckons nothing impoſſible or too difficult; does every thing that he is ordered to do without ſhunning any danger; and is inventive of a thouſand means for accompliſhing his deſign. What may not be performed with ſuch an army when led on by experienced and valiant generals, in whom they have confidence. Let the ſoldier but ſee that he is ſpared as much as poſſible, he attaches himſelf with all his ſoul to his commander, and performs almoſt miracles. Well might the empreſs denominate the Ruſſians an obedient, brave, intrepid, enterpriſing, and powerful people.

In general, it may be affirmed, that no army in Europe coſts ſo little as the Ruſſian, and that no ſoldiers in Europe can ſubſiſt on ſo little pay as the Ruſſian. For, what other European ſoldiers will ſubſiſt on an annual pay not amounting to more than ſeven or eight rubles, or, when in garriſon, only half that ſum, and the allowance of grits and flour weighed out to him with the utmoſt nicety?

Concerning the pay of the officers, &c. it muſt be obſerved, that the officers of the garriſon regiments in the towns of the Baltic, have double the pay of other garriſon regiments; that the officers of all marching regiments have three times the pay of the officers of the regiments in the provinces; and that the private men in the guards have double the pay of thoſe in the marching regiments. A general field-marſhal is allowed, *per annum*, 7000 rubles, 200 rations, valued at 1140 rubles, and 16 denſhiks or ſervants.

	Rubles.	Rations.		Rubles.	Denſh.
A general in chief	3600	80	=	456	12
A lieutenant-general	2160	50	=	285	10
A major-general	1800	40	=	228	8
A brigadier -	840	20	=	171	7

In the marching regiments a colonel is allowed yearly 600 rubles, for rations 96 rubles 90 kopeeks, and 6 denſhiks or ſervants.

	Rubles.		Rub.	Kop.	Denſh.
A lieutenant-colonel	360	For rations	62	70	4
A major - -	300	——	62	70	3
A captain - -	180	——	28	50	2
A lieutenant -	120	——	22	80	1
A ſecond lieutenant	84	——	17	10	1
An enſign - -	84	——	17	10	1
A quarter-maſter of a regiment	84	——	22	80	1
An adjutant -	120	——	22	80	1

A private man is allowed yearly 10 rubles 98 kopeeks, beſides three barrels of meal, a certain quantity of griſt or coarſe oatmeal, 24 pounds of ſalt, and fleſh to the value of 72 kopeeks, all which articles are computed at 5 rubles 74 kopeeks. But 6 rubles 35 kopeeks are deducted from the pay of every private man for clothing, medicines, fleſh, cartridges, and repairing of fire-locks. His whole clothing from head to foot coſts near 12 rubles.

The navy of Ruſſia conſiſts of two fleets, diſtinct from each other. The creator of the Ruſſian fleet was the emperor Peter I. Before his reign armed veſſels, much leſs ſhips of war, were not known in Ruſſia; but in conſequence of travelling into foreign countries, for the ſake of informing himſelf concerning the beſt method of building ſhips, and with a view of introducing it into his empire, he raiſed a maritime force, and cauſed a ſet of regulations to be printed for the eſtabliſhment of a navy. The admiralty is at Peterſburg, with a high admiral at the head of it. According to the regulation of Peter I., the high admiral has the rank and pay of a general field-marſhal in the army; an admiral thoſe of a general-in-chief; a vice-admiral thoſe of a lieutenant-general; and a contre-admiral thoſe of a major-general. The captains in the navy were divided by Peter I. into three claſſes. At preſent, the captain-commander has the rank of a brigadier in the army; the captain of the firſt claſs the rank of a colonel, and the captain of the ſecond claſs that of a lieutenant-colonel; the captain-lieutenant that of a premier-major; the lieutenant that of a captain in the army, and the midſhipman that of a lieutenant. The pay of the high admiral *per annum* is 7000 rubles; that of an admiral, 3600; of a vice-admiral, 2160; of a contre-admiral, 1800; of a captain-commander, 840; of a lieutenant 200, and of a midſhipman 120 rubles. Officers are allowed denſhiks or ſervants, *viz.* a lieutenant two, and the reſt in proportion. When they are at ſea, the officers are allowed table-money, *viz.* in the Baltic, each officer monthly has ſeven rubles, and the captain ſomewhat more. On long voyages this allowance is increaſed. The ſailors are divided into two claſſes: to the firſt belong the experienced, at 18 rubles *per annum* each; but thoſe of the ſecond claſs have only 12. Moreover, they are fed while at ſea;

ſea; but when on ſhore, each receives his ordinary proviſion, as in the land ſervice. To a ſhip of 100 guns the crew is uſually reckoned at 1000 men.

Ruſſia had formerly no more than two dock-yards, thoſe of Peterſburg and Archangel, to which have been added thoſe of Kherſon, Cronſtadt, and Taurida. At Peterſburg and Cronſtadt the men of war are conſtructed of oak, tranſported thither at a great expence from Kazan. At Archangel the ſhips are built of the wood of the larch-tree.

Revenues of the Ruſſian Empire.—Mr. Coxe eſtimates the national revenue of Ruſſia at 41,830,910 rubles, which is below the juſt amount. Mr. Tooke profeſſes to give a more accurate ſtatement: and he begins with enumerating the ſources from which the national revenue is derived. The *firſt* of theſe ſources is the "head-money," paid only by male heads, including babes and old men, and ſuppoſing 12,000,000 of taxable perſons, and averaging them at 72 kopeeks each, the amount will be very conſiderable. The *ſecond* ſource is the "tax upon the capital of merchants," or, as it is ſometimes called, the *per centage*. Every one pays yearly one *per cent.*, in return for which he and his children are exempt from the poll-tax. The *third* ſource of revenue is the "domain lands," the income of which is very various. 4. The "ſea-duties," which are liable to great fluctuations. 5. The "land-tolls." 6. The duties on "law-proceedings," commonly called "poſchlin," to which may be referred the paſſport money. 7. "Stamped-paper," which brings in a conſiderable ſum *per annum*. 8. The duty on the "ſale of immoveable property," including not only houſes and lands but alſo vaſſals; fixed by the late empreſs in 1787 at five *per cent.* 9. The "kabaks," or tipling-houſes, or the ſale of corn ſpirits. 10. The "ſalt-trade." 11. The "mines." 12. The "mint." 13. "Natural products." 14. The ſhare of "exciſe and recognition duties" in towns. 15. The "poſts." 16. All kinds of "rent" for places, ſhops, mills, parcels of ground, bee-hives in foreſts, bathing-houſes, fiſheries, public inns, &c. 17. "Recruit money" from merchants, from which foreign merchants are exempt. 18. Various "pecuniary penalties." The amount of the receipts from the ſeveral towns is upwards of 46,000,000 of rubles, which it has been thought may be rated at 48,000,000.

Coins, Meaſures, and Weights of the Ruſſian Empire.—We are informed by Mr. Tooke (ubi infra), that previous to the 10th century neither foreign nor domeſtic coin was known in Ruſſia; but that inſtead of it, ſmall pieces of marten and ſquirrel ſkins, ſtamped, were the only currency. From that period frequent mention is made in the chronicles of Grecian and other ſorts of money. It is ſaid by ſome perſons, that the firſt coins were introduced by the Tartars into Ruſſia, and that the Ruſſian word for money, "denghi," is derived from the Tartarian term "tanga," which ſignifies a token; but, when coins were impreſſed with the arms of Moſcow, *viz.* a St. George and his ſpear, the name "kopeeka" aroſe from kopæ, or kopeitzo, a ſpear. Towards the middle of the 16th century, though coins had been ſtruck in ſeveral places before, the tzar Ivan Vaſſillievitch inſtituted the firſt regular coinage, ſet up a mint at Moſcow, and cauſed three rubles to be ſtruck out of one "grivenka," denoting probably a certain weight of ſilver. However, at this time, and long afterwards, the ruble was only an imaginary coin. The firſt actual rubles were ſtruck during the reign of tzar Alexey Mikhailovitch, in the year 1654, though hiſtory makes mention of the ruble about the year 1317. The firſt ruble of 1654 is ſtill extant, and it is eaſily diſcernible to have been previouſly a Spaniſh croſs-dollar; Ruſſian rubles having been recoined from dollars. A foreign dollar then paſſed for 50 kopeeks. But afterwards, in conſequence of the war with Poland, the coin ſuffered a diminution; and for ſome time, kopeeks and altines were ſtruck of copper. The intrinſic value, however, of the ruble remained unaltered at 100 kopeeks. Various alterations were made in the coinage by Peter I. By an edict of 1724, he ordered that no more ſilver kopeeks ſhould be coined, and in lieu of them he cauſed to be ſtruck one and two-kopeek pieces of copper, having on one ſide the St. George, and on the other within the initial of the emperor's name П, the value of the coin. All mints were aboliſhed except thoſe at Moſcow; and in proceſs of time a mint was ſet up at St. Peterſburg, which is at preſent the only one where gold and ſilver coins are ſtruck. Although the mint of Moſcow ſtill exiſts, it is confined to the coinage of copper money. At this time Ruſſia has one mint for ſilver and ſix for copper coin.

After the battle of Pultava, Peter cauſed to be coined pieces called ſun-rubles, now very ſcarce, having on the reverſe a ſun in the centre, and in the area the initial in Ruſs П. Beſides the ruble, there were coined at the ſame time half and quarter-rubles (poltiniki and polpoltiniki, or poltins and polpoltins), bearing his likeneſs and the imperial eagle. The grieven, or tenth part of a ruble, had 10 dots, with the inſcription "Grievenik" on one ſide, and the eagle on the other. The altins, or three kopeeks (copecks), had on one ſide the eagle, and on the other the date of the year and the word "Altinik." Theſe were all the ſilver coins under Peter I. The empreſs Elizabeth for a ſhort time cauſed five-kopeek pieces to be coined, which have long ſince ceaſed. The gold coins in Ruſſia have been always ſtruck in larger ſorts than thoſe of ſilver. Nevertheleſs moſt of the gold coins, of ancient times, ſtill ſubſiſting, conſiſt of very ſmall ſorts. There are ſome that are called "golden kopeeks." A Ruſſian ducat was formerly equal to two rubles ſilver, whence probably aroſe the denomination of golden ruble, as well as the quarter-ruble, now ſhewn as curioſities. Under Peter I. the gold coins were either two-ruble pieces, with the apoſtle Andrew on the reverſe, which are very rare; or ducats with a Latin inſcription. On one ſide is the buſt of Peter with a crown of laurels, on the other the Ruſſian imperial eagle, with the St. George on its breaſt. Both ſides have round them "Petrus Alexii I. D. G. Ruſſ. Imp. M. Dux Moſcoviæ 1716." The empreſs Elizabeth firſt cauſed imperials, half-imperials, golden rubles, and half-rubles, to be ſtruck. At the acceſſion of Peter I. the copper coins were half-kopeeks (denuſchka or denga), kopeeks, and five-kopeek pieces. On the firſt, ſtands on one ſide "Denga," and on the other 1706. The kopeeks have on one ſide the St. George, and on the other "Kopeika." The five-kopeek pieces have undergone ſeveral alterations. The copper five-kopeek pieces that had been ſtruck by Elizabeth were fixed by Peter III. at 10, but Catharine II. reduced them again to five kopeeks. For the accommodation of the provinces of Eſthonia and Livonia, the empreſs Elizabeth, in 1757, cauſed to be ſtruck the livoneſes of whole, half, and quarter pieces; the whole piece being in value 96 kopeeks; but the coinage of theſe ſoon ceaſed.

In Ruſſia, accounts are kept in rubles of 100 kopeeks or copecks. The ruble is divided into 10 grievens, 33⅓ altins, or 50 groſchen; and the kopeek or copeck is divided into 2 denuſchkas, or 4 poluſchkas. The coins now in circulation are, of gold, the imperial, and half-imperial of 10 and 5 rubles; double and ſingle ducats, which were formerly worth 4½ rubles and 2¼ rubles; but their value was raiſed, in 1764, that of the double ducat to 5 rubles 60 copecks, and the ſingle to 2 rubles 80 copecks. The ſilver coins are, rubles of 100 copecks; poltins, or half-rubles, of

50 copecks; polpoltins, or quarter-rubles, of 25 copecks; double and single grieven, of 20 and 10 copecks; and pieces of 5 altins or 15 copecks; payte-copecks of 5 copecks each, and altins of three copecks, the two latter of which are now nearly out of circulation. The copper coins are pieces of 10 copecks, called grieven or grievnik, of 5 copecks or pataki, which are the most common, of two copecks or grosch, of 1 kopeek; also denuschkas or half-copecks, and poluschkas or quarter-copecks. The following table shews their mutual relation as to value:

Ruble.	Grievnik.	Altine.	Copecks.	Denuschkas.	Poluschkas.
1	10	$33\frac{1}{3}$	100	200	400
	1	$3\frac{1}{3}$	10	20	40
		1	3	6	12
			1	2	4
				1	2

Dutch ducats are worth $2\frac{3}{4}$ rubles, more or less; Dutch and Danish rixdollars pass for 1 ruble 40 copecks; or 14 rixdollars, weighing a Russian pound, (1 lb. 1 oz. 3 dwt. 2 gr. troy,) are worth 19 rubles 6 copecks.

The fineness both of gold and silver is expressed in solotniks, the pound or other weight being divided into 96 such parts. The solotnik is also the $\frac{1}{96}$th part of a Russian pound weight. By the ukase, or edict, of 1763, the imperial was to weigh $3\frac{3}{4}$ solotniks, the half-imperial $1\frac{47}{96}$ solotniks; and the gold to be 88 solotniks, or 22 carats fine. Also, 118 ducats were to weigh a Russian pound, 93 solotniks fine, or $23\frac{1}{4}$ carats. By the same edict, silver of 72 solotniks, or 9 oz. fine, was coined into rubles and half-rubles, at the rate of 17 rubles $6\frac{3}{4}$ copecks *per* lb.; into quarter-rubles and 20-copeck pieces, at the rate of 17 rubles $15\frac{40}{96}$ copecks *per* lb.; and into grievens and 15-copeck pieces, at the rate of 17 rubles $25\frac{80}{96}$ copecks *per* lb. Copper was coined at the rate of 16 rubles *per* pood of 40 Russian pounds. New regulations were established by an edict of the emperor Alexander, in 1801; according to which, $22\frac{1}{4}$ rubles are to contain a Russian pound of fine silver; and they are to be $83\frac{1}{3}$ solotniks (11 oz. 8 dwt.) fine; and thus each ruble should weigh $320\frac{1}{4}$ English grains, and contain $277\frac{1}{2}$ grains of fine silver. It was also declared, that no gold coin should hereafter be struck in Russia, except the imperial and half-imperial, the standard of which was raised to $94\frac{1}{2}$ solotniks, or $23\frac{5}{8}$ carats; and the weight of the imperial reduced to $2\frac{1}{16}$ solotniks, or $188\frac{1}{4}$ English grains; by which the value is nearly the same as before.

According to these mint regulations,

	£	s.	d.	
The imperial is worth	1	12	$9\frac{1}{2}$	valued in English gold.
The ducat - - - -	0	9	1	
The ruble of 1763 -	0	3	3	valued in English silver.
The ruble of 1801 -	0	3	$2\frac{1}{2}$	

The following is the report of an assay lately made on a number of rubles at the London mint, by order of the Bank of England. Rubles of 1763, weight from 14 dwt. 21 gr. to 15 dwt. 20 gr.; average 15 dwt. $8\frac{1}{2}$ gr.; fineness 44 dwt. worse than English, that is, 8 oz. 18 dwt. Rubles of 1801, weight from 13 dwt. 2 gr. to 13 dwt. 12 gr.; average 13 dwt. 7 gr.; fineness 14 dwt. worse than English, that is, 10 oz. 8 dwt. Hence we have the value of the old ruble, 3*s.* 2*d.* sterling; and of the new, 3*s.* $2\frac{1}{2}$*d.*

Besides the hard coin, "paper money" constitutes the chief circulating medium or money of Russia, under the denomination of "bank-assignations." Until the year 1787, these notes of 100, 50, and 25 rubles in circulation were estimated at the amount of 50 millions of rubles. They were so readily taken through the whole empire, instead of copper money, that, in many places, 1, 2, and as far as 5 *per cent.* agio must be given to get paper money for copper. In 1787 the old notes were liquidated, and a fresh issue was made to the amount of 100 millions. They are at a *per cent.* of 100, 50, 25, 10, and 5 rubles. By the ukase of August 3, 1788, it was ordered, that there should be never more than 100 millions in circulation. It was customary to convert them into copper money on demand at the assignation-banks; but they fluctuate considerably in value, and with respect to gold and silver they are mostly at a discount; and even on copper there is sometimes an agio against them, as they are not always paid off in this metal, when the sum is considerable. The ruble of exchange is subject to a similar depreciation. In 1770 this ruble and the paper ruble were at par with the silver ruble; in 1790 they were 20 *per cent.* worse; in 1799 the paper ruble was 60 *per cent.* below par, and the ruble of exchange 50 *per cent.*; in 1803 the paper ruble was 20 *per cent.*, and the ruble of exchange 10 *per cent.* below par; and in 1808 they were 100 *per cent.* worse, that is, 1 silver ruble was worth 2 rubles of exchange, or 2 of bank paper.

Bills of exchange are paid in copper, or bank notes; but this chiefly regards inland bills, as foreign merchants scarcely ever draw on Russia. The commercial debts here are usually settled by drawing and remitting bills on foreign countries.

Petersburg, Archangel, Moscow, &c. draw on the following places, and give Amsterdam 1 ruble for 37 stivers current, more or less, at 65 days' date; Hamburgh, 1 ruble for 34 schillings or sols banco, more or less, at 65 days' date; London, 1 ruble for 38*d.* sterling, more or less, at 3 months' date.

The ruble here mentioned is not the silver ruble, but the ruble of exchange, which, as we have just stated, is subject to great fluctuations.

Bills drawn in Russia, payable after date, are allowed 10 days' grace; but if payable at sight, 3 days only; but bills payable at so many days after sight are not allowed any days of grace.

During the reign of the empress Catharine, three different banks were established at Petersburg, *viz.* the Loan-bank, the Assignation-bank, and the Loan-bank for the nobility and towns; and during the reign of the emperor Paul, the Aid-bank and Discount-office were established.

The "Loan-bank, or Lombard," lends money on gold, silver, jewels, &c. A year's interest is taken in advance, which, according to the legal rate, is 5 *per cent.* No interest is paid for money drawn out, on giving two days' notice; but if a declaration be made, that the money will be left there a year, and that a notice of three months shall be given of the intention to draw it out, the legal interest is allowed, payable in the same kind of money in which the deposit was made. The property of this bank belongs to the Foundling-hospital at Petersburg.

The "Assignation-bank" was opened in Petersburg and Moscow in the year 1770, and branches of it have been extended to Yaroslaf, Smolensk, Veliki-Ustiug, Astrachan, Nishnei-Novgorod, Vischnevolotschok, Novgorod, Pscove, Tver, Neschna, Kief, Kursk, Kharkof, Tambof, Orel, Tula, Kazan, Kherson, Archangel, Riga, and Revel. This bank issues notes for 5, 10, 25, 50, and 100 rubles. In 1786 it was converted into an imperial establishment, when all the old notes were called in, and exchanged for new ones. It is engaged that these notes are to be reimbursed on demand in copper money, and that the total amount should not exceed 100 millions of rubles; but the number

number now in circulation is ſuppoſed to be greatly beyond this limitation.

The "Loan-bank for the nobility and towns" was eſtabliſhed in 1786, for the purpoſe of advancing money to the nobility on landed property or on male peaſants, and to the cities or towns on the ſecurity of ſtone and brick houſes. The annual intereſt charged is 5 *per cent.*; beſides which, 3 *per cent.* muſt be paid annually, towards diminiſhing the capital, or redeeming part of the mortgage, till the whole be repaid. The loans are made in aſſignation-notes. This bank is alſo empowered to inſure houſes, buildings, and other property, on which it has advanced money, at the annual premium of $1\frac{1}{2}$ *per cent.* It is alſo allowed to coin money of gold, ſilver, and copper, according to the mint regulations; and it has the liberty of diſcounting bills at $\frac{1}{2}$ *per cent. per* month.

The "Aid-bank" was eſtabliſhed in 1797, for affording relief to noblemen, whoſe eſtates are mortgaged, or burdened with debts; and alſo for advancing money to thoſe who wiſh to improve their eſtates, to eſtabliſh works or manufactures, &c. The property is valued according to the number of male peaſants on the eſtates, who, in different provinces, are valued at 40, 50, 65, and 75 rubles *per* man. The money is advanced in tickets ſecured on the eſtates, which are transferrable, and are to be taken as legal money in all the departments of government. Theſe tickets may remain in circulation for 25 years, reckoning from the time of opening the bank. The annual intereſt is 6 *per cent.* for the firſt five years, and 5 *per cent.* for the following years; and a part of the debt is to be diſcharged annually, till the whole be repaid, which muſt be done within 25 years from the opening of the bank. If the intereſt is not regularly paid, a fine is impoſed, which increaſes at the rate of 1 *per cent. per* month, till the third month; and if the intereſt is not then paid, together with part of the capital, the management of the eſtate is taken from the owner, and given to noblemen who live neareſt to it, and they are to receive the produce, and remit it to the bank, till the debt is entirely paid. The payment muſt be made in copper money, or notes of the Aſſignation-bank.

The "Diſcount-office" was eſtabliſhed in 1797, for advancing money on bills and on goods of Ruſſian produce, and alſo for inſuring the goods on which ſuch advances have been made. The holder of the bills or owner of the goods muſt be a Ruſſian ſubject; but money is advanced to foreigners, and all ſorts of people, on gold and ſilver.

The Ruſſian weights are as follow: the berquet or berkowitz = 10 poods; the pood = 40 lb.; the lb. = 32 loths or lotes; and the loth = 3 ſolotniks. The Ruſſian lb. = 28 loths, Cologne weight, or 6314 troy grains; ſo that 500 lb. Ruſſian = 451 lb. avoirdupois. Among merchants, the ordinary computation is, that 36 lb. avoirdupois = the Ruſſian pood, and that 63 poods = 1 ton avoirdupois. Hemp, flax, and cotton, are ſold by the berquet; copper, iron, cordage, horſe-hair and tails, linſeed and hempſeed oil, iſinglaſs, morocco leather, potaſh, wax, briſtles, and tobacco, are ſold by the pood.

The meaſures of Ruſſia are, for corn, the chetwert or cool = 2 oſmins = 4 pajacks = 8 chetwericks = 64 garnitzy. A cool of flour = 9 poods, and a ſack = 5 poods. The chetwerick is $13\frac{1}{8}$ Engliſh inches in diameter, and $11\frac{1}{4}$ in depth; ſo that it meaſures 1555.92 cubic inches, and contains $5\frac{3}{4}$ Wincheſter gallons nearly. In buſineſs the computation is, that 100 chetwerts = 72 quarters, and 1 chetwert = $5\frac{3}{4}$ buſhels, Wincheſter meaſure. For wine, the caſk, ſarokowoi, or pipe, contains 40 vedros; the vedro = 8 oſmuchki or kruſhkas, and the kruſhka = 11 tſcharkays or cups. In Peterſburg the vedro contains 621 French, or 752 Engliſh cubic inches: hence 1 vedro = $3\frac{1}{4}$ Engliſh wine gallons; and 3 kruſhkas = 1 Engliſh ale gallon. The long meaſures are an arſheen or arſhine, which is divided into 16 werſchocks or verſhoks = 28 Engliſh inches; ſo that 9 arſheens = 7 Engliſh yards, and 4 werſchocks = 7 Engliſh inches; a ſaze, ſaſhe, ſajène, or fathom = 3 arſheens, or 7 Engliſh feet; a werſt, verſt, or Ruſſian mile = 500 ſajènes = 1500 arſheens = 3500 Engliſh feet: 20 werſts = 3 German miles, and 264 werſts = 175 Engliſh miles; ſo that a werſt is nearly two-thirds of an Engliſh mile; and a degree of the meridian is reckoned to be about 104 werſts. The Ruſſian foot is 155 French lines = $13\frac{3}{4}$ Engliſh inches; and the Moſcow foot = $148\frac{1}{4}$ French lines = $13\frac{1}{6}$ Engliſh inches; but the Engliſh foot, as well as the Rhineland foot, is generally uſed in Peterſburg. The ſuperficial meaſure, called deſſetina or deſættine, contains 2400 Ruſſian ſquare fathoms, or 21,600 ſquare arſheens = $13,066\frac{2}{3}$ Engliſh ſquare yards, or 2 acres 2 roods 32 perches: hence 10 deſſetinas correſpond to 27 Engliſh acres nearly.

In Ruſſia the Julian calendar, or old ſtyle, is ſtill retained, which (ſince the year 1800) is 12 days later than the new ſtyle; ſo that a Ruſſian bill, dated the firſt day of any month, muſt be reckoned from the 13th day of the ſame month in England, and in every other place where the Gregorian calendar, or new ſtyle, is uſed.

Having availed ourſelves of the materials which are furniſhed by Mr. Coxe, in his "Travels" and "Ruſſian Diſcoveries," and by Mr. Tooke in his comprehenſive and very intereſting "View of the Ruſſian Empire," in the compilation of this article, we ſhall cloſe it with obſerving, that the immenſe territory of the Ruſſian empire naturally forms itſelf into two great diviſions, by the vaſt Ural chain of mountains, that interſect it from north to ſouth; but theſe diviſions are very unequal and diſſimilar, both as to dimenſion and quality. That on the weſtward is *Proper* or *European* Ruſſia; and that lying to the eaſt ſide, *Aſiatic* Ruſſia, or *Siberia*.

European Ruſſia extends, by the final partition of Poland, from the river Dneiſter to the Uralian mountains, the grand chain which, as we have juſt ſaid, divides Europe from Aſia; in length about 1600 miles, and in breadth above 1000 Engliſh miles. The extent is computed at about 1,200,000 ſquare miles. For a further account of *Aſiatic* Ruſſia, ſee SIBERIA.

RUSSIA *Company*. See COMPANY.

RUSSIAN MUSIC, *in the Church*. See GREEK *Church*.

RUSSIAN *Secular Muſic*. The only inſtruments known in Ruſſia till the time of Peter the Great, were ſuch as the peaſants ſtill uſe in the provinces, which are deſcribed in the Gotha Almanac, and in Guthrie's Diſſertations, with drawings. Peter had at firſt only ſuch military inſtruments as he had ſeen in Germany. But the firſt good muſic that was heard in Ruſſia, was brought thither by duke Charles Frederic of Holſtein-Gottorp, at Peterſburg. This prince, deſtined to marry the princeſs Anne Petrowna, daughter of Peter, had a complete band, or chapel, as the Germans call it, in his ſuite, compoſed of twelve good German muſicians: the concerts by this band were new and acceptable to all the great Ruſſian nobility, who had never heard any other muſic than that of the natives, which was coarſe and barbarous. The emperor himſelf uſed to frequent theſe concerts, and eſtabliſhed two regular performances in his palace each week, employing the German muſicians to teach the boys about the court, and in the army.

All

All the ſucceſſors of Peter have followed his example as a model in this inſtance, as in all others.

The empreſs Anne, the niece and ſucceſſor of the great Peter in 1730, who died in 1740, early in her reign firſt regaled Peterſburg with an Italian opera compoſed by Araja, a native of Italy, of ſome eminence, whom ſhe appointed her maeſtro di cappella; and who likewiſe compoſed intermezzi to Italian words, and in the muſical ſtyle of his country. Concerts twice a-week, which had been eſtabliſhed at court, have been continued ever ſince. All the grandees of Ruſſia imitated this example, had private concerts in their manſions, and many of them became dilettante performers themſelves in a high form of excellence.

The empreſs Elizabeth, daughter of Peter, began her reign in 1741, by a revolution which ſet aſide the czar Ivan as incapable of reigning. She had been affianced, in 1747, to the duke of Holſtein-Gottorp; but that prince dying before the marriage took place, ſhe paſſed the reſt of her days in a ſingle ſtate. This princeſs, on whom nature had beſtowed a nice diſcriminating ear, with a paſſion for muſic and all the fine arts, by her patronage cauſed them to flouriſh in her dominions, in a way ſuperior to moſt of the other ſtates of Europe. She built an opera-houſe at Moſcow, capable of containing 5000 people. At her coronation, "La Clemenza di Tito," written by Metaſtaſio, and ſet by Haſſe, was performed by the beſt Italian ſingers of the time; and a prologue to this drama, entitled "La Ruſſia afflitta e conſolata," was ſet by Araja, maeſtro di cappella to the court of Peterſburg. Soon after this, Peterſburg firſt heard an opera in the Slavonian language, ſet likewiſe by Araja.

Such was the progreſs which muſic had made in Ruſſia, when Peter Federowitz, conſort to the empreſs Catharine, was called to the throne as preſumptive heir. The paſſion which this prince had for muſic contributed conſiderably to its further advancement into favour in his dominions. He performed himſelf on the violin ſufficiently to bear a part in a ſymphony. If he now and then played a wrong note, or miſſed a difficult paſſage, the Italian muſicians were too polite to notice it; on the contrary, they perſuaded his imperial majeſty that he had a particular talent for muſic, and that his performance on the violin was perfect. Muſic became his favourite, and almoſt ſole amuſement, even to a degree of enthuſiaſm. He became alſo a great connoiſſeur in violins; and, in a ſhort time, purchaſed a great collection of thoſe made by the moſt celebrated artiſts, particularly thoſe of Cremona, by Amati, Straduarius, Guarnerio, &c. and by Steiner and Albani, Germans. He was never more happy than when at the head of his band in his concerts. He intended aſſembling at his court all the great muſicians in Europe, and he would doubtleſs have ſucceeded, if his reign had been more durable; but aiming at more important revolutions in his ſtate (which, happily for his country, were ſtopt), a termination was put at once to his muſical and political projects.

Catharine II. mounted the throne, attended not only by all the ſciences and fine arts, but by the genius of legiſlators and victory. The ſtate, the church, public order, induſtry, commerce, maritime force, and the ſtate of her army, had her firſt attention.

After having provided for the ſafety and power of her empire, ſhe attended to its embelliſhment by means of the fine arts; and erected a temple to painting, ſculpture, architecture, and formed an imperial academy of ſciences and beaux arts at Peterſburg.

After this latter eſtabliſhment, which has ſince become ſo illuſtrious, ſhe turned her thoughts to muſic, and called to her court from Venice the celebrated Baldaſſar Galuppi, detto Il Buranello, the moſt fertile and ſpirited compoſer of his time. His "Didone abbandonata," in which the Gabrielle performed the part of Dido, had ſuch prodigious ſucceſs, that, after the firſt repreſentation, the empreſs, with her own hands, preſented the compoſer with a magnificent box filled with pieces of gold: telling him that "the unfortunate Dido, when ſhe expired, bequeathed it as a legacy to the illuſtrious Buranello."

Thoſe who recollect the turn which this princeſs gave to her munificence in the purchaſe of Diderot's library, will be leſs ſurpriſed at her liberality to Buranello. Diderot, in his latter years, being conſtrained to offer his library to ſale, unſucceſsfully, to the principal ſovereigns in Europe, in order to enable him to educate his only daughter, when his wiſh was communicated to the empreſs Catharine, ſhe ſaid, "ſhe would willingly purchaſe his library of him at his own price, upon condition that he would be ſo obliging as to take care of it as long as he lived; and in order to improve it, and to keep pace with the times, ſhe hoped that he would take the trouble to lay out for her 2000 rubles a-year in the purchaſe of new books."

Buranello was ſucceeded at Peterſburg by Traetta, an excellent compoſer; and the compoſitions of theſe great maſters, ſung by the fineſt voices of Italy, and accompanied by the beſt inſtrumental performers with which the orcheſtra could be ſupplied, together with the taſte and magnificence of the decorations, and the ſplendour of the dances, rendered the opera at Peterſburg the moſt brilliant and renowned ſpectacle in Europe.

When the empreſs and her ſon, the grand duke, had ſo happily recovered of the ſmall-pox, by the inoculation of baron Dimſdale, the agreeable French comic opera of "Annette and Lubin" was performed by the principal nobility of the court; however, too good a taſte in ſinging and in dramatic muſic was formed at Peterſburg now, for the vocal performers of France to captivate much, even with the compoſitions of Duni, Monſigni, Philidor, and Gretry, which were tried for one ſeaſon.

It is to ſacred muſic that the lyric theatre at Peterſburg is obliged for the great effects of its choruſſes. In the opera of "Ifigenia in Tauride," ſet by Galuppi, he was allowed to make uſe of the choral ſingers of the imperial chapel. Of which permiſſion that great maſter availing himſelf, compoſed choruſſes for ten choirs, in four parts each, which had a moſt ſurpriſing effect. See CHACE.

After the period deſcribed by the Gotha Almanac for 1772, the opera of Peterſburg had Paeſiello and Sarti to compoſe. Paeſiello, after three years reſidence in Ruſſia, where his compoſitions and perſonal merits were perfectly underſtood, and treated with great admiration and regard, was ſucceeded by Sarti, who went to Peterſburg in 1784, for three years, but remained in Ruſſia till 1790; during which time he eſtabliſhed a concert ſpirituel, or oratorio, for which he compoſed muſic *à cappella*, in which he introduced inſtruments which are not allowed in the Greek church. He likewiſe compoſed a Te Deum for the victory obtained over the Turks by the Ruſſians at Ockzakow, and eſtabliſhed a conſervatorio for the education of young muſicians in the Neapolitan manner, of which he was appointed director. With his opera of "Armida" the empreſs was ſo pleaſed, that ſhe gave him a golden vaſe, and a ring of great value. See SARTI.

Muſic is ſtill patronized in Ruſſia; concerts and operas are ſupported in the uſual magnificent manner (1805); and the Italian taſte, beſides its prevalence at the opera and court concerts

concerts to Italian words, is propagated in the church and provinces by national composers, who had been sent to Italy by the empress Catharine to study composition, and who, when they returned, set hymns, motets, and songs in the Slavonian language, which is said to be nearly as soft and capable of receiving melody as the Italian. Palcha, Lolli, Giornovichi, Bortnianiki, Dietz, &c. contributed to refine instrumental music in Russia.

RUSSING, in *Geography*, a town of Austria; 6 miles E. of St. Polten.

RUSSWEIL, a town of Switzerland, in the canton of Lucerne; 6 miles W. of Lucerne.

RUST, Frederic William, in *Biography*, born in 1739, music-director at Dessau. His first instrument was the violin, then the harpsichord; but he seems to have played and written for all kinds of instruments, though chiefly for the harpsichord. He published at Leipsic six sonatas for that instrument, and twenty-four variations to a German song, at Dessau, 1782; with many detached songs and odes for periodical works.

Rust, in *Geography*, a town of Hungary, the inhabitants of which carry on a considerable trade in wine, made nearly as strong as Tokay; 4 miles E.N.E. of Edenburg.—Also, a small island in the North sea, about 60 miles from the coast of Norway. N. lat. 67° 5′.

Rust, in *Rural Economy*, a distemper incident to corn, and generally called mildew. (See Mildew. See also Blight, and Smut.) The ancients generally thought that it came from heaven, being ignorant of its true cause. Virgil gives this up as an incurable distemper, and tells the farmer, that if his corn is blighted he must live upon acorns, not supposing that any remedy could be devised for such a distemper. These people in general, having no true knowledge of the theory of husbandry, had recourse to magic, and used what they thought spells and enchantments on all occasions. Cato, Varro, and even Columella, are full of these ridiculous devices. A better knowledge in the real nature of husbandry has taught us to understand this matter in a very different manner, and to apply more efficacious remedies to it.

Wheat is blighted at seasons, first in the blossom, and then its generation is prevented, many of the husks being empty in the ear, and the rudiments of the grains not impregnated; secondly, wheat is blighted when the grains are brought to maturity; and in this case they become light, and are of little value for making of bread, having scarcely any flour in them.

Under this term of rust may, perhaps, most properly be arranged, and included, that sort of destructive affection of grain, which is caused by the funguses and parasitical plants, which fix themselves on, and attach themselves to, the stems or other parts of it, so as to diminish, intercept, or destroy its nutritive properties and qualities. The injury done in this way is often more dreadful than that from any of the other causes, as whole fields have been known to be utterly destroyed, so as not to contain a single grain of wheat in the ear, and, at the same time, the straw rendered totally unfit for fodder, as being little better than a *caput mortuum*, possessing neither strength nor substance in it. The evidence of different places fully confirm the existence of fungi, as injurious in this manner; as from some it is stated, that, as the wet weather continued, the rust or fungus made a rapid progress from the ear downwards, until, in many instances, it covered the stem from the ear, as far as it was unsheathed. From others it is said, that the rust or fungus prevented those grains which the maggot had not destroyed from being perfected, in a greater or less degree. From still others it is asserted, that these parasitical plants multiplied so much upon the straw, and on the husk and chaff of the ears, that, in many cases, whole fields put on an universal blackened, rusty appearance. From different other persons, various other circumstances of this nature are also related to be met with.

The best means of preventing and removing affections of this nature in this sort of grain crop, are supposed to be those of cultivating only the sorts of wheat which are the hardiest in point of quality, and the least liable to disease; the sowing of the wheat earlier than usual in the season; the introduction of earlier varieties of it; the giving of a sufficient quantity of seed; the draining of the land where it is inclined to be wet; the rolling and treading of the land by live-stock immediately after sowing; the use of sowing different sorts of saline substances as a manure; the proper regulation and improvement of the course of crops; the change of seed, by bringing it fresh from other countries; the extirpation of the diseased stems, stalks, or blades early in the season; and the instantly cutting down of the crop when it is decidedly affected. See Rotation *of Crops*, Saline *Manure*, Treading, and Wheat.

It is supposed, that, by means of one or other of these methods, when properly improved and applied by ingenious naturalists and farmers, there can be no doubt but that this, as well as the other diseases in wheat crops, may, in a great measure, be either wholly remedied, or their effects be so far reduced as to be of little national consequence. Sir John Sinclair's Inquiry into the Blight, Rust, and Mildew in Wheat.

The rust or mildew also attacks, and is highly injurious to many sorts of garden vegetables as well as fruit-trees, such as those of late peas, &c. and peach-trees, &c.

On the supposition of the disease, in these cases, arising from the seeds of fungi, and to be promoted immediately afterwards, and in continuance, by the want of a sufficient supply of moisture from the soil or ground, with an excess of humidity in the air, particularly when the plants are exposed to a temperature below that to which they have been accustomed; the president of the Horticultural Society of London was led to pursue the following mode of cultivation with the late autumnal crops of the pea, by which the table may be as abundantly supplied during the month of September and that which succeeds it, as in those of June and July; and the plants be nearly as free from the disease. The ground is first dug up in the usual manner, and the spaces which are to be occupied by the future rows of peas then well soaked with water. After which, the mould upon each side is collected together, so as to form ridges seven or eight inches above the previous level of the surface of the ground, which are also well watered. The seed-peas are then sown, in single rows, along the tops of the ridges. The plants quickly shew themselves above the surface of the land, and grow with much vigour, on account of the great depth of stirred mould, and the abundant moisture. There is water given in rather a profuse manner, once in the course of every week or nine days, even when the weather proves showery, but if the ground should be thoroughly drenched with the water of the autumnal rains, there will be no further trouble necessary. The plants, under this mode of management, continue perfectly green and luxuriant, until their blossoms and young seed-vessels become destroyed by the frosts; and their produce will retain its proper flavour, which is constantly destroyed by this disease.

The pea, which has constantly been cultivated in this intention and manner, is a very large kind, the seeds of which are

are greatly ſhrivelled, and grow very high: it is now become common in the ſeed ſhops of the metropolis under the title of knight's pea. This variety is preferred on account of its more ſaccharine quality, and the retention of its flavour more perfectly in the autumnal ſeaſon; however, it is not improbable but that any other late tall-growing variety may ſucceed equally well. It is the practice to ſow a ſmall quantity every ten days until about midſummer, which afford good ſupplies for the table until the end of October, though the ſevere froſts, which ſometimes happen in the early part of that month, prove deſtructive of the more late crops.

The ſame, or ſimilar means, it is ſuppoſed, may be equally effectual in preventing this diſeaſe in the peach-tree. As it is found, that when the roots of it, which ſtrike to the greateſt depth in the ſoil, and which are conſequently the beſt ſuited to ſupply the tree with moiſture during the ſummer, are deſtroyed by a hurtful under ſoil, or by an exceſs of moiſture in the winter ſeaſon, the diſeaſe, on many varieties of the peach-tree, becomes extremely formidable. But that where, on the contrary, a deep, fertile, dry loam permits the roots to extend to their proper depth; and where the ſituation is not ſo low as to be much infeſted with fogs, little of this diſeaſe is met with: alſo in a forcing-houſe it has been found equally eaſy, by appropriate management, to introduce or prevent the appearance of it. When the mould has been kept very dry, and the air in the houſe damp and unchanged, the plants have ſoon become diſeaſed; but when the mould has been regularly, and rather abundantly watered, not a ſingle veſtige of the diſeaſe has ſhewn itſelf.

Rust, in *Gardening*, a diſeaſe of the blight or mildew kind, which affects many ſorts of crops, as well as ſome fruit-trees. All the later pea, bean, kidney-bean, and ſeveral other ſimilar ſorts of crops, are liable to be attacked, and greatly injured, or wholly deſtroyed in this way. Some kinds of the peach and other ſorts of the finer fruit-trees are alſo much expoſed to its ravages and deſtructive effects. See the preceding article.

Rust *of a metal*, the flowers or calx thereof, procured by corroding and diſſolving its ſuperficial parts by ſome menſtruous fluid: or the earth of the metal decompoſed by the action of a proper menſtruum.

Water is the great inſtrument or agent in producing ruſt; the air apparently ruſts bodies, but it is only in virtue of the water it contains.

Hence, in a dry air, metals remain a long time without contracting ruſt; and hence oils, and other fatty bodies, ſecure metals from ruſt, or from being oxydated; water being no menſtruum to oil, &c. and therefore not able to make its way through it. See Iron.

All metals are liable to ruſt; even gold itſelf, though generally held incapable of it, grows ruſty, if expoſed to the fumes of ſea-ſalt.

The reaſon why gold is ſo rarely found to ruſt is, that ſea-ſalt, which is the only ſalt that will prey upon it, is of a very fixed nature; and therefore little of its effluvia, or exhalations, are found floating in the air.

Ruſt is uſually ſuppoſed to be a corruption of the metal, but without much foundation: it is the very metal itſelf, only under another form; and accordingly we find, that ruſt of copper may again be turned into copper.

The ruſt of copper, called *ærugo*, makes what we call *verdigris*. Ceruſs is made of lead converted into ruſt by vinegar. Iron, in time, turns wholly into ruſt, unleſs preſerved from the air by paint or varniſh.

Citizen Conté has adopted a method, which he finds effectual, for preventing the oxydation of iron and ſteel; or, in popular terms, to prevent iron and ſteel from ruſting. It conſiſts in mixing with fat oil varniſh, at leaſt half, or at moſt four-fifths of its quantity of highly rectified ſpirits of turpentine. This varniſh muſt be lightly and evenly applied with a ſponge; after which the article is left to dry in ſome ſituation not expoſed to duſt. He affirms that articles thus varniſhed retain their metallic luſtre, and do not contract any ſpots of ruſt. This varniſh may alſo be applied to copper, of which it preſerves the poliſh, and heightens the colour. It may be employed with particular advantage to preſerve philoſophical inſtruments from any change, in experiments where, by being placed in contact with water, they are ſubject to loſe that poliſh and preciſion of form, which conſtituted part of their value. Nicholſon's Journal, vol. vi. p. 142.

Plumbago protects iron from ruſt, and on that account is rubbed on various ornamental caſt-iron works, ſuch as the fronts of grates, &c.

RUSTAN, in *Geography*, a town of Perſia, in the province of Schirvan; 14 miles N. of Derbend.

RUSTANGUNGE, a town of Hindooſtan, in Bahar; 13 miles S.W. of Patna.

RUSTBURN, in *Farming*, a term provincially uſed to ſignify the troubleſome weed reſt-harrow.

RUSTENBURG, in *Geography*, a town of Weſtphalia, in the territory of Eichsfeld, with a caſtle; nine miles W. of Heiligenſtadt.

RUSTGADEN, a town of Sweden, in Dalecarlia; 23 miles S.S.W. of Fahlun.

RUSTI, or Rust, in *Biography*, born in 1744, was maeſtro di cappella, at Barcelona, in 1767. He ſtudied in the conſervatorio of La Pietà at Naples, and afterwards under Rinaldo di Capua. His firſt opera, "La Contadina in Ceſte," was compoſed for Venice in 1764. He went from Venice to Barcelona, where he compoſed "l'Idolo Cineſe," in 1774, "Amor Bizzazzo" in 1775, and "Aleſſandro nell' Indie," the ſame year. "Il Baron di terra aſciutta," 1776; "Il Socrate Immaginario," 1776; "Il Giove Immaginario;" "Il due protetti," 1777. His operas were much eſteemed in Italy.

RUSTIC Gods, *Dii Ruſtici*, in *Antiquity*, were the gods of the country, or thoſe who preſided over agriculture, &c. Varro invokes the twelve *dii conſentes*, as the principal among the ruſtic gods; *viz.* Jupiter, Tellus, the Sun, Moon, Ceres, Bacchus, Rubigus, Flora, Minerva, Venus, Lympha, and Good Luck. Beſides theſe twelve arch-ruſtic gods, there was an infinity of leſſer ones; as Pales, Vertumnus, Tutelina, Fulgor, Sterculius, Mellona, Jugatinus, Collinus, Vallonia, Terminus, Sylvanus, and Priapus. Struvius adds the Satyrs, Fauns, Sileni, Nymphs, and even Tritons; and gives the empire over all the ruſtic gods to the god Pan.

Rustic, in *Architecture*, expreſſes a manner of building in imitation of ſimple or coarſe nature, rather than according to the rules of art.

Rustic *Faſti*. See Fasti.

Rustic *Fountain*. See Fountain.

Rustic *Freeze*. See Freeze.

Rustic *Quoins*, by Vitruvius called *lapides minant.r*. See *Ruſtic* Quoin.

Rustic *Services*. See Service.

Rustic *Work* is where the ſtones in the face, &c. of a building, inſtead of being ſmooth, are hatched or picked with the point of an inſtrument.

Rustics, *Regular*, are thoſe in which the ſtones are chamfered off at the edges, and form angular or ſquare re-

ceſſes of about an inch deep at their jointings, or beds, and ends.

Rustic *Order*, is an order decorated with ruſtic quoins, ruſtic work, &c.

Felibien ſays, it is properly where the ſeveral parts of the five orders are not exactly obſerved; but this confounds ruſtic with Gothic.

RUSTICI, Francesco, in *Biography*, a native of Sienna, born about 1595, was a diſciple of Franceſco Vanni. His taſte led him afterwards to adopt the ſtyle and ſubjects of Caravaggio. A dying Magdalen in the gallery at Florence, and a Sebaſtian in the Borgheſe palace at Rome, are in that manner, though with more ſelection of form. He ſtudied at Rome the works of a Caracci and Guido, not, however, to the loſs of his own peculiar ſtyle. His moſt renowned work is the Annunciation, at Sienna. He died in the prime of life, in 1625.

RUSTICIANA, in *Ancient Geography*, a town of Hiſpania, in Luſitania, on the left bank of the Tagus, to the E. of Norba-Cæſarea, and W. of Auguſto-Briga.

RUSTICOLA, in *Ornithology*, a ſpecies of *Scolopax*; which ſee.—Alſo, a ſpecies of tringa. See Tringa *Calidris*.

RUSTICULA, a name by which Aldrovand, and ſome other authors, have called the godwit, more commonly known by the name *ægocephalus*. See Scolopax *Ægocephala*.

Rusticula *Braſilienſis*, the name given by Mr. Ray, and ſome others, to the guarauna, a water-bird of the Braſils, of the ſize of our ſnipe. See Scolopax *Guarauna*.

RUSTONIUM, in *Ancient Geography*, a town of Africa, on the coaſt of Mauritania Cæſarienſis, between the river Savus and the town of Ruſicibar, according to Ptolemy. It is called Ruſconia Colonia by Pliny; Rungoniæ Coloniæ by Antonine; and according to Livy, the Africans called it Ruſcinona.

RUSTRE, in *Heraldry*, a bearing of a diamond ſhape, pierced through in the middle with a round hole.

RUSUBESER, Tacksibt, in *Ancient Geography*, a town of Africa, upon the coaſt of Mauritania Cæſarienſis, according to Ptolemy, ſituated to the E. of Ruſucurium, between Iomnyum and Ruſazus.

RUT, in *Hunting*, &c. a term uſed for the venery or copulation of deer.

For the terms which obtain in reſpect of this and other beaſts of game, with the noiſe they make during the acts, ſee Hunting.

The rutting-time with the hart begins about the middle of September; and holds two months: the older they are the better, and the more beloved they are by the hinds, and the earlier do they go to rut. At this time they will turn head, and furiouſly make at any living creature. It is eaſy killing them at this time; their whole buſineſs being to ſcent and purſue the track of the females; ſcarcely feeding at all. The young herd are forced to fly with great precipitancy, when the hart comes in ſight of his mate. If there be any other of bulk, they will diſpute it very hotly with their horns. As the ſeaſon expires, they withdraw, and dig themſelves holes in which to lie to aſſuage the ſtrong fervour of their luſt: when become a little ſweet, they return to their paſture, and live in herds.

The rutting or tourning time of the roe-buck begins in October, and laſts only twelve or fifteen days. When this is paſt, he caſts his horns.

After the hind is filled, ſhe keeps no more company with the male till ſhe be delivered. But the doe always accompanies her paramour till her time approaches, when ſhe retires, for the ſafety of her young, which he would otherwiſe kill.

Rut, in *Rural Economy*, a track or narrow opening formed in a road by the wheel of a cart or other carriage, which has but little breadth. Ruts of this ſort are often dangerous and troubleſome, when they become of any conſiderable depth; therefore they frequently ſtand in need of being filled in and rendered even with the other ſurface. In order to do this with the beſt effect, the inſides of them require to be well looſened with the point of a pick, that a firm bed may be given to the freſh ſtones which are put in, and at the ſame time, the protuberances about them, if there ſhould happen to be any, may be chipped off and removed. And ſtill further to prevent the freſh ſtones from being diſplaced, it is neceſſary that they ſhould be covered in with part of the looſened or other materials, and the whole firmly rammed down, or otherwiſe driven in, ſo as to give the part, thus put in order, not only the evenneſs of ſurface, but, as much as poſſible, the firmneſs of the reſt of the road. This ſort of accuracy may be readily attained by a little practice and experience.

All the minor ruts, depreſſions, and dimples or hollows in roads which are of any conſequence, ſhould always be made up and ſecured in the ſame manner, as no water ſhould ever be ſuffered to ſtand on any part of the ſurface of them.

An implement of the three-pointed pick kind is often found extremely uſeful and convenient in trimming and filling in ruts in this way, as well as for rendering the ſurface even and regular. See Pick.

Rut *of the Sea*, is where it daſhes againſt any thing.

RUTA, in *Botany*, an ancient Latin name, ῥυτη of the Greeks, which lexicographers derive from ῥυω, *to flow*, in alluſion to ſome reputed expelling qualities of the plant. The word is rather perhaps, as De Theis obſerves, not capable of explanation, being nearly the ſame in all the moſt ancient European languages; *ruz* in Runic; *rude*, *ruta*, or *rutu*, in Anglo-Saxon; *rutiza* in Sclavonian. Hence it is *rue* in Engliſh and French; *ruta* in Italian; *ruda* in Spaniſh and Portugueſe; *raute* in German; *rhy'w* in Welſh. Πηγανον, a Greek ſynonym of ῥυτη, is derived from πηγνυω, *to congeal* or *repreſs*; and ſuppoſed to refer to a quality in the plant, oppoſite, in ſome reſpects, to the above-mentioned. This latter name is uſed by Linnæus for a genus nearly akin to *Ruta*; ſee Peganum. If etymology were a ſure guide to the virtues of plants, rue might be taken by monks, who wiſh to keep their vows, and by nuns, who have broken theirs. But we believe its efficacy, in either caſe, as uncertain, as the object is unworthy of conſideration.—Linn. Gen. 210. Schreb. 286. Willd. Sp. Pl. v. 2. 542. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 34. Sm. Prodr. Fl. Græc. Sibth. v. 1. 271. Juſſ. 297. Tourn. t. 133. Lamarck Illuſtr. t. 345. Gærtn. t. 111.—Claſs and order, *Decandria Monogynia*. Nat. Ord. *Multifiliquæ*, Linn. *Rutaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, in five deep ſegments, ſhort and permanent. *Cor.* Petals five, ſpreading, nearly ovate, concave, with narrow claws. *Stam.* Filaments ten, awl-ſhaped, ſpreading variouſly, the length of the corolla, broadiſh at the baſe; anthers incumbent, ſimple, very ſhort. *Piſt.* Germen gibbous, cut croſſwiſe, ſurrounded with ten melliferous pores at the baſe, and raiſed on a *receptacle* pierced with as many ſimilar pores; ſtyle central, erect, awl-ſhaped; ſtigma ſimple. *Peric.* Capſule gibbous, five-lobed half way down, of five cells, burſting elaſtically at the ſummit of each lobe. *Seeds* numerous, rough, angular, ſomewhat kidney-ſhaped.

Obſ.

Obſ. R. *graveolens*, and ſome others, in all except the primary flowers, exclude one-fifth of every part of the fructification. In *R. chalepenſis* the petals are fringed at the baſe.

Eſſ. Ch. Calyx in five deep ſegments. Petals concave, Receptacle ſurrounded with ten honey-bearing pores. Capſule lobed. Seeds numerous. Anthers ſimple.

1. R. *graveolens*. Common Rue. Linn. Sp. Pl. 548. Willd. n. 1. Ait. n. 1. Bulliard Herb. t. 85. (Ruta; Matth. Valgr. v. 2. 95. R. hortenſis, et montana; Ger. Em. 1255.)—Leaves repeatedly compound; leaflets oblong; the terminal one obovate. Petals entire.—Native of the ſouth of Europe. Frequent in the iſlands of the Archipelago. A hardy ſhrub, cultivated, time out of mind, in our gardens, where it flowers from June to September, and propagates itſelf ſpontaneouſly by ſeed. The *ſtem* is buſhy, riſing to the height of ſeveral feet, round, ſmooth, branched. *Leaves* alternate, ſtalked, twice or thrice compound, ſmooth, of a deep blueiſh glaucous hue; their leaflets oblong or obovate, entire, tapering at the baſe. *Stipulas* none. *Flowers* of a rather dull yellow, copious, in terminal corymboſe *panicles*; the terminal ones only having the full number of each of the parts of fructification, while the reſt are octandrous and four-cleft. *Petals* jagged at the extremity; angular, but not fringed, at the baſe. The *ſtamens* of this, and perhaps all the other ſpecies, are remarkable for their progreſſive approach to the *ſtigma*, over which they in turn drop their pollen and retire. Every part of the plant when rubbed, or touched, has a peculiar acrid pungent ſmell, too ſtrong to be agreeable. The bruiſed leaves excoriate the lips and noſtrils, if incautiouſly applied, as they often are, to counteract bad ſmells; rue being ſuppoſed powerfully to prevent contagion. Its internal uſe is unſafe; yet we have known it eaten with bread and butter in no ſmall quantity; not altogether with impunity. Botaniſts diſtinguiſh two varieties; the wild, which has more oblong leaflets, or ſegments, and the garden rue, which has rounder ones. Gerarde has tranſpoſed the cuts of theſe, borrowed from Dodonæus.

2. R. *montana*. Mountain Rue. Ait. n. 2. Willd. n. 2. (R. legitima; Jacq. Ic. Rar. t. 76. R. ſylveſtris; Camer. Epit. 495. R. ſylveſtris minima; Ger. Em. 1255.)—Leaves repeatedly compound; leaflets all linear. Branches of the panicle racemoſe. Petals entire.—Native of dry hilly ſituations in the ſouth of Europe. Dr. Sibthorp found this ſpecies in various parts of Greece, and the neighbouring countries, and juſtly conſidered it as the πτελεα ορεινον, or Mountain Rue of Dioſcorides, for which moſt of the commentators of that old writer have miſtaken the wild, or narrower-leaved, *R. graveolens*. This is a hardy perennial herb, rather than a ſhrub, flowering in autumn in our gardens, where, however, though cultivated by Gérarde, it is now rarely to be ſeen. The plant is known by its more humble ſtature, and eſpecially by the very narrow *leaflets*. The radical *leaves* are crowded into a denſe tuft. Moſt of the *flowers* are four-cleft, as in the former. The branches of the *panicle* are racemoſe, and elongated. *Capſule* not half ſo big as in the Common Rue.

3. R. *chalepenſis*. African Rue. Linn. Mant. 69. Willd. n. 3. Ait. n. 3. Sm. Fl. Græc. Sibth. t. 368. (R. tenuifolia, florum petalis villis ſcatentibus; Moriſ. ſect. 5. t. 35.)—Leaves repeatedly compound; leaflets oblong or obovate. Petals with fringe-like teeth.—Native of Africa, as well as of Zante, and the iſles of the Archipelago. A common greenhouſe ſhrub, flowering at various ſeaſons, and chiefly diſtinguiſhed from the Common Rue by its larger *flowers*, whoſe *petals* are copiouſly fringed with taper teeth. Many of the *flowers* are four-cleft, and the *foliage* varies in breadth, as in that ſpecies.

4. R. *pinnata*. Wing-leaved Rue. Linn. Suppl. 232. Willd. n. 4. Ait. n. 4.—Leaves ſimply pinnate; leaflets lanceolate, tapering at the baſe, bluntly ſerrated. Petals ſomewhat notched.—Native of rocks in the Canary iſlands, from whence it was brought by Mr. Maſſon to Kew, in 1780. This is a greenhouſe ſhrub, flowering in ſpring and ſummer. It is very diſtinct from all the foregoing, reſembling the firſt in ſize and *inflorescence*, but the *flowers* are ſmaller, with crenate, or ſlightly toothed, petals. The *leaves* are very different, compoſed of two or three pair of oppoſite *leaflets*, above an inch long, various in breadth, more or leſs obtuſe, with unequal blunt ſerratures; the odd one rather the largeſt, on a long ſtalk.

5. R. *patavina*. Three-leaved Rue. Linn. Sp. Pl. 549. Willd. n. 5. Sm. Fl. Græc. Sibth. t. 369, unpubliſhed. (Pſeudo-ruta patavina trifolia, floribus luteis umbellatis; Mich. Gen. 22. t. 19.)—Leaves ternate, ſeſſile. Stamens hairy. Germen creſted.—Originally diſcovered by Micheli on a hill near Arqua, not far from Padua. Dr. Sibthorp met with it on mount Parnaſſus. Linnæus had no ſpecimen, nor is the plant known in our gardens, ſo that it ſeems not to have fallen in the way of many botaniſts. The *root* is woody and perennial. *Stems* ſeveral, a foot high, erect, round, downy, leafy, branched at the baſe only. *Leaves* numerous, downy, of a light, rather glaucous green, alternate, ſeſſile, each compoſed of three, nearly equal, narrow, obtuſe, entire, ſlightly revolute *leaflets*, about an inch long. *Flowers* five-cleft, in a terminal, denſe, cymoſe *panicle*. *Calyx* hairy, ſpreading. *Petals* ovate, obtuſe, entire, of a pale dull yellow, with a green central rib. *Stamens* ten, not ſo long as the petals; their filaments hairy half way up. *Germen* five-lobed, covered with glandular tubercles, and crowned with numerous oblong, notched, creſt-like, leafy ſcales.

6. R. *linifolia*. Broad Flax-leaved Rue. Linn. Sp. Pl. 549. Willd. n. 6. Ait. n. 5. Andr. Repoſ. t. 565. Sm. Fl. Græc. Sibth. t. 370, unpubliſhed. (R. ſylveſtris linifolia hiſpanica; Bocc. Muſ. v. 1. 82. t. 73. f. 3. Barrel. Ic. t. 1186. R. montana, foliis integris ſubrotundis; Buxb. Cent. 2. 30. t. 28. f. 2.)—Leaves ſimple, obovate. Stamens hairy. Germen without a creſt.—Native of Spain, Cyprus, and various parts of Greece. The plant of Buxbaum, gathered by him in fields, after harveſt, near Rodoſtro, in Thrace, as far as can be diſcerned from his imperfect figure, does not deſerve to be conſidered as even a variety. This agrees with the laſt in general habit, but is more robuſt, the *flowers* more numerous, and of a deeper yellow. *Leaves* much broader, leſs glaucous, and all ſimple and ſolitary. *Stamens* much dilated, and very hairy, in their lower part. *Germen* roundiſh, five-lobed, ten-furrowed, rough with ſmall granulations, but entirely deſtitute of the leafy creſt, which, though ſo remarkable in *R. patavina*, is not expreſſed by the generally exact Micheli. The name of *linifolia*, uſually alluding to the Common Flax, is not well adapted to the plant we have been deſcribing, except we underſtand it as referring to ſome of the broad-leaved yellow ſpecies of *Linum*, between which and this *Ruta* there exiſt indeed many points of reſemblance.

7. R. *fruticuloſa*. Narrow Flax-leaved Rue. Labillard. Syr. faſc. 1. 13. t. 4. Willd. n. 7. (R. orientalis, linariæ folio, flore parvo; Tourn. Cor. 19. Buxb. Cent. 2. 30. t. 28. f. 1.)—Leaves ſimple, ovato-lanceolate. Clusters corymboſe, of few flowers. Stamens hairy at the baſe. Germen hairy, without a creſt.—Gathered in Syria, near Damaſcus, by our worthy friend M. Labillardiere, to whom

ceſſes of about an inch deep at their jointings, or beds, and ends.

Rustic *Order*, is an order decorated with ruſtic quoins, ruſtic work, &c.

Felibien ſays, it is properly where the ſeveral parts of the five orders are not exactly obſerved; but this confounds ruſtic with Gothic.

RUSTICI, Francesco, in *Biography*, a native of Sienna, born about 1595, was a diſciple of Franceſco Vanni. His taſte led him afterwards to adopt the ſtyle and ſubjects of Caravaggio. A dying Magdalen in the gallery at Florence, and a Sebaſtian in the Borgheſe palace at Rome, are in that manner, though with more ſelection of form. He ſtudied at Rome the works of a Caracci and Guido, not, however, to the loſs of his own peculiar ſtyle. His moſt renowned work is the Annunciation, at Sienna. He died in the prime of life, in 1625.

RUSTICIANA, in *Ancient Geography*, a town of Hiſpania, in Luſitania, on the left bank of the Tagus, to the E. of Norba-Cæſarea, and W. of Auguſto-Briga.

RUSTICOLA, in *Ornithology*, a ſpecies of *Scolopax*; which ſee.—Alſo, a ſpecies of tringa. See Tringa *Calidris*.

RUSTICULA, a name by which Aldrovand, and ſome other authors, have called the godwit, more commonly known by the name *ægocephalus*. See Scolopax *Ægocephala*.

Rusticula *Braſilienſis*, the name given by Mr. Ray, and ſome others, to the guarauna, a water-bird of the Braſils, of the ſize of our ſnipe. See Scolopax *Guarauna*.

RUSTONIUM, in *Ancient Geography*, a town of Africa, on the coaſt of Mauritania Cæſarienſis, between the river Savus and the town of Ruſicibar, according to Ptolemy. It is called Ruſconia Colonia by Pliny; Rungoniæ Coloniæ by Antonine; and according to Livy, the Africans called it Ruſcinona.

RUSTRE, in *Heraldry*, a bearing of a diamond ſhape, pierced through in the middle with a round hole.

RUSUBESER, Tacksibt, in *Ancient Geography*, a town of Africa, upon the coaſt of Mauritania Cæſarienſis, according to Ptolemy, ſituated to the E. of Ruſucurium, between Iomnyum and Ruſazus.

RUT, in *Hunting*, &c. a term uſed for the venery or copulation of deer.

For the terms which obtain in reſpect of this and other beaſts of game, with the noiſe they make during the acts, ſee Hunting.

The rutting-time with the hart begins about the middle of September; and holds two months: the older they are the better, and the more beloved they are by the hinds, and the earlier do they go to rut. At this time they will turn head, and furiouſly make at any living creature. It is eaſy killing them at this time; their whole buſineſs being to ſcent and purſue the track of the females; ſcarcely feeding at all. The young herd are forced to fly with great precipitancy, when the hart comes in ſight of his mate. If there be any other of bulk, they will diſpute it very hotly with their horns. As the ſeaſon expires, they withdraw, and dig themſelves holes in which to lie to aſſuage the ſtrong fervour of their luſt: when become a little ſweet, they return to their paſture, and live in herds.

The rutting or tourning time of the roe-buck begins in October, and laſts only twelve or fifteen days. When this is paſt, he caſts his horns.

After the hind is filled, ſhe keeps no more company with the male till ſhe be delivered. But the doe always accompanies her paramour till her time approaches, when ſhe retires, for the ſafety of her young, which he would otherwiſe kill.

Rut, in *Rural Economy*, a track or narrow opening formed in a road by the wheel of a cart or other carriage, which has but little breadth. Ruts of this ſort are often dangerous and troubleſome, when they become of any conſiderable depth; therefore they frequently ſtand in need of being filled in and rendered even with the other ſurface. In order to do this with the beſt effect, the inſides of them require to be well looſened with the point of a pick, that a firm bed may be given to the freſh ſtones which are put in, and at the ſame time, the protuberances about them, if there ſhould happen to be any, may be chipped off and removed. And ſtill further to prevent the freſh ſtones from being diſplaced, it is neceſſary that they ſhould be covered in with part of the looſened or other materials, and the whole firmly rammed down, or otherwiſe driven in, ſo as to give the part, thus put in order, not only the evenneſs of ſurface, but, as much as poſſible, the firmneſs of the reſt of the road. This ſort of accuracy may be readily attained by a little practice and experience.

All the minor ruts, depreſſions, and dimples or hollows in roads which are of any conſequence, ſhould always be made up and ſecured in the ſame manner, as no water ſhould ever be ſuffered to ſtand on any part of the ſurface of them.

An implement of the three-pointed pick kind is often found extremely uſeful and convenient in trimming and filling in ruts in this way, as well as for rendering the ſurface even and regular. See Pick.

Rut *of the Sea*, is where it daſhes againſt any thing.

RUTA, in *Botany*, an ancient Latin name, ῥυτη of the Greeks, which lexicographers derive from ῥυω, *to flow*, in alluſion to ſome reputed expelling qualities of the plant. The word is rather perhaps, as De Theis obſerves, not capable of explanation, being nearly the ſame in all the moſt ancient European languages; *ruz* in Runic; *rude*, *ruta*, or *rutu*, in Anglo-Saxon; *rutiza* in Sclavonian. Hence it is *rue* in Engliſh and French; *ruta* in Italian; *ruda* in Spaniſh and Portugueſe; *raute* in German; *rhy'w* in Welſh. Πηγανον, a Greek ſynonym of ῥυτη, is derived from πηγνυω, *to congeal* or *repreſs*; and ſuppoſed to refer to a quality in the plant, oppoſite, in ſome reſpects, to the above-mentioned. This latter name is uſed by Linnæus for a genus nearly akin to *Ruta*; ſee Peganum. If etymology were a ſure guide to the virtues of plants, rue might be taken by monks, who wiſh to keep their vows, and by nuns, who have broken theirs. But we believe its efficacy, in either caſe, as uncertain, as the object is unworthy of conſideration.—Linn. Gen. 210. Schreb. 286. Willd. Sp. Pl. v. 2. 542. Mart. Mill. Dict. v. 4. Ait. Hort. Kew. v. 3. 34. Sm. Prodr. Fl. Græc. Sibth. v. 1. 271. Juſſ. 297. Tourn. t. 133. Lamarck Illuſtr. t. 345. Gærtn. t. 111.—Claſs and order, *Decandria Monogynia*. Nat. Ord. *Multifiliquæ*, Linn. *Rutaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, in five deep ſegments, ſhort and permanent. *Cor.* Petals five, ſpreading, nearly ovate, concave, with narrow claws. *Stam.* Filaments ten, awl-ſhaped, ſpreading variouſly, the length of the corolla, broadiſh at the baſe; anthers incumbent, ſimple, very ſhort. *Piſt.* Germen gibbous, cut croſſwiſe, ſurrounded with ten melliferous pores at the baſe, and raiſed on a *receptacle* pierced with as many ſimilar pores; ſtyle central, erect, awl-ſhaped; ſtigma ſimple. *Peric.* Capſule gibbous, five-lobed half way down, of five cells, burſting elaſtically at the ſummit of each lobe. *Seeds* numerous, rough, angular, ſomewhat kidney-ſhaped.

Obſ.

Obſ. R. *graveolens*, and ſome others, in all except the primary flowers, exclude one-fifth of every part of the fructification. In *R. chalepenſis* the petals are fringed at the baſe.

Eſſ. Ch. Calyx in five deep ſegments. Petals concave, Receptacle ſurrounded with ten honey-bearing pores. Capſule lobed. Seeds numerous. Anthers ſimple.

1. R. *graveolens*. Common Rue. Linn. Sp. Pl. 548. Willd. n. 1. Ait. n. 1. Bulliard Herb. t. 85. (Ruta; Matth. Valgr. v. 2. 95. R. hortenſis, et montana; Ger. Em. 1255.)—Leaves repeatedly compound; leaflets oblong; the terminal one obovate. Petals entire.—Native of the ſouth of Europe. Frequent in the iſlands of the Archipelago. A hardy ſhrub, cultivated, time out of mind, in our gardens, where it flowers from June to September, and propagates itſelf ſpontaneouſly by ſeed. The *ſtem* is buſhy, riſing to the height of ſeveral feet, round, ſmooth, branched. *Leaves* alternate, ſtalked, twice or thrice compound, ſmooth, of a deep blueiſh glaucous hue; their leaflets oblong or obovate, entire, tapering at the baſe. *Stipulas* none. *Flowers* of a rather dull yellow, copious, in terminal corymboſe *panicles*; the terminal ones only having the full number of each of the parts of fructification, while the reſt are octandrous and four-cleft. *Petals* jagged at the extremity; angular, but not fringed, at the baſe. The *ſtamens* of this, and perhaps all the other ſpecies, are remarkable for their progreſſive approach to the *ſtigma*, over which they in turn drop their pollen and retire. Every part of the plant when rubbed, or touched, has a peculiar acrid pungent ſmell, too ſtrong to be agreeable. The bruiſed leaves excoriate the lips and noſtrils, if incautiouſly applied, as they often are, to counteract bad ſmells; rue being ſuppoſed powerfully to prevent contagion. Its internal uſe is unſafe; yet we have known it eaten with bread and butter in no ſmall quantity; not altogether with impunity. Botaniſts diſtinguiſh two varieties; the wild, which has more oblong leaflets, or ſegments, and the garden rue, which has rounder ones. Gerarde has tranſpoſed the cuts of theſe, borrowed from Dodonæus.

2. R. *montana*. Mountain Rue. Ait. n. 2. Willd. n. 2. (R. legitima; Jacq. Ic. Rar. t. 76. R. ſylveſtris; Camer. Epit. 495. R. ſylveſtris minima; Ger. Em. 1255.)—Leaves repeatedly compound; leaflets all linear. Branches of the panicle racemoſe. Petals entire.—Native of dry hilly ſituations in the ſouth of Europe. Dr. Sibthorp found this ſpecies in various parts of Greece, and the neighbouring countries, and juſtly conſidered it as the πηγανον ορειον, or Mountain Rue of Dioſcorides, for which moſt of the commentators of that old writer have miſtaken the wild, or narrower-leaved, *R. graveolens*. This is a hardy perennial herb, rather than a ſhrub, flowering in autumn in our gardens, where, however, though cultivated by Gérarde, it is now rarely to be ſeen. The plant is known by its more humble ſtature, and eſpecially by the very narrow *leaflets*. The radical *leaves* are crowded into a denſe tuft. Moſt of the *flowers* are four-cleft, as in the former. The branches of the *panicle* are racemoſe, and elongated. *Capſule* not half ſo big as in the Common Rue.

3. R. *chalepenſis*. African Rue. Linn. Mant. 69. Willd. n. 3. Ait. n. 3. Sm. Fl. Græc. Sibth. t. 368. (R. tenuifolia, florum petalis villis ſcatentibus; Moriſ. ſect. 5. t. 35.)—Leaves repeatedly compound; leaflets oblong or obovate. Petals with fringe-like teeth.—Native of Africa, as well as of Zante, and the iſles of the Archipelago. A common greenhouſe ſhrub, flowering at various ſeaſons, and chiefly diſtinguiſhed from the Common Rue by its larger *flowers*, whoſe *petals* are copiouſly fringed with taper teeth. Many of the *flowers* are four-cleft, and the *foliage* varies in breadth, as in that ſpecies.

4. R. *pinnata*. Wing-leaved Rue. Linn. Suppl. 232. Willd. n. 4. Ait. n. 4.—Leaves ſimply pinnate; leaflets lanceolate, tapering at the baſe, bluntly ſerrated. Petals ſomewhat notched.—Native of rocks in the Canary iſlands, from whence it was brought by Mr. Maſſon to Kew, in 1780. This is a greenhouſe ſhrub, flowering in ſpring and ſummer. It is very diſtinct from all the foregoing, reſembling the firſt in ſize and *inflorescence*, but the *flowers* are ſmaller, with crenate, or ſlightly toothed, petals. The *leaves* are very different, compoſed of two or three pair of oppoſite *leaflets*, above an inch long, various in breadth, more or leſs obtuſe, with unequal blunt ſerratures; the odd one rather the largeſt, on a long ſtalk.

5. R. *patavina*. Three-leaved Rue. Linn. Sp. Pl. 549. Willd. n. 5. Sm. Fl. Græc. Sibth. t. 369, unpubliſhed. (Pſeudo-ruta patavina trifolia, floribus luteis umbellatis; Mich. Gen. 22. t. 19.)—Leaves ternate, ſeſſile. Stamens hairy. Germen creſted.—Originally diſcovered by Micheli on a hill near Arqua, not far from Padua. Dr. Sibthorp met with it on mount Parnaſſus. Linnæus had no ſpecimen, nor is the plant known in our gardens, ſo that it ſeems not to have fallen in the way of many botaniſts. The *root* is woody and perennial. *Stems* ſeveral, a foot high, erect, round, downy, leafy, branched at the baſe only. *Leaves* numerous, downy, of a light, rather glaucous green, alternate, ſeſſile, each compoſed of three, nearly equal, narrow, obtuſe, entire, ſlightly revolute *leaflets*, about an inch long. *Flowers* five-cleft, in a terminal, denſe, cymoſe *panicle*. *Calyx* hairy, ſpreading. *Petals* ovate, obtuſe, entire, of a pale dull yellow, with a green central rib. *Stamens* ten, not ſo long as the petals; their filaments hairy half way up. *Germen* five-lobed, covered with glandular tubercles, and crowned with numerous oblong, notched, creſt-like, leafy ſcales.

6. R. *linifolia*. Broad Flax-leaved Rue. Linn. Sp. Pl. 549. Willd. n. 6. Ait. n. 5. Andr. Repoſ. t. 565. Sm. Fl. Græc. Sibth. t. 370, unpubliſhed. (R. ſylveſtris linifolia hiſpanica; Bocc. Muſ. v. 1. 82. t. 73. f. 3. Barrel. Ic. t. 1186. R. montana, foliis integris ſubrotundis; Buxb. Cent. 2. 30. t. 28. f. 2.)—Leaves ſimple, obovate. Stamens hairy. Germen without a creſt.—Native of Spain, Cyprus, and various parts of Greece. The plant of Buxbaum, gathered by him in fields, after harveſt, near Rodoſtro, in Thrace, as far as can be diſcerned from his imperfect figure, does not deſerve to be conſidered as even a variety. This agrees with the laſt in general habit, but is more robuſt, the *flowers* more numerous, and of a deeper yellow. *Leaves* much broader, leſs glaucous, and all ſimple and ſolitary. *Stamens* much dilated, and very hairy, in their lower part. *Germen* roundiſh, five-lobed, ten-furrowed, rough with ſmall granulations, but entirely deſtitute of the leafy creſt, which, though ſo remarkable in *R. patavina*, is not expreſſed by the generally exact Micheli. The name of *linifolia*, uſually alluding to the Common Flax, is not well adapted to the plant we have been deſcribing, except we underſtand it as referring to ſome of the broad-leaved yellow ſpecies of *Linum*, between which and this *Ruta* there exiſt indeed many points of reſemblance.

7. R. *fruticuloſa*. Narrow Flax-leaved Rue. Labillard. Syr. faſc. 1. 13. t. 4. Willd. n. 7. (R. orientalis, linariæ folio, flore parvo; Tourn. Cor. 19. Buxb. Cent. 2. 30. t. 28. f. 1.)—Leaves ſimple, ovato-lanceolate. Cluſters corymboſe, of few flowers. Stamens hairy at the baſe. Germen hairy, without a creſt.—Gathered in Syria, near Damaſcus, by our worthy friend M. Labillardiere, to whom

whom we are obliged for a ſpecimen. This ſpecies is not known in gardens. The *ſtem* is ſhrubby, a ſpan high, much branched, particularly from the baſe, round, downy, leafy. *Leaves* ſcattered, ſeſſile, downy, about half an inch, or rather more, in length. *Flowers* ſmall, five-cleft, yellowiſh, four or five together, forming ſhort ſimple *cluſters* at the ſummit of each *branch*. *Calyx* fringed with hairs, like the lower part of the *ſtamens*. *Germen* deeply five-lobed, clothed with fine hairs. The *petals* have ſhort claws, more evident, as Willdenow obſerves, than in the preceding.

Ruta, in *Gardening*, contains plants of the under-ſhrubby evergreen kinds, of which the ſpecies cultivated are: the common rue (R. graveolens); the mountain rue (R. montana); the African rue (R. chalepenſis); and the three-leaved rue (R. patavina).

In the firſt ſort the varieties are; the common broad-leaved rue, the narrow-leaved rue, and the variegated-leaved rue.

And in the third kind there are varieties with broad leaves and with narrow leaves.

Method of Culture.—All the ſpecies and varieties of theſe plants may be readily increaſed by ſeeds, ſlips, and cuttings. The ſeed ſhould be ſown in the open ground in March or April, on a bed of light earth, raking it in: the plants ſoon come up, which, when two or three inches high, ſhould be planted out in nurſery-rows, and watered till freſh rooted. And from the ſcattered or ſelf-ſown ſeeds of the common ſort, many young plants often riſe in autumn and ſpring, which form good plants; but by ſlips or cuttings is the moſt expeditious method of raiſing all the ſorts, as every ſlip or cutting of the young wood will readily grow. It is the only method by which the different varieties can be continued diſtinct. The ſlips or cuttings ſhould be made from the young ſhoots ſix or eight inches long, and planted in a ſhady border, in rows half a foot aſunder, giving a good watering, and repeating it occaſionally; by which they will ſoon emit roots below and ſhoots at top, ſo as to form little buſhy plants by the autumn following. And they all afford variety in the borders and other parts of gardens and pleaſure-grounds, and the firſt ſort and varieties are alſo uſeful medicinal plants. The third ſort ſhould have a dry ſoil and ſheltered ſituation, otherwiſe it does not ſucceed well.

Some of theſe plants may be uſed for variety in the borders and other parts of pleaſure-grounds, gardens, &c.

Ruta, in the *Materia Medica*. See Rue.

Ruta Baga, in *Agriculture*, a plant of the turnip kind, which has lately been introduced into field culture with great benefit to the farmer, as affording a ſupply of green food for the ſupport and fattening of ſheep or other live-ſtock, between the common turnip and graſs ſeaſons. This root has been conſidered by ſome as a mere variety of the yellow turnip, but it is found to differ very materially from it both in texture and other properties. With reſpect to the top, or ſtem, it has ſomething of the appearance of the rape, or cabbage kind; and the bottom, or that part of the root-bulb which is above the ſurface of the ground, is covered by a thick, green, tough cuticle or ſkin, which in ſome is ſmooth, but in others quite rough, and the internal fleſhy part is of a denſe, cloſe, firm conſiſtence, having a yellowiſh tinge, nearly ſimilar to that of the horn carrot. It has indeed been ſuſpected by ſome that there are two varieties of this valuable plant, the one having a *white*, and the other a *yellow* root, the latter being conſidered as much the beſt; but this ſeems to have ariſen from their having been grown from ſeed collected in the neighbourhood of plants of the turnip or cole kinds, as is fully ſhewn in the Surveys of the North Riding of Yorkſhire and Nottinghamſhire.

But the great inducements for the farmer to enter freely into the culture of this root are, according to Mr. Young, 1. If he has the right ſort of ſeed, the root yellow in fleſh, and rough in coat, it laſts through all froſts, and may be depended on for ſheep quite through the month of April, though drawn two months before, and ſpread on a graſs field. 2. It is an excellent and nouriſhing food for ſheep, and alſo for any ſort of cattle. 3. It is equal to potatoes, in keeping ſtock ſwine: a point of very great conſequence. 4. It is, next to carrots, the very beſt food that can be given to horſes. 5. It is ſown at a ſeaſon which leaves ample time, in caſe of a failure, to put in common turnips, or cabbages.

And in regard to the ſoils moſt proper for this root, thoſe of the good, rich, loamy kinds are perhaps the beſt; but it may be grown to advantage on many of thoſe that are too moiſt and heavy for the common turnip; where the land has been brought into a tolerably perfect ſtate of pulverization and mellowneſs, and been well enriched with manure before the ſeed was put into the ground, or the plants ſet out upon it; as it has been perhaps from the want of this full preparation of the land, and the putting in the ſeed of a bad kind, and at too late a period, that cultivators of this uſeful root have been ſo frequently diſappointed in obtaining good crops.

Seed.—In procuring the ſeed, it ſhould always be collected from ſuch plants as have been tranſplanted, and which are the moſt perfect of their kind, as where this is not the caſe, the cultivator can never be certain of having his plants of the proper ſort. The writer of the Eaſt Lothian Report on Agriculture has indeed obſerved, that as no dependence can be placed on the ſeed purchaſed in the ſhops, every farmer ought to raiſe ſeed for himſelf: this may be done with very little trouble, and at no expence; it is only neceſſary that the ſeed-plants be carefully placed by themſelves, and not allowed to be near other plants bearing flowers or ſeed, while they are in the ſame ſtate. The danger ſeems to reſult from plants of kinds nearly related to each other mixing the farina of their flowers, when growing to ſeed. The ruta baga ſeems much liable to ſome adulteration of this kind, and unleſs farmers guard againſt it, by taking the trouble to preſerve their own ſeed, they need hardly expect it genuine.

With reſpect to the quantity or proportion of ſeed that is made uſe of where the broad-caſt method is employed, it is generally about two pounds to the acre; but where the drill plan is purſued, a ſomewhat ſmaller proportion may be ſufficient: however, as it is moſtly found difficult to produce a ſufficient plant of this crop, it may be adviſeable never to be too ſparing in the article of ſeed. In all caſes new ſeed is to be conſtantly preferred, and when the ſeaſon is hot and dry, it may be of utility to have it prepared by ſteeping a ſhort time before ſowing it.

In what regards the time of ſowing, as this plant is much ſlower in its vegetation than that of the common turnip, it ought to be ſown or put into the ground at an earlier period, by which circumſtance, it will not only be more forwarded for the hoe, and more fully fixed and eſtabliſhed in the ſoil, but better protected from the attacks of the fly, and the heats of the enſuing ſummer months. It has been the too common practice of farmers to ſow this crop at the ſame time with that of the common turnip, by which the crops have often failed. But if put in a month or ſix weeks ſooner, it will be found more advantageous, as from about the latter end of April to the middle of May, or perhaps a little later in the northern diſtricts, as is ſhewn by the agricultural ſurveys of theſe counties. In different places different

ferent methods are practised in raising these kinds of crops; sometimes, instead of sowing the seed over the land in either the broast-cast or drill manner, it is sown upon nursery beds of good rich earth, and after the plants are sufficiently advanced, as where they are about the size of small cabbage-plants, they are transplanted into the field, and set out on raised drills, at the distance of eight or nine inches or more from each other, and a foot or more in the rows. The business of transplanting should, if possible, be performed when the weather is in a moist state. And this may perhaps be the best mode of executing the work where such crops are cultivated only to a small extent; but where they are grown upon a more extensive scale, the former are probably to be preferred, as being more expeditious and convenient, as well as more certain of affording a sufficient plant for a full crop. From the danger of these crops being destroyed by the ravages of the fly, it has been suggested by Mr. Young, that the best culture of this plant is to sow it where it is to remain, broad-cast, from the 10th of May to the end of the month; and of all others, the best preparation to secure a crop is that of paring and burning, for the fly being the grand enemy, from its coming so very slowly to the hoe, this operation not only proves by far the best preservative against that enemy, but also pushes the plants on in an accelerated vegetation, and thereby doubly secures the crop. If the seed cannot be thus put in on land so prepared, the next best management is, to sow it after common turnips fed on the land by sheep. If neither method suits, it must be put in on well pulverized soil, very amply manured.

On a well cultivated farm near Hampstead, in the county of Middlesex, the method of culture and expences attending it were these.

Expences of Cultivation of an Acre of Land.

	£	s.	d.
Three ploughings, at 10s. - -	1	10	0
Three harrowings, at 5s. - - -	0	15	0
Cleaning by hand-picking - -	0	10	0
Making up drills - - - -	0	5	0
Dung and labour of putting it in, half only allowed to this crop - - -	2	10	0
Covering it up in drills - - -	0	5	0
Seed 2lb. - - - -	0	7	6
Drilling in ditto - - - -	0	1	0
Horse-hoeing twice - - -	0	1	8
Hand-hoeing twice - - -	0	12	0
Moulding up rows - - -	0	1	0
	6	18	2

And in this mode the crop was very good, being capable of being sold in 1806 at 12*l. per* acre; the turnips averaging about five pounds weight each, and a large portion rising as high as twelve. The crop was put in upon land that had previously borne winter tares. And under this management the cultivator has no doubt of raising still larger crops.

After-culture.—It is evident, that in the after-culture of this plant, from its advancing more slowly to the hoe, that it must require greater attention to keep it clean and free from weeds than that of the common turnip. The business of hoeing, both in the horse and hand methods, must therefore be more diligently practised, repeating the operations as often as may be sufficient for the purpose, keeping the mould constantly well broken down, and applied to the roots of the plants.

And the plants of the Swedish turnip are liable to be affected by the same causes as those of the common turnip, the fly especially, being equally, if not more prejudicial to these crops than those of the common turnip kind. And besides, they are apt to be greatly injured or destroyed by rabbits, hares, and different sorts of birds, both in their tops and roots.

It may be noticed, that there is much difference in the statements in regard to the amount of the produce in this sort of crop; but when it is put in at a sufficient early period, and the ground prepared and managed in the manner that has been stated above, it will probably in general equal, if not surpass, that of the common turnip. And when it is considered that the flesh of the roots is much more solid and compact, and abounds more with nutritious matter, the *real* quantity of food which they afford must probably be much greater. In the trials of the above cultivator, they are found to go one-third further in the fattening of cattle or other animals, than the common turnip. And the Rev. Mr. Close, in the ninth volume of the Bath papers, has recorded an experiment in the transplanted method upon ridges of the same dimensions as those used for the common turnip, and the produce was found, after they had sustained the frosts, in the month of March, without either tops or tails, and when perfectly free from dirt, to be thirty-two tons on the acre. Mr. Daiken has stated in the Nottinghamshire Report, their advantage in the feeding of horses for a few acres to have been as high as thirty pounds the acre. And in the experiments of others, as detailed in the Agricultural Report of the North Riding of Yorkshire, they have likewise been found in common heavier than those of common turnips, though in appearance, from the closeness of their texture, they did not seem to equal them. This is, however, only conjecture, and is quite at variance with what has been the result in other cases, where actual weighing and measuring have been had recourse to. In common soils, and the ordinary modes of cultivation and application of these crops, the quantity of produce on the acre must probably be rated considerably lower, as well as their value as food for live-stock.

On actually weighing a square perch of each of these different sorts of turnip crops in the month of November, in 1808, which were grown together in the same field, on the very same kind of land, at Quarmer Park, near Lancaster, under the excellent management of Charles Gibson, esq. the respective weights were found to stand thus:

	Cwt.	qrs.	lbs.
Common turnip - - - - -	4	2	10
Ruta baga, or Swedish turnip - - -	4	2	7
Difference	0	0	3

Which is a very trifling superiority in favour of the former; and on account of the earliness of the season for the growth of the latter, they would in all probability soon exceed it, as they are well known to increase in size and weight to a considerable later period.

It may be stated, that this sort of crop has been found of vast use in the support of sheep and other sorts of live-stock, in the more late winter and early vernal months, where the common turnip is liable to become rotten; or run up to seed: as being much more easily preserved in a sound condition, from its greater power of resisting the effects of the season, even when taken up, as well as while in the ground. In some situations, in very severe seasons, it is however sometimes a little injured, when left in the ground through the winter. Mr. Close has however found, that by having the tops and tails removed when they first begin to shoot, and being

being ſtacked, they may be kept till the latter end of May, and later probably if neceſſary; but which can rarely be the caſe. In this manner an uſeful ſupply of cattle food is provided for that difficult and haraſſing period, when turnips or other ſimilar ſorts of food get ſcarce, exhauſted, or unfit for being employed, and when the graſs is not in a ſtate to be made uſe of by the ſtock. On theſe accounts it is of courſe of admirable advantage for the farmer to be well provided with crops of this kind, to the full extent of his live-ſtock, in bringing them through the difficult months of March, April, and the early part of May. Its application has been to almoſt all ſorts of domeſtic animals: with neat cattle, both in fattening, and as an ordinary article of food, it has long been in uſe, it is ſaid, with much greater effect than the common turnip. It is given after being cut or chopped into ſmall pieces: when given to milch cows, it is found to increaſe the milk conſiderably, and render it more rich, as well as to give it a finer colour; but we are afraid it in ſome meaſure affects the flavour, though ſome have denied its having this effect.

And ſheep ſucceed well upon it, gaining much more while upon it than on the common turnip, but it has been objected to in this application, from its hardneſs being ſuppoſed to injure their teeth, when the root is well grown: this is, we believe, from experience to be only imaginary.

Alſo, in the North Riding of Yorkſhire, in the ſtore-feeding of hogs, it has been found equal to potatoes. And as a food for labouring horſes, it is ſaid to be highly beneficial, as rendering a ſmaller proportion of oats requiſite, not being of ſo looſening a quality as moſt other roots. In this application, the roots, after being waſhed and having their tails cut off, are put as below, and cut or chopped into large pieces by ſome ſort of ſharp tool acting in a high ſort of tub or box for the purpoſe. In ſome of the northern diſtricts it is given both in its raw ſtate, or boiled and mixed with barley duſt or broken corn. But as the roots are liable to be greatly injured by expoſure after being cut, for this uſe as well as that of fattening cattle, not more than are neceſſary for the daily conſumption ſhould be prepared at a time.

It may be neceſſary as well as advantageous after this account of the culture and uſes of theſe turnips, to ſtate the facts reſpecting them, as they are found in thoſe diſtricts where they are become an article of almoſt general growth. In Hertfordſhire, according to the Agricultural Survey of that diſtrict, they have ſo rapidly made their way, as to be found in the uſual management of great numbers of the common farmers: no trivial proof, the writer ſays, of their obſervation, knowledge, and good ſenſe. He adds that Mr. Byde has this year (1804) 25 acres of them; a very regular plant, promiſing a great produce. He finds that ſheep will not touch the common turnip, if they can get at theſe; but they are apt to break their teeth, from the greater hardneſs and ſolidity of the root. He alſo finds that they do not taint the milk of cows, like the common turnip; and are an uſeful food for horſes. He ſows them from the 13th of May to the 20th of June. When ſown very early, as in May, they are ſo difficult to keep clean, that he prefers June. Mr. Byde reaps better crops of barley after them than after common turnips. And Mr. Greg, at Weſtmill, has 25 acres: he has cultivated this crop for ſome years, and generally on a large ſcale. He manures for them with yard-muck, or pulverized rape-cake, from ſix to twenty buſhels an acre, according to the ſoil, uſually with about twelve, and ſows the ſeed early in May. He ſtates them, from his experience, to be much better than the common turnips; as they never rot, let the weather be as ſevere as it may, nor are they ſtringy, when conſumed late in the ſpring. He informs him that the barley after them is not ſo good as after other turnips eat earlier, but much better than when thoſe turnips are conſumed as late as the Swediſh; that they do not coſt more in cultivation, yet are of double the value. The farmers ſow them very generally, ſo that few are to be found who ſow none. Mr. Wittington, at Broadwater, is a conſiderable cultivator of this plant. He prefers them to common turnips, and would ſubſtitute them for the greateſt part of that crop. He ſows ſoon after the firſt week in May: for the value in feeding, time of conſumption, duration, &c. he knows nothing equally valuable. The Rev. Mr. Keate, at Hatfield, is alſo conſiderably in this cultivation, and with much ſucceſs: he has had crops of them for five years. His crop this year amounts to five acres, which he viewed with great pleaſure—a fine regular plant, very luxuriant; equally ſet out, and quite clean. They were well manured with yard-dung, and the land ploughed four times. He ſows in the middle of June: they had been hoed at the expence of ſeven ſhillings *per* acre: part of the field had yielded a crop of winter tares. They have uſually come to a large ſize on Mr. Keate's farm. He has fed horſes with them, entirely to his ſatisfaction; and cuts the roots with a very ſimple, effective turnip-ſlicer: each horſe had a buſhel every day, with chaff, but no oats; they did their work very well, and became fat while they were eating this turnip. Cows alſo do well on it; nor does it give their milk or butter any taſte, but increaſes their milk conſiderably. They are excellent alſo for fattening ſheep. The culture is become very general through this county: ſo that there are few farmers in it who are without a field of this excellent plant. He likewiſe ſays that the marchioneſs of Saliſbury has many acres in great perfection, and finds them of incomparable uſe. But Mr. Stephenſon remarks, that their moſt important uſe is ſo late in the ſpring, that it is difficult to introduce them in a regular courſe, and ſow ſpring corn in time: he thinks them rather applicable to a few fields out of a regular rotation for ſowing ſome other crop than barley or oats after them; ſuch, for inſtance, as winter tares. He may add buck-wheat alſo. Cows do very well on Swediſh turnips without hay, and give much milk; and theſe roots laſt longer for ſheep in conſumption than an equal quantity of common turnips, but the ſheep do not thrive equally. Mr. Deerman, of Aſtwich, is a great friend to them; but obſerves, that they throw the land out of courſe: as they are moſt uſeful ſo late in the ſeaſon, that ſpring corn cannot be ſown after them, he thinks the beſt way is to ſow common turnips for the next crop, by which means alſo the land would be brought into remarkably high order. Mr. Marſh, his neighbour, makes the ſame obſervation, but has, however, always ſown ſpring corn after them.

On this ſubject it is further ſtated, that Mr. Clarke, of Sandridgbury, has cultivated them eight or nine years with great ſucceſs; having generally from 20 to 25 acres annually. He ſows the laſt week in May, and finds no difficulty with the ſucceeding crop, which is always barley, and as good as any, and often the beſt on his farm. He has eat them ſo late as the 6th of May. Mr. Cotton, at Hempſtead, cultivates, and has the higheſt opinion of them; and has only one objection to them, their ſlow growth, which retards their hoeing. His corn grown after them is good. Mr. Pickford, at Market-ſtreet, has 30 acres this year, a beautiful regular crop. He has from experience a great opinion of them, when applied to the fatting of oxen and ſheep, and to the feeding of hogs; in which laſt application he thinks them

them ſuperior to potatoes. He ſaw above 500 hogs on his farm. On finding theſe roots ſo profitable, he grew no more potatoes. But Mr. Chapman, of Hitchin, is of opinion that this root demands a richer and ſtronger ſoil than the chalks and loams about Hitchin; for they have been cultivated ſome years, dunged for, and twice hoed, but the ſucceſs has not been great. The farmers entertain a high opinion of them. And Mr. Hale, of King's Walden, has cultivated them four years; he ſows them the latter end of May broad-caſt; hoes them twice always, picks charlock by hand, and uſes all for ſheep and lambs: they have been very valuable indeed. In the ſpring of 1800, he could have ſold the crop, eight acres, at 10*l. per* acre. In the beginning of March, common turnips being over, 200 ſheep and 200 lambs, and 140 other ſheep, were kept on them near ſeven weeks. The ſame field was to have been ſown with barley, and ploughed twice, but being late, was ſown with Swediſh turnips again, and the crop, without manure, except two cart-loads of pigeons' dung, was in every reſpect as good as the other. This year the land was ploughed once, and ſown with white oats, and the crop was equal to full eight quarters *per* acre. Laſt year he had fifteen acres, and this year eleven, of this root. Mr. Roberts, the ſteward, who has a farm himſelf, has nine acres this year, and intends never to be without them; being perfectly convinced that they are a moſt uſeful crop. The writer has not ſeen many finer crops than Mr. Hale's, and all the parts of a full yellow colour. Lord Clarendon has five or ſix acres every year, and finds them of capital uſe. His lordſhip ſows in May, on land, upon which, in autumn, the dung was ploughed in, as he thinks it very eſſential for this crop; he ſtirs the land in April, and ploughs it in May for ſowing: he ſows three pounds *per* acre: they are hand-hoed twice: he firſt uſes them in the beginning of March: he did not eat them laſt year until the 24th of April, and had a large barley crop after them. They run very much to top, more than common turnips, and if his lordſhip had none, he would buy them for the ſpring at a much greater price than common. He feeds firſt with ewes and lambs, and then ſtore ſheep follow and eat clean. Good barley always grows after them. He has only gravels to ſow them on. Mr. Parker, at Munden, has alſo cultivated them four years: he has twenty acres this year, and had ſixteen laſt year; and as many the year before. The yellow-fleſhed turnip is much the beſt. He ſows in May, hand-hoes twice, and has always very good crops. He feeds them on the land with ſheep; and draws them for horſes, for which ſtock they are very uſeful: he uſes them alſo for beaſts of all ſorts; they are of prodigious utility in point of duration, and excellent, late in the ſpring, for ſtraw-fed beaſts. He grows as good ſpring corn after them as after common turnips; but manures for them rather higher than for other ſorts. They are beſt on loamy land; do well on good gravel; but, on very ſharp gravel, they ſhould not be ſown. His twenty-acred field this year, for ſuch an extent, is the fineſt crop that the writer ever ſaw, the earl of Winchelſea's at Burley alone excepted; yet this crop is from the ſecond ſowing in June. Mr. Calvert, at Albury, has had them four years; has now ſeven or eight acres: he ſows them at the end of May; and finds that there is not any thing ſo good for every animal for which he has tried them. He once gave a few to ſome fattening wethers that were at common turnips, and after eating them, they would not take again to the common turnips without much ſtarving. He has had Swediſh turnips and common turnips on each ſide of them in the ſame field, and ſheep turned into the field would not touch the common turnip, but ſeized on the Swediſh immediately. The yellow-fleſhed is much ſuperior to the white; and the rough-coated to the ſmooth ſkins. His preſent plan is, to aſſign two fields, well ſituated for the cattle and ſheep, and to have one every year under the Swediſh, and the other in common turnips, to follow each other, by which means no inconvenience will reſult from not getting the Swediſh off in time for barley. But Mr. Hill, of Whittle, thinks they injure the land by late keeping and running to ſeed. However, Mr. Foſter, of Royſton, has a high opinion of them; and obſerves that they are peculiarly valuable in a chalky diſtrict, where turnips *muſt* be fed very early, or the barley crop loſt; Swediſh then come in when moſt wanted.

It is noticed that the writer concludes on theſe ſtatements, that the plant, where the ſoil is not ſufficiently rich, may probably give way; but as to the more common objection of ſome, that barley cannot follow, not to ſpeak of the ſucceſs with which ſo many others ſow that grain, it may be obſerved, that the right ſyſtem, where the objection has really ſome foundation, is hinted at in the preceding notes: common turnips, winter tares, or buck-wheat, may properly ſucceed; and this double fallow can ſcarcely fail of anſwering in the uncommon degree of cleanneſs, which muſt be the conſequence. Another plan is, to draw ſuch as would remain too late, and ſtrew them on graſs for cattle or ſheep. The objection is, therefore, in any caſe eaſily remedied. And in the Agricultural Survey of Norfolk, it is ſtated that Mr. Walker, of Harpley, has cultivated them for ſome years with great ſucceſs, generally has from twenty to thirty acres annually; feeds them off with ſheep and bullocks, and can depend on them when common turnips are all rotten. This crop in 1800, notwithſtanding the drought, was very fine. And Mr. Coke, of Holkham, has thirty acres this year, has cultivated them for ſeveral years with the greateſt ſucceſs, and eſteems them as a very valuable acquiſition. Mr. Syble, of South Walſham, had laſt year a crop of theſe roots, which came to a good ſize, but they were ſo hard that no ſtock which he tried liked them. But Mr. H. Blythe, of Burnham, had a field of them of great uſe in the ſpring; this year he has ten acres.

It may be remarked, upon the whole, that as the objections to this root, on the ſcore of its being difficult to take up, and of its hurtful and inconvenient effects in remaining upon the land to ſo late a period, ſeem not well founded, or to be capable of being readily obviated, there can be no doubt but that it muſt be found of great advantage on moſt farms where much live-ſtock is kept, as a food to ſucceed that of the common turnip late in the ſpring, when ſcarcely any other ſorts are to be had in plenty for the feeding of live-ſtock.

In ſome other diſtricts they are alſo cultivated to conſiderable extent, and with much ſucceſs and advantage, as in thoſe of Oxfordſhire, Eſſex, &c.: their introduction is likewiſe attempting in many others, where their utility and value are beginning to be known. In the firſt of the above counties, Mr. Edwards, who cultivates them largely, has a great opinion of them as a reſource, when nothing elſe is to be had, particularly as a ſpring feed: though they loſe their leaves in the winter, what they produce in the ſpring is very great. As good barley is got after them, in his management, as after common turnips, but they are ſuppoſed to draw the ground rather more: it is not known what could be done without them. Mr. James Payne alſo grows them largely, and has the higheſt opinion of their utility. They are found by him to be the moſt profitable of all ways, when applied in the fattening of young pigs called porkers; which ſhould run about as uſual during the time of their becoming fat, only having as much of this kind of food as they

they can eat. Nine porkers fed in this way paid each ſixpence in the day, for ſix weeks together; which is a remarkable fact, and highly valuable for the cultivators of this root to be acquainted with. Others have had equally great ſucceſs in the ſame way of uſing this root. Mr. Salmon likewiſe cultivates this root with much ſucceſs, putting in the crops of it in the latter end of May, or early in the following month: uſes his own ſeed, which produces roots which are ſingle with yellow-coloured fleſh, and quite round in form: three hoeings are given in raiſing them. They are applied as food for calves, ſheep, cows, and pigs, being extremely uſeful in each of ſuch modes: the pigs, however, have only the hulls, after other cattle. They are made uſe of to the end of April, when ſpring wheat is ſown on the ſame land after them, and as good crops are procured as after any other ſort of crop. They are ſuppoſed to produce ſo much fertility, by the abundant ſtock which they keep, that barley, if ſown after them, would be all ſtraw.

In fact, the farmers of this diſtrict are ſtated to feel a thorough conviction of the importance which is attached to them, and to be well informed of the beſt modes of applying them in their conſumption. Their uſe in feeding ſheep is well underſtood, and great reliance is placed on them as a late feed in difficult ſpring ſeaſons. The improved practice of giving them ſliced in troughs to penned ſheep, is highly worthy of the farmer's attention; and their application in the fattening of oxen, from ſtores laid up and preſerved for that purpoſe, is of great importance, and highly deſerves to be imitated by different other diſtricts. And the diſcovery which has been made of the young pigs termed porkers being moſt profitably fattened upon them, is alone of very great conſideration: but it requires to be further and more fully aſcertained, by a ſet of experiments inſtituted expreſsly for the purpoſe; as, ſhould the ſame fact turn out to be well eſtabliſhed, not only in this caſe, but upon ſoils ſuperior in fertility to the red ſand lands in the north of this diſtrict, it would be a moſt valuable diſcovery indeed to the farming intereſts of the whole country.

The practical circumſtance of ſowing winter tares upon a rich and full manuring, eating them off upon the land, and then immediately putting in a crop of this ſort, is likewiſe ſuppoſed a method of cultivation which can ſcarcely be exceeded, on ſuch ſoils as are of a good quality. The fact of the barley crops after this root being found full as good as thoſe after common turnips, alſo deſerves to be attended to; as the cultivators who maintain it are perfectly aware, that roots, ſtanding in the ground late in the ſpring, muſt neceſſarily tend to draw the land more than if they were conſumed at an earlier period; but this circumſtance is found to be compenſated by the ſheep, or other ſtock, remaining ſo much longer upon the ground.

In caſes where this ſort of crop is removed from the field, there is no more objection on that account than in the caſe of common turnips; but it may be done with the very ſuperior advantage, that this root can be kept in any method with perfect ſafety, which is well known cannot be done with common turnips.

And in the latter of the above counties, the farmers find them equally valuable and uſeful in feeding and fattening different ſorts of live-ſtock. By ſome they are thought to be uncommonly uſeful, and to feed ſtock in a manner which ſhews their quality to be very rich in nouriſhment. But when kept late, ſpring tares, it is thought, ſhould be ſown after them, as barley is hazardous; and others find them much better for fattening ſheep and bullocks than common turnips. They are the grand ſtaple article for the latter purpoſe, in ſome inſtances; one buſhel of them being found worth three of common turnips, in ſuch an application. The beaſts and hogs, which have once taſted them, refuſe other turnips afterwards. Eight or nine quarters of barley are taken from the acre, in ſome caſes, after this root; but the manuring for it was large. The leaves of the crops have ſometimes been fed off in the autumn, which did not in the leaſt hurt them; and though the ſheep ate into ſome of the roots, the froſt had no other effect than to cover the wound with a thin ſkin of putreſcence, leaving the reſt of the root perfectly ſound. Half the crop has been drawn for horſes, which are found to be very fond of them; and they were aſcertained to be nearly as uſeful as carrots in this application. They are alſo excellent for feeding and rearing young calves. The beſt crops here ſeem to be raiſed by full manuring, eſpecially with long, freſh, unſtirred dung from the farm-yard.

This root is likewiſe beginning to be eſteemed, and a favourite with ſome farmers, in the county of Berks, where it is found to have ſeveral advantages over the common turnip, eſpecially thoſe of reſiſting the ſeereſt froſts, and of being as good and fit for uſe in the beginning of the new year, as the other kind is at the end of the old one, and thus forming a link in the ſucceſſion of feed for live-ſtock, and ſaving the expence of hay and other articles. From its ſweetneſs, ſuperior firmneſs, and more nutritious juicy quality, it is found more quick in its fattening properties; but from its more ſlow growth, it is ſuppoſed to exhauſt the land to a greater degree: yet, where there are rich, deep, loamy ſoils, it is undoubtedly entitled to a preference, on theſe and many other accounts.

In Devonſhire, in the practice of Mr. Exter, the relative produce between the tranſplanted root of this kind and the Norfolk green turnip, under preciſely the ſame circumſtances as to the nature and condition of the land, is ſtated by Mr. Vancouver as 628 to 851; giving a moſt decided preference to the former, after amply defraying the additional expence of tranſplanting.

RUTA MURARIA, in *Botany*, Wall Rue, a common little European Fern, ſo called from its general place of growth, and the reſemblance of its deep glaucous green fronds, to the leaves of Rue. See RUTA, and ASPLENIUM, ſpecies 21.

RUTACEÆ, ſo named from the genus *Ruta*, which is one of the tribe, is a natural order of plants, the 81ſt in the ſyſtem of Juſſieu, or the 21ſt of his 13th claſs. The characters of this important claſs are given under GERANIA. Of the order now before us, Juſſieu muſt be conſidered as the founder. We ſhall, therefore, exhibit his own view of it, though that view is very incomplete, and capable of being much improved and elucidated by recent diſcoveries.

Calyx of one leaf, often in five deep ſegments. *Petals* moſtly five, alternate with the ſegments of the calyx. *Stamens* definite, diſtinct, generally ten, alternately oppoſite to the petals and to the calyx. *Germen* ſimple; ſtyle ſolitary; ſtigma ſimple, or rarely divided. *Fruit* either of many cells, or many capſules, the cells or capſules moſtly five, each containing one or more *ſeeds*, inſerted into the inner angle. *Corculum* flat, in a fleſhy *albumen*. *Stem* either herbaceous or ſhrubby, rarely arboreous. *Leaves* in ſome alternate, naked; in others accompanied by *ſtipulas*, in which caſe they are moſt uſually oppoſite. *Flowers* either axillary or terminal.

Sect. 1. *Leaves with ſtipulas, and moſtly oppoſite.*

This ſection conſiſts of *Tribulus*, *Fagonia*, *Zygophyllum*, and *Guaiacum*, all Linnæan genera.

Sect. 2. *Leaves alternate, without ſtipulas.*

Ruta, *Peganum*, and *Dictamnus*.

Sect. 3. *Genera akin to the Rutaceæ.*

Melianthus, *Diosma*, *Empleurum* of Solander, and *Aruba* of Aublet.

The author obferves that the plants of the firft fection are moft akin to his *Gerania*, but differ from that order in having a fleffy *albumen* and a ftraight *corculum*. Their habit is more like *Caffia*, and its allies, among the leguminous family, which have likewife abruptly pinnated leaves, attended by ftipulas, as well as ten ftamens with one ftyle; but thefe *Rutaceæ* differ in having oppofite leaves, a fruit of many cells, and efpecially ftamens inferted into the receptacle, beneath the germen. He inquires whether *Quaffia*, *Thryallis*, *Trigonia*, &c. be akin to them? Alfo whether his two fections are with propriety combined together, and whether they ought not rather to conftitute different orders, diftinguifhed by the fruit? However this may be, he adds, the *Rutaceæ* are diftinguifhed, by the definite number of their ftamens, from both *Tiliaceæ* and *Cifti*, while the alternate fituation of thofe organs with refpect to the corolla, diftinguifhes this order from the *Berberides*.

The true idea of the order before us muft be taken from Juffieu's fecond fection, compofed of *Ruta*, *Peganum*, and *Dictamnus*, to which are, moft indubitably, to be added from his third, *Diofma* and *Empleurum*; but fcarcely the *Aruba* of Aublet, and certainly not *Melianthus*. The difcoveries in the fouthern hemifphere have made botanifts acquainted with many new genera of this tribe. (See PHEBALIUM, CORRÆA, CROWEA, ERIOSTEMON, and MELICOPE.) *Tetratheca*, however, is erroneoufly mentioned, under the laft article, as belonging to the fame family. We have always been inclined to refer OXALIS to it, (fee that article,) rather than to the *Gerania*, on account of the elaftic *arillus* of its feeds, fo analogous to what occurs in many *Rutaceæ*; at leaft *Oxalis* is a connecting link between the two orders.

The *Rutaceæ* are nearly all fhrubby; their *leaves* without *ftipulas*, coriaceous, or flightly fleffy, moftly fmooth, full of refinous dots ftrongly fcented, fometimes acid; ufually alternate and fimple; in fome inftances oppofite, whorled, or compound. *Flower-ftalks* moftly axillary, either fimple, aggregate, or forked. *Calyx* in four or five deep fegments. *Petals* four or five. *Stamens* almoft always twice as many as the petals; their filaments often peculiar in ftructure, with fome fort of appendages; the anthers not always terminal, fometimes fupported on a partial ftalk. *Style* fimple, connected with the inner angle of each cell of the germen, either at the fummit or bafe. *Capfule* of four or five cells, each lined with a membranous or horny, more or lefs elaftic, tunic, ferving to fcatter the *feeds*. Moft of the flowers are regular, *Dictamnus* being perhaps the only exception. It is an obfervation of our learned friend Mr. Correa, that every natural order feems to afford one genus, at leaft, with an irregular flower.

Our ZIERIA, Tr. of Linn. Soc. v. 4. 216, belongs to this order, and we truft will appear, in its proper place, hereafter. So likewife does BORONIA, which, having been accidentally omitted by the Rev. Mr. Wood, in vol. v. we fhall here defcribe.

BORONIA was fo named, by the writer of the prefent article, in memory of his faithful fervant and friend Francis Borone, born at Milan, April 6, 1769, who devoted himfelf to botany with an ardour, which his fingular turn for obfervation, and acutenefs of difcrimination, even with regard to the technical characters of plants, promifed to render eminently advantageous to the fcience. This ardour induced him to vifit Sierra Leone, as affiftant to Dr. Adam Afzelius, with whom he returned, rich in difcoveries and information, in the autumn of 1793. The next year he attended the late profeffor Sibthorp to Greece, and unfortunately died, by an accidental fall, at Athens, in October, 1794.—Sm. Tracts, 287. Poiret in Lamarck Dict. v. 8. 503. Ait. Hort. Kew. v. 2. 348.—Clafs and order, *Octandria Monogynia*. Nat. Ord. *Rutaceæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, in four deep, equal fegments, permanent. *Cor.* Petals four, equal, alternate with the calyx and much longer, feffile, withering. Nectary a glandular ring, furrounding the bafe of the germen. *Stam.* Filaments eight, fhorter than the corolla, inferted into the receptacle, alternately oppofite to the petals and calyx, flat, tapering, fringed, terminating variouffly, four of them a little the fhorteft; anthers of two cells, roundifh, incumbent, inferted on the infide below the fummit of each filament. *Pift.* Germen fuperior, ftanding on the nectary, conical, with four furrows: ftyle vertical, fhort; ftigma roundifh, fmooth, with four notches. *Peric.* Capfule of four diftinct lobes, foon feparating, compreffed, each of one cell, and two equal valves, lined with a bivalve elaftic tunic. *Seeds* one or two, oblong, compreffed, fmooth, polifhed.

Eff. Ch. Calyx in four deep fegments. Petals four. Anthers ftalked, below the fummit of the filaments. Style terminal, very fhort. Stigma capitate. Capfule of four compreffed lobes. Seeds with an elaftic tunic.

Sect. 1. *Leaves compound.*

1. B. *pinnata*. Hawthorn-fcented Boronia. Sm. Tr. 290. t. 4. Ait. n. 1. Andr. Repof. t. 58. Venten. Malmaif. t. 38. Poiret n. 4.—Leaves pinnate, entire, fmooth. Flower-ftalks axillary, forked. Filaments obtufe and glandular at the fummit.—Found in the neighbourhood of Port Jackfon, New South Wales. Firft raifed in England by Meffrs. Lee and Kennedy in 1794. It proves a favourite, but not common, green-houfe fhrub, flowering throughout the fpring, and much admired for the beauty as well as fcent of its flowers, which laft refembles hawthorn, approaching to *Heliotropium peruvianum*. The plant is fmooth, fhrubby, two or three feet high, with many roundifh, reddifh, leafy branches. *Leaves* oppofite, rarely three together, without *ftipulas*, of from three to five pair of feffile, lanceolate, pointed, entire *leaflets*; the terminal one rather fmaller than the reft; the common ftalk jointed, channelled, flightly winged, fmooth. *Panicles* axillary, forked, fmooth, with fquare ftalks, fwelling upward. *Bracteas* fmall, thick, oppofite, acute. *Calyx* reddifh. *Corolla* of a delicate pink. *Filaments* fringed with white woolly hairs to the very top, which terminates in a blunt glandular body, fometimes flightly hairy alfo, rifing above the *anther*, whofe ftalk is curved downwards, over the *ftigma*. *Germen* fmall, with a hairy *ftyle*. *Seeds* folitary, black, in a white, polifhed, rigid, elaftic tunic. The dried *petals* retain fomewhat of an acid tafte.

2. B. *alata*. Wing-ftalked Boronia. Sm. Tranf. of Linn. Soc. v. 8. 283.—Leaves pinnate, crenate; their common ftalk hairy. Flower-ftalks forked. Filaments obtufe. Anthers nearly terminal.—Gathered by Mr. Menzies, at King George's found, on the weft coaft of New Holland. Rather larger, and more handfome, than even the preceding. The *branches* are hairy, as well as the under fide of the common *footftalks*, efpecially at their joints. Thefe ftalks have alfo a more dilated wing, refembling *Fagara* in that refpect. *Leaflets*, moftly five pair, broad, elliptical, revolute, and crenate, with a hairy rib beneath. *Panicles* axillary, but all crowded about the tops of the branches, hairy, with fringed *bracteas*. *Flowers* larger than in *B. pinnata*; their dried petals with an opaque whiteneft

on the upper ſide, reddiſh-brown beneath. *Filaments* fringed all the way up, each terminating in a round knob, nearly on the top of which ſtands the capillary ſtalk bearing the *anther*.

3. B. *piloſa*. Hairy Boronia. Labill. Nov. Holl. v. 1. 97. t. 124. Poiret n. 1.—Leaves pinnate; leaflets linear-lanceolate, hairy, entire. Flowers ſolitary, axillary, and terminal, on ſtalks longer than the leaves.—Native of the cape of Van Diemen. *Labillardiere*. A ſmaller ſhrub than the two preceding, being only from nine to eighteen inches high. *Leaflets* from five to eleven, ſmall and narrow, each about half an inch long; their ſtalks jointed, not winged. *Flowers* erect, about half the ſize of *B. pinnata*, ſolitary, on ſimple ſtalks, bearing two pair of awl-ſhaped *bracteas*. *Filaments* fringed, each with a round hairy head, beneath which the capillary footſtalk of the *anther* is inſerted.

4. B. *tetrandra*. Tetrandrous Boronia. Labill. Nov. Holl. v. 1. 98. t. 125. Poiret n. 2.—Leaves pinnate; leaflets obtuſe, ſmooth. Flowers ſolitary, axillary, on ſhort recurved ſtalks. Four of the ſtamens awl-ſhaped, without anthers.—Gathered by the ſame botaniſt in Lewin's land, on the ſouth coaſt of New Holland. This ſhrub is a cubit high and hairy, except the *leaflets*, which are of a very narrow obovate figure, obtuſe and entire, about the ſize and number of the laſt. *Flowers* drooping, on ſhort axillary ſtalks. Four of the *filaments*, oppoſite to the petals, are ſomewhat club-ſhaped, and bear the *anthers* on ſtalks below the ſummit; the reſt, oppoſite to the *calyx*, are awl-ſhaped, rather longer, deſtitute of *anthers* or their ſtalks.

Sect. 2. *Leaves ſimple*.

5. B. *ſerrulata*. Roſe-ſcented Boronia. Sm. Tr. 292. t. 5.—Leaves rhomboid, acute; unequally ſerrated in the upper part. Flower-ſtalks aggregate, terminal. Filaments heart-ſhaped and hiſpid at the ſummit.—Gathered near Port Jackſon, New South Wales, by John White, M.D., to whom we are obliged for ſpecimens and coloured drawings. A very elegant, ſmooth, much branched *ſhrub*, four feet high, not yet introduced into our green-houſes, though few can be more worthy of cultivation. The *leaves* are oppoſite, numerous, rather crowded, hardly an inch long, ſomewhat oblique, entire, and tapering towards the baſe, ſharply ſerrated or toothed above; ſmooth on both ſides, minutely dotted, with ſcarcely any traces of ribs or veins; their colour often purpliſh; their flavour approaching to that of turpentine. *Flowers* of a beautiful red, many together, in terminal corymboſe cluſters; their ſize rather exceeding that of the firſt ſpecies, and their ſcent ſaid to reſemble the fragrance of a roſe. The *filaments* are red, fringed with pale hairs chiefly at the baſe, each terminating in a globular, emarginate knob, covered with white prominent hairs, and largeſt in the four longer ſtamens. The *anthers* ſtand, each on a deflexed ſtalk, below this knob. *Style* very ſhort. *Seeds* two in each elaſtic tunic.

6. B. *crenulata*. Small-leaved notched Boronia. Sm. Tranſ. of Linn. Soc. v. 8. 284.—Leaves obovate, with a ſmall point, finely crenate. Stalks ſingle-flowered, axillary, and terminal. Filaments obtuſe and glandular at the ſummit.—Gathered at King George's ſound, by Mr. Menzies, with the ſecond ſpecies. This appears at firſt like a ſlender delicate variety of the *ſerrulata*, the *leaves* being about one-third the ſize of that ſpecies; but they are obovate, minutely crenate, not ſharply toothed. The *flowers* eſſentially differ, being much ſmaller, axillary, as well as terminal, and all ſolitary, on bracteated angular *ſtalks*, ſhorter than the leaves. *Calyx* fringed. *Filaments* denſely fringed throughout, obtuſe, but not inverſely heart-ſhaped, at the top, neither are they briſtly, though glandular, there; below the ſummit they are tumid and inflexed; and the footſtalks of the *anthers* are nearly terminal.

7. B. *denticulata*. Narrow-leaved toothed Boronia. Sm. Tranſ. of Linn. Soc. v. 8. 284.—Leaves linear, toothed. Flower-ſtalks corymboſe. Filaments obtuſe and glandular at the ſummit.—Found by Mr. Menzies with the laſt. A branched, ſmooth, erect ſhrub, with longer, and much narrower, *leaves* than in any other known ſpecies of this genus, their margins regularly, and rather ſtrongly, but obtuſely, toothed; their baſe tapering down into a ſort of *footſtalk*. *Flowers* in axillary or terminal ſmooth *corymbs*, with ſmall deciduous *bracteas*. *Calyx* ſmooth. *Petals* of a pale roſe-colour, with a dark red rib, their ſize not much above half that of the *B. pinnata*. *Filaments* but ſlightly fringed, their ſummits obtuſe and glandular, but not hairy. *Anthers* on lateral horizontal ſtalks.

8. B. *parviflora*. Pale-flowered Boronia. Sm. Tr. 295. t. 6.—Leaves obovato-lanceolate, obſcurely crenate. Stalks aggregate, terminal, ſingle-flowered. Filaments oblong and glandular at the ſummit.—Gathered near Port Jackſon, by Dr. White, who ſent us ſpecimens and drawings in 1795. A ſmooth erect ſhrub, a foot or more in height, moſt branched and leafy at the top. *Leaves* obovate, or elliptic-lanceolate, oppoſite, as in all the preceding ſpecies of the preſent ſection, hardly an inch long, ſlightly crenate, chiefly towards the end, ſmooth dotted, veinleſs, a little aromatic. *Flower-ſtalks* ſmooth, ſimple, club-ſhaped, three together at the ſummit of each branch, with two axillary ones occaſionally from the adjoining pair of leaves. Sometimes one or two leafy branches are extended beyond the inflorescence. *Bracteas* two or four, ovate, concave, ſmooth, at the common baſe of the ſtalks. *Flowers* ſmall. *Calyx* purpliſh, half as long as the *petals*, which are ovate, pointed, pale bluſh-coloured, with a red mid-rib. *Filaments* pink, fringed with white hairs, and terminating in an oblong, obtuſe, ſmall, ſlightly glandular, but not hairy, appendage, below which the *anther* projects laterally, on a horizontal ſtalk.

9. B. *pilonema*. Single-flowered Boronia. Labill. Nov. Holl. v. 1. 98. t. 126. Poiret n. 3.—Leaves elliptic-oblong, entire. Stalks terminal, ſolitary, ſingle-flowered, without bracteas. Filaments ſmooth, their ſummit very ſhort.—Found by Labillardiere, at cape Van Diemen. The *root* is knotty at the ſummit, producing ſeveral upright, ſimple, round, rather ſhrubby, *ſtems*, about half a foot high. *Leaves* oppoſite or three together, dotted, not an inch long, entire, acute, without rib or veins. *Flower-ſtalks* erect, ſwelling upwards, longer than the leaves, naked. *Flowers* about the ſize of the laſt. *Calyx* ſmooth, nearly as long as the *petals*. *Filaments* awl-ſhaped, ſmooth, ſimple, their minute points hardly extended beyond the inſertion of the little ſtalk of the *anther*, which however is marginal, or lateral. The author ſuſpected this plant to be very nearly related to the laſt, from which nevertheleſs he rightly diſtinguiſhes it by the ſolitary *flowers*, unaccompanied by *bracteas*, and the ſmooth *ſtamens*, whoſe points ſcarcely project above the ſpot where the *anther* is inſerted, ſo that the latter ſtands above the *filament*, like a little hat, or cap; a circumſtance perhaps alluded to in the name. The habit of this ſpecies, particularly the *root*, ſeems moſt to reſemble the following.

10. B. *polygalifolia*. Milkwort-leaved Boronia. Sm. Tr. 297. t. 7.—Leaves linear-lanceolate, entire. Stalks axillary, ſolitary, ſingle-flowered, much ſhorter than the leaves. Filaments hairy, their ſummit ſhort and blunt.—Native of the neighbourhood of Port Jackſon. The *root* is woody and knotty like the laſt, throwing up many *ſtems*, which

which are ſimple and leafy, as in that ſpecies, and the ſame height, but appear to be herbaceous rather than ſhrubby. *Leaves* moſtly oppoſite, very rarely alternate, ſometimes three together, almoſt ſeſſile, an inch or more in length, acute at each end, entire, dotted, with one central rib; their under ſide paleſt. *Flower-ſtalks* erect, club-ſhaped, not a quarter the length of the leaves, angular, with a pair of ſmall *bracteas* about the middle. *Calyx* ſmall, green, ſmooth. *Petals* five times as long as the calyx, roſe-coloured, tipped with deeper crimſon. *Filaments* pale, fringed to the top, obtuſe, though ſcarcely extended beyond the point where the ſtalk of the drooping *anther* is laterally inſerted. *Style* about as long as the *germen*, firmly attached to its top, ſo as to ſplit into four parts with the ſeparating cells of the fruit. *Seeds* ſolitary. The various diſtribution of the *leaves* in this ſpecies is peculiar to it. The *ſtems* are very rarely branched.

RUTE, in *Geography*, a town of Spain, in the province of Cordova; 5 miles S. of Lucena.

RUTENI Provinciales, in *Ancient Geography*, a people of Gallia Narbonnenſis, according to Pliny. Cæſar (Bell. Gall. l. vii. c. 7.) mentions them. Theſe people inhabited the territory to the left of the Tarn.

RUTGERS, John, in *Biography*, an able critic and negociator, was born of an ancient family at Dordrecht, in 1589. He received a part of his early education under Gerard Voſſius, and in 1605 was ſent to Leyden, where he reſided with Dominic Baudius. Having completed his courſe, he travelled into France, and took the degree of licentiate in law at Orleans. While at Paris, he printed, at the office of Robert Stephens, an edition of Horace, with notes; which was afterwards reprinted by Burmann, at Leyden, in 1699. When he returned to Holland, he accepted the invitation of the Swediſh ambaſſador to accompany him to Sweden, where Guſtavus Adolphus, in 1614, conferred upon him the title of his counſellor. He was, after this, employed three times as envoy from that prince to Holland upon very important affairs, in which he acquitted himſelf with great credit, and quite to the ſatisfaction of his majeſty, who ennobled him in 1619. He viſited Bohemia, Denmark, and ſeveral German courts, in the ſame quality; and laſtly he reſided at the Hague, as miniſter from Guſtavus to that republic, where he died in 1625, at the age of 36. He had publiſhed in 1618 ſix books, entitled "Variæ Lectiones;" and after his death, Heinſius publiſhed his Latin poems in conjunction with his own.

RUTH, in *Biblical Hiſtory*, a ſacred book of ſcripture, admitted into the canon, and placed in our bibles between the book of Judges and thoſe of Samuel, as being the ſequel of the former and an introduction to the latter. St. Jerome informs us, that the Jews added it to the book of Judges, becauſe the tranſactions which it records happened in the time of the judges of Iſrael (Judges, ii. 1.); and ſeveral of the ancient fathers make but one book of the Judges and Ruth. But the modern Jews place in their bibles, after the Pentateuch, the five megilloth, *viz.* the Song of Songs, Ruth, the Lamentations of Jeremiah, Eccleſiaſtes, and Eſther. Ruth is ſometimes placed the firſt of the five, ſometimes the ſecond, and ſometimes the fifth.

The ſcope of the author of this book is to relate the genealogy of David; and hence it has been conjectured, that the firſt book of Samuel was compoſed by the ſame author; in which book he could not conveniently place the genealogy of David, and he therefore choſe to give it by itſelf. The writer obſerves, at the beginning of his work, that the hiſtory he propoſed to relate happened when the judges governed Iſrael; and, therefore, they ceaſed to govern it when he wrote. He alſo ſpeaks of David at the end of his book; which ſhews, that the earlieſt period that can be aſſigned to it muſt be the time of David. Beſides, there are two modes of expreſſion in it, which occur only in the books of Samuel and of the Kings. The firſt is, "The Lord do ſo to me, and more alſo," Ruth, i. 17. Compare 1 Sam. iii. 17. xiv. 44. xx. 23. 2 Sam. iii. 9. 35. xiv. 13. 1 Kings, ii. 23. xix. 2. xx. 10. 2 Kings, vi. 31. The ſecond phraſe is, "I have diſcovered to your ear," for "I have told you," Ruth, iv. 4. Compare 1 Sam. xx. 2. 2 Sam. vii. 27. The canonicalneſs of this book was never diſputed. Ruth the Moabiteſs occurs in the genealogy of our Saviour, Matt. i. 5.

Ruth had married the ſon of Elimelech and Naomi, who had ſettled for ſome time in Moab; but being deſirous of returning to Bethlehem, her own country, after having loſt her huſband and two ſons, was accompanied by her daughter-in-law Ruth. This event happened, according to Uſher, about 120 years after the time of Joſhua. When Naomi came to Bethlehem, Ruth went to the fields in order to glean for their ſupport; and by chance entering the field of a rich citizen of Bethlehem, named Boaz, who was related to Elimelech, her father-in-law, received from him civilities, which indicated his affection for her. In proceſs of time, Ruth became the wife of Boaz, by whom ſhe had a ſon called Obed, who was father to Jeſſe, and grandfather to king David. Such is an outline of the hiſtory contained in the book of Ruth.

RUTHE, in *Commerce*, a long meaſure at Amſterdam, which is equal to 13 feet, or 143 inches, the Amſterdam foot being = $11\frac{1}{7}$ inches; the Rhineland foot of 12 inches being = $12\frac{1}{3}$ Engliſh inches. At Berlin the ruthe is = 12 Rhineland feet = $148\frac{2}{3}$ Engliſh inches. At Hamburgh the ruthe or perch is of two ſorts: one is 7 ells, or 14 feet; the other 8 ells, or 16 feet, Hamburgh meaſure. The Rhineland ruthe (12 Rhineland feet) is $13\frac{1}{7}$ Hamburgh feet, or $12\frac{1}{10}$ Engliſh feet. A Hamburgh mile contains 2000 Rhineland ruthes, or 8244 Engliſh yards: hence $14\frac{2}{5}$ ſuch miles anſwer nearly to a degree of the meridian, and 16 Hamburgh miles to 75 Engliſh miles. A ſcheffel of corn-land contains 200 ſquare ruthes, each 256 Hamburgh ſquare feet, which gives 166 Engliſh ſquare perches, or 1 acre 6 perches. A morgen or acre of land contains 600 ſquare ruthes, each ruthe being 196 Hamburgh ſquare feet, which equal 2 acres $6\frac{1}{3}$ perches, Engliſh meaſure. See Measure. Kelly's Un. Camb.

RUTHERFORD, in *Geography*, a county of Morgan diſtrict, in North Carolina, bounded N. by Burke, and S. by the ſtate of South Carolina. It contains 13,202 inhabitants.

Rutherford, the capital of the above county, which has a court-houſe, gaol, and a few houſes.

RUTHERFORTH, Thomas, in *Biography*, was born at Papſworth-Everhard, in Cambridgeſhire, in 1712. Having paſſed through the elementary parts of his education, he was entered at St. John's college, in the univerſity of Cambridge, where he took his degrees in the arts, and obtained a fellowſhip in the college. He was afterwards appointed regius profeſſor of divinity in the univerſity, and created D.D. Being attached to, and well verſed in, mathematics and natural philoſophy, he was elected a fellow of the Royal Society, and was afterwards appointed a chaplain to his royal highneſs the prince of Wales. In the church he was rector of Barley in Hertfordſhire, and of Shenfield in Eſſex, and an archdeacon. He died in October, 1771, having nearly completed his 59th year. He was author of a thin

on the upper ſide, reddiſh-brown beneath. *Filaments* fringed all the way up, each terminating in a round knob, nearly on the top of which ſtands the capillary ſtalk bearing the *anther*.

3. B. *piloſa*. Hairy Boronia. Labill. Nov. Holl. v. 1. 97. t. 124. Poiret n. 1.—Leaves pinnate; leaflets linear-lanceolate, hairy, entire. Flowers ſolitary, axillary, and terminal, on ſtalks longer than the leaves.—Native of the cape of Van Diemen. *Labillardiere*. A ſmaller ſhrub than the two preceding, being only from nine to eighteen inches high. *Leaflets* from five to eleven, ſmall and narrow, each about half an inch long; their ſtalks jointed, not winged. *Flowers* erect, about half the ſize of *B. pinnata*, ſolitary, on ſimple ſtalks, bearing two pair of awl-ſhaped *bracteas*. *Filaments* fringed, each with a round hairy head, beneath which the capillary footſtalk of the *anther* is inſerted.

4. B. *tetrandra*. Tetrandrous Boronia. Labill. Nov. Holl. v. 1. 98. t. 125. Poiret n. 2.—Leaves pinnate; leaflets obtuſe, ſmooth. Flowers ſolitary, axillary, on ſhort recurved ſtalks. Four of the ſtamens awl-ſhaped, without anthers.—Gathered by the ſame botaniſt in Lewin's land, on the ſouth coaſt of New Holland. This ſhrub is a cubit high and hairy, except the *leaflets*, which are of a very narrow obovate figure, obtuſe and entire, about the ſize and number of the laſt. *Flowers* drooping, on ſhort axillary ſtalks. Four of the *filaments*, oppoſite to the petals, are ſomewhat club-ſhaped, and bear the *anthers* on ſtalks below the ſummit; the reſt, oppoſite to the *calyx*, are awl-ſhaped, rather longer, deſtitute of *anthers* or their ſtalks.

Sect. 2. *Leaves ſimple*.

5. B. *ſerrulata*. Roſe-ſcented Boronia. Sm. Tr. 292. t. 5.—Leaves rhomboid, acute; unequally ſerrated in the upper part. Flower-ſtalks aggregate, terminal. Filaments heart-ſhaped and hiſpid at the ſummit.—Gathered near Port Jackſon, New South Wales, by John White, M.D., to whom we are obliged for ſpecimens and coloured drawings. A very elegant, ſmooth, much branched *ſhrub*, four feet high, not yet introduced into our green-houſes, though few can be more worthy of cultivation. The *leaves* are oppoſite, numerous, rather crowded, hardly an inch long, ſomewhat oblique, entire, and tapering towards the baſe, ſharply ſerrated or toothed above; ſmooth on both ſides, minutely dotted, with ſcarcely any traces of ribs or veins; their colour often purpliſh; their flavour approaching to that of turpentine. *Flowers* of a beautiful red, many together, in terminal corymboſe cluſters; their ſize rather exceeding that of the firſt ſpecies, and their ſcent ſaid to reſemble the fragrance of a roſe. The *filaments* are red, fringed with pale hairs chiefly at the baſe, each terminating in a globular, emarginate knob, covered with white prominent hairs, and largeſt in the four longer ſtamens. The *anthers* ſtand, each on a deflexed ſtalk, below this knob. *Style* very ſhort. *Seeds* two in each elaſtic tunic.

6. B. *crenulata*. Small-leaved notched Boronia. Sm. Tranſ. of Linn. Soc. v. 8. 284.—Leaves obovate, with a ſmall point, finely crenate. Stalks ſingle-flowered, axillary, and terminal. Filaments obtuſe and glandular at the ſummit.—Gathered at King George's ſound, by Mr. Menzies, with the ſecond ſpecies. This appears at firſt like a ſlender delicate variety of the *ſerrulata*, the *leaves* being about one-third the ſize of that ſpecies; but they are obovate, minutely crenate, not ſharply toothed. The *flowers* eſſentially differ, being much ſmaller, axillary, as well as terminal, and all ſolitary, on bracteated angular *ſtalks*, ſhorter than the leaves. *Calyx* fringed. *Filaments* denſely fringed throughout, obtuſe, but not inverſely heart-ſhaped, at the top, neither are they briſtly, though glandular, there; below the ſummit they are tumid and inflexed; and the footſtalks of the *anthers* are nearly terminal.

7. B. *denticulata*. Narrow-leaved toothed Boronia. Sm. Tranſ. of Linn. Soc. v. 8. 284.—Leaves linear, toothed. Flower-ſtalks corymboſe. Filaments obtuſe and glandular at the ſummit.—Found by Mr. Menzies with the laſt. A branched, ſmooth, erect ſhrub, with longer, and much narrower, *leaves* than in any other known ſpecies of this genus, their margins regularly, and rather ſtrongly, but obtuſely, toothed; their baſe tapering down into a ſort of *footſtalk*. *Flowers* in axillary or terminal ſmooth *corymbs*, with ſmall deciduous *bracteas*. *Calyx* ſmooth. *Petals* of a pale roſe-colour, with a dark red rib, their ſize not much above half that of the *B. pinnata*. *Filaments* but ſlightly fringed, their ſummits obtuſe and glandular, but not hairy. *Anthers* on lateral horizontal ſtalks.

8. B. *parviflora*. Pale-flowered Boronia. Sm. Tr. 295. t. 6.—Leaves obovato-lanceolate, obſcurely crenate. Stalks aggregate, terminal, ſingle-flowered. Filaments oblong and glandular at the ſummit.—Gathered near Port Jackſon, by Dr. White, who ſent us ſpecimens and drawings in 1795. A ſmooth erect ſhrub, a foot or more in height, moſt branched and leafy at the top. *Leaves* obovate, or elliptic-lanceolate, oppoſite, as in all the preceding ſpecies of the preſent ſection, hardly an inch long, ſlightly crenate, chiefly towards the end, ſmooth dotted, veinleſs, a little aromatic. *Flower-ſtalks* ſmooth, ſimple, club-ſhaped, three together at the ſummit of each branch, with two axillary ones occaſionally from the adjoining pair of leaves. Sometimes one or two leafy branches are extended beyond the inflorescence. *Bracteas* two or four, ovate, concave, ſmooth, at the common baſe of the ſtalks. *Flowers* ſmall. *Calyx* purpliſh, half as long as the *petals*, which are ovate, pointed, pale bluſh-coloured, with a red mid-rib. *Filaments* pink, fringed with white hairs, and terminating in an oblong, obtuſe, ſmall, ſlightly glandular, but not hairy, appendage, below which the *anther* projects laterally, on a horizontal ſtalk.

9. B. *pilonema*. Single-flowered Boronia. Labill. Nov. Holl. v. 1. 98. t. 126. Poiret n. 3.—Leaves elliptic-oblong, entire. Stalks terminal, ſolitary, ſingle-flowered, without bracteas. Filaments ſmooth, their ſummit very ſhort.—Found by Labillardiere, at cape Van Diemen. The *root* is knotty at the ſummit, producing ſeveral upright, ſimple, round, rather ſhrubby, *ſtems*, about half a foot high. *Leaves* oppoſite or three together, dotted, not an inch long, entire, acute, without rib or veins. *Flower-ſtalks* erect, ſwelling upwards, longer than the leaves, naked. *Flowers* about the ſize of the laſt. *Calyx* ſmooth, nearly as long as the *petals*. *Filaments* awl-ſhaped, ſmooth, ſimple, their minute points hardly extended beyond the inſertion of the little ſtalk of the *anther*, which however is marginal, or lateral. The author ſuſpected this plant to be very nearly related to the laſt, from which nevertheleſs he rightly diſtinguiſhes it by the ſolitary *flowers*, unaccompanied by *bracteas*, and the ſmooth *ſtamens*, whoſe points ſcarcely project above the ſpot where the *anther* is inſerted, ſo that the latter ſtands above the *filament*, like a little hat, or cap; a circumſtance perhaps alluded to in the name. The habit of this ſpecies, particularly the *root*, ſeems moſt to reſemble the following.

10. B. *polygalifolia*. Milkwort-leaved Boronia. Sm. Tr. 297. t. 7.—Leaves linear-lanceolate, entire. Stalks axillary, ſolitary, ſingle-flowered, much ſhorter than the leaves. Filaments hairy, their ſummit ſhort and blunt.—Native of the neighbourhood of Port Jackſon. The *root* is woody and knotty like the laſt, throwing up many *ſtems*, which

which are ſimple and leafy, as in that ſpecies, and the ſame height, but appear to be herbaceous rather than ſhrubby. *Leaves* moſtly oppoſite, very rarely alternate, ſometimes three together, almoſt ſeſſile, an inch or more in length, acute at each end, entire, dotted, with one central rib; their under ſide paleſt. *Flower-ſtalks* erect, club-ſhaped, not a quarter the length of the leaves, angular, with a pair of ſmall *bracteas* about the middle. *Calyx* ſmall, green, ſmooth. *Petals* five times as long as the calyx, roſe-coloured, tipped with deeper crimſon. *Filaments* pale, fringed to the top, obtuſe, though ſcarcely extended beyond the point where the ſtalk of the drooping *anther* is laterally inſerted. *Style* about as long as the *germen*, firmly attached to its top, ſo as to ſplit into four parts with the ſeparating cells of the fruit. *Seeds* ſolitary. The various diſtribution of the *leaves* in this ſpecies is peculiar to it. The *ſtems* are very rarely branched.

RUTE, in *Geography*, a town of Spain, in the province of Cordova; 5 miles S. of Lucena.

RUTENI PROVINCIALES, in *Ancient Geography*, a people of Gallia Narbonnenſis, according to Pliny. Cæſar (Bell. Gall. l. vii. c. 7.) mentions them. Theſe people inhabited the territory to the left of the Tarn.

RUTGERS, JOHN, in *Biography*, an able critic and negociator, was born of an ancient family at Dordrecht, in 1589. He received a part of his early education under Gerard Voſſius, and in 1605 was ſent to Leyden, where he reſided with Dominic Baudius. Having completed his courſe, he travelled into France, and took the degree of licentiate in law at Orleans. While at Paris, he printed, at the office of Robert Stephens, an edition of Horace, with notes; which was afterwards reprinted by Burmann, at Leyden, in 1699. When he returned to Holland, he accepted the invitation of the Swediſh ambaſſador to accompany him to Sweden, where Guſtavus Adolphus, in 1614, conferred upon him the title of his counſellor. He was, after this, employed three times as envoy from that prince to Holland upon very important affairs, in which he acquitted himſelf with great credit, and quite to the ſatisfaction of his majeſty, who ennobled him in 1619. He viſited Bohemia, Denmark, and ſeveral German courts, in the ſame quality; and laſtly he reſided at the Hague, as miniſter from Guſtavus to that republic, where he died in 1625, at the age of 36. He had publiſhed in 1618 ſix books, entitled "Variæ Lectiones;" and after his death, Heinſius publiſhed his Latin poems in conjunction with his own.

RUTH, in *Biblical Hiſtory*, a ſacred book of ſcripture, admitted into the canon, and placed in our bibles between the book of Judges and thoſe of Samuel, as being the ſequel of the former and an introduction to the latter. St. Jerome informs us, that the Jews added it to the book of Judges, becauſe the tranſactions which it records happened in the time of the judges of Iſrael (Judges, ii. 1.); and ſeveral of the ancient fathers make but one book of the Judges and Ruth. But the modern Jews place in their bibles, after the Pentateuch, the five megilloth, *viz.* the Song of Songs, Ruth, the Lamentations of Jeremiah, Eccleſiaſtes, and Eſther. Ruth is ſometimes placed the firſt of the five, ſometimes the ſecond, and ſometimes the fifth.

The ſcope of the author of this book is to relate the genealogy of David; and hence it has been conjectured, that the firſt book of Samuel was compoſed by the ſame author; in which book he could not conveniently place the genealogy of David, and he therefore choſe to give it by itſelf. The writer obſerves, at the beginning of his work, that the hiſtory he propoſed to relate happened when the judges governed Iſrael; and, therefore, they ceaſed to govern it when he wrote. He alſo ſpeaks of David at the end of his book; which ſhews, that the earlieſt period that can be aſſigned to it muſt be the time of David. Beſides, there are two modes of expreſſion in it, which occur only in the books of Samuel and of the Kings. The firſt is, "The Lord do ſo to me, and more alſo," Ruth, i. 17. Compare 1 Sam. iii. 17. xiv. 44. xx. 23. 2 Sam. iii. 9. 35. xiv. 13. 1 Kings, ii. 23. xix. 2. xx. 10. 2 Kings, vi. 31. The ſecond phraſe is, "I have diſcovered to your ear," for "I have told you," Ruth, iv. 4. Compare 1 Sam. xx. 2. 2 Sam. vii. 27. The canonicalneſs of this book was never diſputed. Ruth the Moabiteſs occurs in the genealogy of our Saviour, Matt. i. 5.

Ruth had married the ſon of Elimelech and Naomi, who had ſettled for ſome time in Moab; but being deſirous of returning to Bethlehem, her own country, after having loſt her huſband and two ſons, was accompanied by her daughter-in-law Ruth. This event happened, according to Uſher, about 120 years after the time of Joſhua. When Naomi came to Bethlehem, Ruth went to the fields in order to glean for their ſupport; and by chance entering the field of a rich citizen of Bethlehem, named Boaz, who was related to Elimelech, her father-in-law, received from him civilities, which indicated his affection for her. In proceſs of time, Ruth became the wife of Boaz, by whom ſhe had a ſon called Obed, who was father to Jeſſe, and grandfather to king David. Such is an outline of the hiſtory contained in the book of Ruth.

RUTHE, in *Commerce*, a long meaſure at Amſterdam, which is equal to 13 feet, or 143 inches, the Amſterdam foot being = $11\frac{1}{7}$ inches; the Rhineland foot of 12 inches being = $12\frac{1}{3}$ Engliſh inches. At Berlin the ruthe is = 12 Rhineland feet = $148\frac{2}{7}$ Engliſh inches. At Hamburgh the ruthe or perch is of two ſorts: one is 7 ells, or 14 feet; the other 8 ells, or 16 feet, Hamburgh meaſure. The Rhineland ruthe (12 Rhineland feet) is $13\frac{1}{7}$ Hamburgh feet, or $12\frac{1}{10}$ Engliſh feet. A Hamburgh mile contains 2000 Rhineland ruthes, or 8244 Engliſh yards: hence $14\frac{2}{7}$ ſuch miles anſwer nearly to a degree of the meridian, and 16 Hamburgh miles to 75 Engliſh miles. A ſcheffel of corn-land contains 200 ſquare ruthes, each 256 Hamburgh ſquare feet, which gives 166 Engliſh ſquare perches, or 1 acre 6 perches. A morgen or acre of land contains 600 ſquare ruthes, each ruthe being 196 Hamburgh ſquare feet, which equal 2 acres $6\frac{1}{7}$ perches, Engliſh meaſure. See MEASURE. Kelly's Un. Camb.

RUTHERFORD, in *Geography*, a county of Morgan diſtrict, in North Carolina, bounded N. by Burke, and S. by the ſtate of South Carolina. It contains 13,202 inhabitants.

RUTHERFORD, the capital of the above county, which has a court-houſe, gaol, and a few houſes.

RUTHERFORTH, THOMAS, in *Biography*, was born at Papſworth-Everhard, in Cambridgeſhire, in 1712. Having paſſed through the elementary parts of his education, he was entered at St. John's college, in the univerſity of Cambridge, where he took his degrees in the arts, and obtained a fellowſhip in the college. He was afterwards appointed regius profeſſor of divinity in the univerſity, and created D.D. Being attached to, and well verſed in, mathematics and natural philoſophy, he was elected a fellow of the Royal Society, and was afterwards appointed a chaplain to his royal highneſs the prince of Wales. In the church he was rector of Barley in Hertfordſhire, and of Shenfield in Eſſex, and an archdeacon. He died in October, 1771, having nearly completed his 59th year. He was author of a thin

a thin quarto in Latin, entitled "Ordo Inſtitutionum Phyſicarum in privatis Lectionibus," of which the ſecond edition was publiſhed at Cambridge in 1756; alſo of "A Syſtem of Natural Philoſophy," in 2 vols. 4to., which for many years was held in high eſtimation; "Inſtitutes of Natural and Political Law," being the ſubſtance of a courſe of lectures on Grotius, read in St. John's college in Cambridge, in 2 vols. 8vo. 1756; "A Letter to Dr. Middleton, in defence of Biſhop Sherlock's Diſcourſe on Prophecy," and divers other theological works. Dr. Rutherforth communicated to a philoſophical ſociety at Spalding, a curious correction of Plutarch's deſcription of the inſtrument uſed to renew the veſtal fire, as relating to the triangle with which the inſtrument was formed.

RUTHERGLEN, or Ruglen, in *Geography*, a royal borough and market-town in the lower ward of the county of Lanark, Scotland, is ſituated on the ſouth bank of the river Clyde, at the diſtance of 2½ miles S.E. from Glaſgow, and 9 miles W. from Hamilton. It is a town of high antiquity, and was conſtituted a royal borough by king David I., whoſe charter was ſubſequently confirmed by his ſucceſſors, king Robert Bruce, James V., and James VI. At that period the river Clyde was much deeper in the lower part of its courſe than at preſent, and Rutherglen was not only a conſiderable ſea-port, but was in fact the firſt mercantile town in the valley of Clyde. When the city of Glaſgow, now the emporium of Scottiſh commerce and manufactures, conſiſted but of a few private houſes attached to the cathedral, this town was comparatively a buſy ſpot, whoſe inhabitants devoted themſelves to civil and commercial employments. Glaſgow, indeed, appears even to have been within the bounds, over which the corporation of Rutherglen claimed juriſdiction; for a charter is yet extant, bearing date in 1226, whereby a grant is made to the biſhop of Glaſgow, and his ſucceſſors, that no toll nor cuſtom ſhall be levied in that city by the inhabitants of Rutherglen. All the mercantile importance of this place, however, is now loſt, and it is alſo reduced in extent and population. It ſtill retains, nevertheleſs, all the privileges of a royal burgh, and is governed by a provoſt, two baillies, a dean of guild, and fifteen counſellors, who are elected annually at Michaelmas. The principal branch of trade carried on here is the weaving of muſlins for the Glaſgow manufacturers. The market-day is Wedneſday, weekly; and there are, beſides, ſix annual fairs, famous for the ſale of horſes. Since the union, this burgh has joined with Glaſgow, Renfrew, and Dumbarton, in ſending a repreſentative to the Britiſh ſenate.

The town of Rutherglen conſiſts chiefly of one principal ſtreet, and a lane, called the Back-Row, both lying parallel in a direction nearly eaſt and weſt. The main ſtreet, which is very ſtraight and well paved, extends about half a mile in length, and is about 100 feet in breadth. From both ſides of it, ſeveral lanes go off; and at the diſtance of about 150 yards to the ſouthward is another lane, known by the name of Din's-Dykes, which is characterized with an indelible mark of opprobrium from the following circumſtance. The unfortunate Mary, queen of Scots, having viewed the battle of Langſide from an eminence near this town, no ſooner ſaw her army defeated than ſhe fled to the ſouth. Din's-Dykes unfortunately lay in her way. Two ruſtics, who were at that inſtant cutting graſs cloſe by, ſeeing her majeſty flying in haſte, rudely attempted to ſtop her, and threatened to cut her to pieces with their ſcythes if ſhe preſumed to proceed a ſtep further. Neither beauty, nor even royalty itſelf, can at all times ſecure the unfortunate, when they are aſſailed by the unfeeling or revengeful. Relief, however, was luckily at hand, and her majeſty was reſcued from her barbarian oppoſers.

The church of this town, which is the only public edifice worthy of notice, is very ancient, and is in a ſtyle of architecture ſuperior to moſt churches in Scotland. But what renders it particularly intereſting is the circumſtance of its having been the ſcene of two tranſactions, in which the fate of ſir William Wallace, and of the kingdom of Scotland, were deeply concerned. It was within the walls of this church that peace was concluded between England and Scotland in the year 1297, and it was here alſo that ſir John Monteith contracted with the Engliſh to betray the greateſt of Scottiſh heroes.

Rutherglen, in ancient times, was a place of ſtrength, and had a caſtle attached to it, which was conſidered to be one of the moſt important Scottiſh fortreſſes. In the diſpute between Bruce and Baliol for the poſſeſſion of the throne, it fell, with many others, into the hands of the Engliſh. It was beſieged by Robert Bruce in 1309; but he appears to have been compelled to abandon the enterpriſe by the approach of an Engliſh army. In 1313, however, it was taken by Edward Bruce, the king's brother; and ſeems ever after to have belonged to the Scotch. This caſtle was kept in good repair till a ſhort time after the battle of Langſide, when it was burnt by the orders of the regent, Murray, out of revenge againſt the Hamilton family, in whoſe cuſtody it then was. One of the principal towers was, however, afterwards repaired, and having been enlarged by ſome modern improvements, became the ſeat of the Hamiltons of Elliſton, lairds of Shawfield. At length, on the decline of that family, it was for about a century wholly neglected, and, by frequent dilapidations, was ſoon levelled with the ground. Its ſcite is now converted into a kitchen-garden; but many of its ſculptured ſtones may be ſeen built into the walls adjoining the town.

In Rutherglen the cuſtom of riding the marches of the borough is ſtill obſerved. On the day appropriated to this purpoſe, the magiſtrates and council aſſemble at the croſs, whence they proceed, in martial order, with drums beating, &c. round the boundaries of the royalty, to ſee if any encroachment has been made. Theſe boundaries are diſtinguiſhed by march-ſtones ſet up at ſmall diſtances from each other, which are ſhaped at the top in the form of a man's head; but the lower part is ſquare. This peculiar form was originally deſigned to repreſent the god Terminus, of whom they are ſo many rude images. Every new burgeſs is bound to provide a march-ſtone at his own expence, and to cut upon it the initials of his name, and the year in which it is ſet up. It has been a cuſtom, time out of memory, for the riders of the marches to deck their hats and drums with broom, and to combat with one another at the newly-erected ſtone, out of reſpect perhaps to the deity whoſe image they had ſet up, or that they might the more firmly impreſs on their minds the preciſe boundary of that place. This ceremony has of late been deferred till the company return to the croſs, when the broom engagement commences with great fury, and laſts as long as the weapons will endure. Rutherglen is likewiſe famous for the ſingular cuſtom of baking, what are called, ſour cakes, previous to St. Luke's fair. The operators are women only, and they ſeldom begin till after ſunſet, and a night or two before the fair. A large ſpace of the houſe is marked out by a line drawn upon it. The area is conſidered as ſacred, and if paſſed by any of the bye-ſtanders, he or ſhe incurs the penalty of a fine, which is expended in drink for the uſe of the company. This hallowed ſpot is occupied by ſix or eight women, all of whom, except the toaſter,

ſeat

feet themſelves on the ground in a circular form, having their feet turned towards the fire. Each of them is provided with a baking-board about two feet ſquare, which they hold on their knees. The perſon who toaſts the cake, which is done on an iron-plate, ſuſpended over the fire, is called the queen or bride, and the others her maidens. She neareſt the fire on the eaſt is named the todler, and her companion on the left-hand the hodler. The remainder have arbitrary names given them by the bride. The buſineſs is commenced by the todler, who takes a ball of the dough, forms it into a ſmall cake, and then caſts it on the bake-board of the hodler, who beats it out a little thinner, and then throws it on the board of her next neighbour, and thus it goes round from eaſt to weſt till it comes to the toaſter, by which time it is as thin and ſmooth as a ſheet of paper. The firſt cake caſt on the girdle is uſually named as a gift to ſome well-known cuckold, from a ſuperſtitious notion that thereby the reſt will eſcape that miſchance. As the whole operation is performed by the hand, conſiderable noiſe is made; but as the bakers generally beat time to ſome air ſung by one or more of the company, it is far from being diſagreeable. Great dexterity is requiſite in the performance of this cuſtom, particularly in throwing the cakes from one board to another, without ruffling or breaking them; and as the toaſting requires great ſkill, the moſt experienced perſon is always choſen for that part of the work. One cake is ſent round in quick ſucceſſion after another, ſo that none of the individuals engaged are ſuffered to be idle. The whole is a ſcene of activity, mirth, and diverſion. There being no account, even by tradition, of the origin of this cuſtom, it is preſumed to be very ancient, and probably took its riſe in the days of paganiſm, as it is fraught with ſeveral of the ſacred rites peculiar to heathen worſhip; ſuch as the leavened dough, the mixing with ſugar and ſpices, the conſecrated ground, &c.; but the particular deity for whoſe honour theſe cakes were firſt made, is a point of difficult ſolution. According to the population cenſus of 1811, the borough and pariſh of Rutherglen contain 756 houſes, and 3529 inhabitants. The Hiſtory of Glaſgow and its Suburbs, by James Denholm, 1 vol. 12mo. Glaſgow, 1798. Beauties of Scotland, vol. iii. 8vo. Lond. 1806.

RUTHIN. See Rhuthyn.

RUTHSBOROUGH, a village in queen Anne's county, Maryland, on Tuckahoe creek; 6 miles S.E. of Centerville.

RUTHWELL, a market-town and pariſh in the county of Dumfries, Scotland, is ſituated on the northern bank of the Solway frith. The town, which ſtands on the high road from Port-Patrick to Carliſle, was formerly a long ſtraggling place, but has of late years been much improved, and almoſt entirely rebuilt, chiefly at the expence of the earl of Mansfield, who is proprietor of the greater part of the pariſh. It is a burgh of barony, and has the privileges of a weekly market, and ſeveral annual fairs. The pariſh extends about ſix miles along the ſhore of the Solway frith, and is nearly three miles in breadth. In virtue of an ancient charter from one of the kings of Scotland, all the inhabitants were entitled to manufacture ſalt duty free; conſequently a large quantity of that article was formerly made here; and the trade is ſtill followed by many perſons, though the exemption from duty has been diſcontinued ſince the union. About forty years ago a ſingular road was diſcovered leading through a deep moraſs. It was formed of ſtrong oak planks, eight feet in length, faſtened down by ſtakes driven through the boards into the earth. At the time it was thrown open, it lay ſix feet beneath the ſurface of the earth.

The church of Ruthwell, one of the oldeſt eccleſiaſtical buildings in Scotland, was formerly remarkable for an ancient obeliſk which ſtood within its walls, and fragments of which are ſtill viſible in the church-yard. This monument was demoliſhed by order of the General Aſſembly in 1644, under pretence of its being an object of ſuperſtition among the vulgar. When entire, according to Pennant, it meaſured about twenty feet high, excluſive of pedeſtal and capital, and was of a ſquare form, but the ſides were of unequal breadth. Two of theſe were ornamented with foliage and figures of animals, and had Runic inſcriptions round the margin. On one of the broader ſides was a very rude figure of our Saviour, and beneath were two other figures, one bearded, and the other not, deſigned to repreſent ſome of the apoſtles. The oppoſite ſide alſo diſplayed a figure of the Saviour, with Mary Magdalen waſhing his feet. Theſe ſculptures, ſays the author abovementioned, were probably "the work of different times and nations; the firſt, that of Chriſtian Saxons, the other of the Danes, who either found thoſe ſides plain, or, defacing the ancient carving, replaced it with ſome of their own." In the cemetery is a monument to the memory of Mr. Gawin Young, the Scottiſh vicar of Bray, who was ordained miniſter of this pariſh in 1617, and maintained his poſt for fifty-four years, notwithſtanding the many changes from Preſbyterianiſm to Epiſcopacy, and from Epiſcopacy to Preſbyterianiſm, which occurred during that revolutionary period. The inſcription has, among others, theſe words:

> "Far from our own; amidſt our own we ly;
> Of our dear bairns thirty and one us by."

Within this pariſh ſtands Comlorgan caſtle, an ancient manſion, belonging to the earl of Mansfield. It is ſurrounded by extenſive parks and plantations, and commands a fine view of the Solway frith, and of the adjacent country. There are likewiſe ſome remains of an ancient caſtle at Cockpool.

According to the population cenſus of 1811, Ruthwell pariſh contained 231 houſes, and 1184 inhabitants. Pennant's Tour in Scotland, vol. i. 4to. Lond. 1776. Carliſle's Topographical Dictionary of Scotland, 4to. 1813.

RUTICILLA, in *Ornithology*, a ſpecies of *Muſcicapa*; which ſee.

Ruticilla, the *Red-Start*; which ſee. See alſo Motacilla *Phœnicurus*.

RUTIDEA, in *Botany*, a genus ſo named by Decandolle, from ῥυτίς, ῥυτίδος, *a wrinkle*, alluding to the ruggedneſs of its ſeeds. Annales du Muſée d'Hiſt. Nat. v. 9. 219. *De Theis*.

RUTIGLIANO, in *Geography*, a town of Naples, in the province of Bari; 8 miles S.W. of Monopoli.

RUTILE, in *Mineralogy*, *Titane Rutile* of Brongniart, an oxyd of titanium: it is of a dark blue-red colour, inclining to brown, with a degree of metallic ſplendour: the longitudinal fracture is foliated; the croſs fracture conchoidal and unequal. It is opaque or ſlightly tranſlucent, and ſometimes ſufficiently hard to ſcratch quartz. The ſpecific gravity is from 4.18 to 4.24. Rutile is infuſible by the blowpipe, but with the addition of borax it melts into a yellow glaſs. It is found cryſtallized: the primitive form of the cryſtals is a right-angled priſm. Sometimes two cryſtals are united by their extremities, forming a kind of twin-cryſtal. It alſo occurs in extremely minute capillary cryſtals,

cryſtals, which are either divergent or reticulated, but ſometimes ſingle, and are imbedded in quartz and rock-cryſtal. From the analyſis of Klaproth, it appears to be a pure oxyd of titanium. This mineral is found near Limoges in France, in Hungary, at St. Gothard in Switzerland, on the Carpathian mountains, near Burgos in Spain, in Siberia, on the ſummit of Sierra de Avilla, in New Granada in South America, and in South Carolina in North America.

RUTILITE, called by Klaproth *Sphen*. Its colour is a brown, inclining to red, yellow, grey, or black. It is found both cryſtallized and amorphous. The cryſtals are ſmall, oblique, four-ſided priſms, which are acutely bevelled at both extremities, but are ſometimes terminated by tetrahedral pyramids. The longitudinal fracture is radiated or foliated, the croſs fracture flatly conchoidal, paſſing into even. The luſtre is gliſtening, or faintly glimmering; it is more or leſs tranſlucent on the edges. Rutilite ſcratches glaſs, is very brittle, and nearly infuſible by the blowpipe, without the addition of borax or an alkali. The ſpecific gravity is from 3.1 to 3.5. According to Klaproth it conſiſts of

Oxyd of titanium - -	35
Silex - - - -	35
Lime - - - -	33

It is found at Paſſau, in the diſtrict of the Inn, in a rock compoſed of felſpar, hornblende, and quartz. It alſo occurs in ſeveral Norwegian mines.

RUTILIUS, Numatianus, in *Biography*, a Latin poet, probably a native of Touloufe, and advanced to high employments at the Roman court, was a military tribune, and about the year 414 A. D. was prefect of Rome. The empire at this time, as we have ſeen in the article Rome, was over-run by the Viſigoths, under the furious Alaric and his ſucceſſors; and Rutilius, for the purpoſe of ſuccouring his diſtreſſed native country, took a journey from Rome to Gaul, of which he wrote a deſcription in elegiac verſe. It conſiſted of two books, of which the latter is loſt. The work gives a favourable impreſſion of the writer, who was a Pagan, though it has been greatly cenſured by Catholic authors, on account of the following remarks which it contains on the monks of the iſland of Capraria. "The whole iſland," ſays Rutilius, "is filled, or rather defiled, by men who fly from the light. They call themſelves monks, or ſolitaries, becauſe they chooſe to live without any witneſſes of their actions. They fear the gifts of fortune, from the apprehenſion of loſing them; and leſt they ſhould be miſerable, they embrace a life of voluntary wretchedneſs. How abſurd is their choice; how perverſe their underſtanding, to dread the evils, without being able to ſupport the bleſſings, of the human condition. Either this melancholy madneſs is the effect of diſeaſe, or elſe the conſciouſneſs of guilt urges theſe unhappy men to exerciſe on their bodies the tortures which are inflicted on fugitive ſlaves by the hand of juſtice." For theſe and ſome other remarks on the Jewiſh ſabbath as a commemoration "Laſſati Dei," Rutilius and his adherents are ſtyled, by his commentator, Barthius, *rabioſi canes diaboli;* but Tillemont remarks, that the unbelieving poet praiſes where he means to cenſure. The verſe of Rutilius is ſaid to be more elegant than the common ſtandard of the age; and though the ſubject does not admit of poetry, he diſplays much taſte and ingenuity. The "Itinerarium" was diſcovered in 1494 at a monaſtery, and has been ſeveral times printed. The beſt editions are thoſe of 1582, and 1687. It is inſerted in Burmann's "Poetæ Minores," and in Mattaire's "Corpus Poetarum."

RUTILUS, Roach, in *Ichthyology*, a ſpecies of *Cyprinus;* which ſee.

Rutilus *Latior*, a name given by many authors to the fiſh called in Engliſh *rud*, or *finſcale*, and *rubellus*. See Cyprinus *Erythrophthalmus*.

RUTINIUM, in *Ancient Geography*, a town of the iſland of Albion, upon the route from the Portus Rutupæ, between Mediolanum and Urioconium in the Itinerary of Antonine. Camden, Gale, and Baxter agree in opinion, that Rutinium was ſituated at Rowton caſtle; but Mr. Horſley is poſitive, that it was really at Wem, on the banks of the river Roden.

RUTKIN, in *Geography*, a town of Bohemia, in the circle of Konigingratz; 8 miles E. of Gitſchin.

RUTLAM, a town of Hindooſtan, in the Malwa country; 48 miles W. of Ougein. N. lat. 23° 23′. E. long. 74° 58′.

RUTLAND, *Firſt Duke of*, in *Biography*. The words of the opera of Tamerlane, written by Nicola Haym, and ſet by Handel in 1724 for the Royal Academy of Muſic, were dedicated to the duke of Rutland, not only as one of the directors of the Royal Academy of Muſic, and a liberal patron of ſcience, but as a nobleman who, by ſtudy and application, had rendered himſelf a moſt intelligent judge both of the theory and practice of the art of muſic. And it is well known that the firſt duke of Rutland was an excellent performer on the violin; that his grace brought Carbonelli hither from Italy, when he returned from his tour through that country; and that the ſolos which this muſician dedicated to him, were compoſed expreſsly for his uſe.

Rutland, in *Geography*, one of the Andaman iſlands, in the Eaſt Indian ſea. N. lat. 11° 24′. E. long. 92° 27′.

Rutland, a county of Vermont, bounded N. by Addiſon county, E. by Windſor, S. by Bennington, and W. by New York. This county is watered by Otter creek and other ſtreams. It abounds with lakes or ponds ſtored with fiſh; the principal are lakes Bombazan and St. Auſtin, the former in Hubbarton and Caſtleton, and the latter in Wells. It contains 25 townſhips, and 29,486 inhabitants. In this county are 14 forges, 3 furnaces, and a ſlitting-mill.—Alſo, a poſt-town of Vermont, the capital of the above county, ſituated on Otter creek; 55 miles from its mouth in lake Champlain, 45 miles W. by N. from Windſor. It contains a congregational church, a court-houſe, and 2379 inhabitants. The mean heat of this place is 43°.6, the leaſt 21°, and the greateſt 92°. Durable crucibles are wrought of the pipe-clay found here. N. lat. 43° 34′ 30″. W. long. 72° 50′ 10″.—Alſo, a townſhip of Worceſter county, Maſſachuſetts; 14 miles N.W. of Worceſter; incorporated in 1722, and containing 1231 inhabitants. It is ſituated on the height of land between Connecticut river and Merrimack. The proſpects from the centre of the town are extenſive and delightful. It is a curious circumſtance, that the water which drops from the eaſtern roof of a barn in this town runs to the Merrimack, and that which falls from the weſtern ſide runs to the Connecticut. In this town are two conſiderable ponds, which furniſh ſtreams in different directions, ſome of which are large enough for mills.

Rutland, a poſt-town of Ireland, in the county of Donegal, built in one of the cluſter of iſlands called North iſles of Arran, in the diſtrict of the Roſſes. The late colonel Burton Conyngham procured a grant from parliament to eſtabliſh a ſettlement here, as a ſituation peculiarly adapted to the herring fiſhery. This town, ſo called from the duke of Rutland, who was viceroy at the time, has very fine ſtores and accommodations for drying and ſalting the fiſh, but,

but, like most undertakings which owe their origin to parliamentary grants, it has proved unsuccessful, and remains a monument of the folly of expecting to force trade by such means. The sum expended was 20,000*l.* by parliament, and as much more raised by mortgage on the estate of colonel Conyngham; a man who, however he might be mistaken in his calculations of advantage, was too honourable and patriotic to be suspected of an intention to mislead. Rutland is 153 miles N.W. from Dublin. N. lat. 54° 56′. W. long. 8° 18′. Journals of the House of Commons.

RUTLANDSHIRE, one of the central counties of England, is bounded on the north, north-west, west, and south-west, by Leicestershire; on the south and south-east by Northamptonshire; and on the east and north-east by the county of Lincoln. It is the smallest shire in the kingdom, extending only about 18 miles in length and 15 in breadth; its circumference being 60 miles, which gives an area of 200 square miles, or 128,000 acres. According to the parliamentary returns of 1811, it contains 3417 houses and 16,380 inhabitants.

The *history* of this county, in remote times, is so intimately connected with that of the surrounding counties, that they can scarcely be separated. Previous to the arrival of the Romans it formed part of the territories of the Coritani; and after the latter were forced to submit to the imperial authority, it was included in the province of Flavia-Cæsariensis. During the Saxon heptarchy it formed part of the kingdom of Mercia, under eighteen successive monarchs; and when the Saxon kingdoms became united into one, it seems to have belonged to the crown; as we find that Edward the Confessor bequeathed it to his queen Edith, and after her demise to Westminster Abbey. His will, which is still extant, says, "I will, that after the decease of queen Eadgith my consort, Rotelond, with all its appurtenances, be given to my monastery of St. Peter, and be surrendered, without delay, to the abbot and monks there serving God, for ever." So anxious, indeed, was the king to secure this obituary grant to the abbey, that he endeavoured to render more certain the observance of his will by a kind of anterior deed of gift, bearing date in the 25th year of his reign. This grant, however, was but of short duration, for when William the Conqueror ascended the throne, he resumed possession of Rutlandshire as crown land, and merely allowing the monastery to receive the tithes, divided it among some of his nearest relatives, and his most powerful adherents. These first Norman grantees were Robert Malet, great chamberlain of England; Gilbert de Gaunt; earl Hugh; Aubrey, the clerk, and several others. Some manors were likewise granted to the conqueror's niece Judith, afterwards countess of Huntingdon; and to Maud, countess of Albemarle, his half sister. Considerable possessions, however, were reserved to the crown; and in the reign of Edward II. it possessed the hundreds of Martinsley, Alsto, and East hundred, all of which that monarch granted to the lady Margaret, wife of Piers de Gaveston, duke of Cornwall, to be held by her during the royal pleasure. The hundred of Wrangdyke was then the property of Guy de Beauchamp, earl of Warwick, but his son Thomas being a minor at his father's death, Edward gave that estate to Hugh Spencer the elder, on the pretence of its being in satisfaction of a debt due to him of 6770*l.* During those transactions, the present hundred of Oakham-Soke is never mentioned: it is therefore conjectured to have formed part of Martinsley hundred.

The aspect of the country in Rutlandshire is, generally speaking, very beautiful, being much diversified by gently rising hills, running east and west, with vallies about half a mile in breadth intervening, so that every three or four miles presents a new view to the eye of the traveller. The principal vale is that of Catmose, in the centre of the county, which Camden describes as "a pleasant and fertile valley, perhaps from Coet Maes, which signifies in British, a woody plain." On the north side of this vale the ground rises, and level with its summit a flat tract extends for several miles to the northward, forming a kind of table land, looking down upon the fertile and well-wooded plains of Leicester, Nottingham, and Lincoln-shires. The southern district consists, in a great measure, of one widely expanded vale, mostly open land, which stretches into Northamptonshire; and on the western borders, the remains of the old forest of Liefield are well wooded, and sink in the distance into the Leicestershire plains.

The climate of this county is generally reckoned good and healthy, but has no peculiarity demanding notice. The soil is various, but is, upon the whole, fertile. The most prevalent kind is a strong reddish loam, intermixed with keal, lying upon an under-stratum of blue clay; but almost every farm has a mixture of poor clay, hazel earth, white stony land, black clay and gravelly clay. This great variation of soils within a small space causes each sort to be much more valuable than it would be, were one kind prevalent throughout an entire lordship.

The modes of agriculture adopted here differ, as may be supposed, in some degree on the different soils, and also on the inclosed and uninclosed lands. Upon the uninclosed arable lands, except upon some of the light soils, the old course of two crops and a fallow is yet practised. On the light soil, a turnip crop is substituted for the fallow, and barley is sown instead of wheat for the ensuing crop. The second crops on both soils are peas, or peas and beans. A few farmers in the eastern district sow barley and broad clover after fallow, mowing the clover for a second year's crop, and feeding it off with sheep when it is considered as proper for a course of wheat. The farmers have an idea that winter ploughing is hurtful to the land, and consequently they lay their manure on the fallows, where it remains till the spring.

The inclosed lands consist mostly of the light soils, on limestone bases; and of the heavy red loam. These are principally under the Norfolk husbandry of four years' rotation, and without feeding off, except in the turnip crops; but another mode is likewise practised, of taking two crops of spring corn after breaking up the clover, then turnips, next barley with rye-grass and clover, after which there are three or four years' sheep-feeding, when it is broken up again for spring corn. The first of these methods is beneficial for raising a large crop of wheat, and the second is equally advantageous for sheep stock, and hence each has its warm advocates among the farmers.

Tenures in this county are various; freehold, leasehold, and copyhold, but freehold is most general. A few farmers hold their lands by leases of seven or twenty-one years' duration; but by far the greater proportion of land is held at will from year to year. Rents, in 1806, averaged about 1*l.* 1*s.* *per* acre, but they are now much increased. Above three-fourths of the parishes are exonerated from tythes, either by modus, or being made free. Farms differ much in size, running from 15 to 640 acres, but the large farms are few in number.

Respecting the mineralogy of Rutlandshire there is nothing worthy of notice, except that there is at Ketton "a kind of stone very proper and famous for buildings;" and in several places lime-stone, consisting of a hard and soft species,

ſpecies, and containing a great number of marine ſubſtances. The exiſtence of chalybeate ſprings in different parts of the county, however, ſeems to prove the preſence of ironſtone, but that mineral has not yet been diſcovered, at leaſt in any quantity.

The only rivers of note, connected with the county, are the Guaſh and the Welland. The former, which is popularly called the Waſh, interſects the county nearly in the centre, croſſing it from eaſt to weſt. It takes its riſe in Leiceſterſhire, and is conſidered to be an excellent fiſhing river. The Welland alſo has its ſource in Leiceſterſhire, and forms the boundary for many miles between this county and Northamptonſhire. The other Rutlandſhire ſtreams are the Chater, which croſſes the county to the ſouthward of the Guaſh, and the Little Eye, or Lytelee, which bounds it on the ſouth-weſt. Rutlandſhire does not boaſt of a ſingle lake; but it has the more important advantage of a canal, denominated the Oakham canal. This branch of a more extended line begins in the vicinity of Melton Mowbray, in Leiceſterſhire, enters Rutlandſhire near Teigh, and paſſes by Market Overton, Barrow, Cotſmore, and Burley, until it approaches Oakham on the north ſide in the level of the vale of Catmoſe.

The roads in this county are tolerably good, but are not generally formed on a good plan, being raiſed too high before the materials are laid upon them, and the ſtones being much too large. No manufactures of any import are carried on here, owing to the deficiency of water and the ſcarcity of fuel. Rutlandſhire may, therefore, be conſidered as entirely an agricultural county; and it is worthy of remark, that notwithſtanding the improvements in huſbandry, population has not increaſed during the laſt thirty years; while in manufacturing counties it has almoſt doubled itſelf within the ſame period.

Politically ſpeaking, Rutlandſhire is divided into five hundreds, *viz.* Wrangdyke, Alſto, Oakham, Eaſt, and Martinſley, which contain fifty-three pariſhes and two market towns, Oakham and Uppingham. There are no boroughs in the county, ſo that it is repreſented in parliament only by two knights of the ſhire. In judicial affairs it is in the Midland circuit, and in eccleſiaſtical juriſdiction is ſubject to the biſhop of Peterborough. Rutland was an earldom at a very early period, and the honour was uſually a branch of the royal family. It is now a dukedom in the family of Manners. This county is altogether devoid of objects of antiquarian curioſity. Beauties of England and Wales, vol. xvii. by Mr. Laird, 8vo. 1814. General View of the Agriculture of the County of Rutland, by Richard Parkinſon, London, 8vo. 1808. A portion of a hiſtory of this county has been recently publiſhed by Thomas Blore, folio. This ſpecimen is ſo well executed, that every lover of topographical hiſtory, as well as the inhabitants of the county in general, muſt regret that the whole work is not completed in the ſame ſtyle and manner.

RUTLEDGE, the ſhire-town of Grainger county, in the ſtate of Teneſſee, ſituated in Richland valley: it contains a few dwelling-houſes, and is merely a handſome flouriſhing village.

RUTLINGEN. See Reutlingen.

RUTNAGHERI, a hill-fort of Hindooſtan, in Myſore, taken in the year 1799 by the Britiſh; three miles W.S.W. of Oudeadurgam.

RUTSHA, a town of Imiretta; 38 miles N.E. of Cotatis.

RUTTAGURRA, a town of Hindooſtan, in Malwa; 30 miles E.N.E. of Bilſah.

RUTTANGUR, a town of Hindooſtan, in Baglana; 25 miles N.W. of Junere.

RUTTEE, a weight uſed in the Eaſt Indies, one hundred of which make eighty-eight caracts. See Caract.

RUTTENSTEIN, in *Geography*, a town of Auſtria; 9 miles N.N.W. of Grein.

RUTTUNGUNGE, a town of Bengal, 47 miles S.S.E. of Nattore. N. lat. 23° 53′. E. long. 89° 43′.—Alſo, a town of Bengal; 10 miles S. of Boglipour.

RUTTUNPOUR, a circar of Hindooſtan, bounded on the N. by Surgooja and Juſhpour, on the E. by Gangpour, on the S. by a country unknown to Europeans, and on the E. by Goondwanah. Its chief towns are Ruttunpour, Raypour, and Dumdah. It is traverſed towards the ſouth by the river Mahanada.—Alſo, the capital of the fore-mentioned circar, in the country of Oriſſa; 326 miles W. of Calcutta, lying in the road from Bahar to Nagpour. N. lat. 22° 16′. E. long. 82° 36′.—Alſo, a town of Hindooſtan, in Bahar; 12 miles N.W. of Durbungah.

RUTUBA, in *Ancient Geography*, a river of Italy, in Liguria, according to Pliny, lib. iii. c. 5.

RUTULI, a people of Italy, in Latium, who inhabited the country near the ſea-coaſt. Their origin is uncertain; but it ſeems, according to Virgil, that at the arrival of Æneas, Turnus was their king. This prince, in his attempt to oppoſe the eſtabliſhment of the Trojans, was killed in the combat. The Rutuli, in proceſs of time, were often confounded with the Latins. Their capital was called Ardea.

RUTULUS, in *Roman Antiquity*, the barrier of the cavea, or place where the wild beaſts uſed in amphitheatrical ſports were ſhut up. It was made of iron bars, which turned upon hinges, and all at once flew open with great ſwiftneſs.

RUTUNIUM, in *Ancient Britiſh Geography*. See Rutinium.

RUTUPIÆ Portus, in *Ancient Geography*. See Richborough.

RUTY-PUNDOC, in *Natural Hiſtory*, a name given by the people of the Eaſt Indies to a peculiar ſpecies of yellow orpiment, which they find on the tops of the mountains there; and, after ſeveral calcinations, give internally in coughs and colds. The ancient Greeks uſed this orpiment in the ſame manner. We have of late run into an opinion of its being a fatal poiſon; but Dr. Boerhaave, in his Chemiſtry, affirms, on his own trials, that it is innocent and harmleſs. Theſe people, who have not the uſe of chemiſtry, give us a hint of the virtues of great numbers of our own foſſils, which are common alſo to their country. The ſelenitæ, fibroſe tails, ſpars, and many other foſſils, which we wholly neglect, are in common uſe with them, and great cures are often performed by them.

RUTZDORF, in *Geography*, a town of Brandenburg, in the New Mark; eight miles N. of Cuſtrin.

RUTZEN, a town of Sileſia, in the principality of Wolau; 18 miles N. of Wolau. N. lat. 51° 37′. E. long. 16° 32′.

RUUN, Runo, or *Runeholm*, an iſland of the Baltic, belonging, in an extenſive ſenſe, to the province of Oeſel, and lying in the middle of the gulf of Riga, at the diſtance of 95 verſts from the town of that name, and rather more than 51 verſts from Oeſel. It is diſtinguiſhable far off at ſea by a foreſt of birch trees, which occupies one of its ſides. It is entirely the property of the crown, and is inhabited by Swediſh boors. Here is a church, to which belongs a preacher, whoſe congregation is ſmall, but income very decent, conſiſting of the tythe of all the products of the iſland, together with a portion of land. In this iſland is a light-

a light-houſe, for the ſupply of which the boors are obliged to buy the fuel on the continent, the crown allowing them towards it 40 dollars. There is no farm on the iſland except that of the paſtorate. Among the inhabitants, it is ſaid, there are ſome remains of the old Livonians, who ſpeak the Runic language, alſo the Eſthnic, the Lettiſh, the Swediſh, and moſt commonly the German and Ruſs, each with facility, from their frequent intercourſe with others. In the labours of the chace, and the capture of the ſea-dog, they are indefatigable, by which they gain an opulent ſubſiſtence. They live in great harmony, and only intermarry among their own ſociety. Tooke's Ruſſia, vol. ii.

RUVO, a town of Naples, in the province of Bari, the ſee of a biſhop; 5 miles S. of Trani. N. lat. 41° 12′. E. long. 16° 28′.—Alſo, a town of Naples, in Baſilicata; 18 miles S.W. of Venoſa.

RUY, a town of France, in the department of the Iſere; 20 miles E. of Vienne.

RUYSCH, Frederic, in *Biography*, a celebrated anatomiſt and phyſician, was born at the Hague, in the month of March 1638. His father was commiſſary of the States-general, and deſcended from a family of conſiderable wealth and importance at Amſterdam, where they had occupied places of public truſt for two centuries, until the Spaniſh war, which began in 1576, occaſioned a great revolution in their fortunes. The celebrity of the name, however, is built upon the talents and perſonal merits of Frederic. He commenced his academical ſtudies at Leyden, after being grounded in grammatical learning in his native city, and applied himſelf with great aſſiduity to the ſtudy of anatomy, botany, and chemiſtry, eſpecially to the practical inveſtigation of theſe ſciences, having conceived an early bias to the profeſſion of medicine. His zeal and curioſity were ſo much excited by the new objects which opened before him, that he allowed nothing to interfere with his labours, and at length the habit of experimental reſearch rendered the moſt laborious inquiries a mere agreeable recreation. He repaired alſo to Franeker, for the farther purſuit of his ſtudies; but received the degree of doctor at Leyden, in 1664. Even during his pupillage at Leyden, he was applied to by Sylvius and Van Horne, to aſſiſt them in combatting the vanity of Bilſius, who came thither to exhibit his boaſted method of preſerving dead bodies.

After his graduation, young Ruyſch returned to the Hague, where he married, and ſettled ſo heartily to the practice of his profeſſion, as even to neglect every purſuit which had not ſome relation to it. In the following year, 1665, he publiſhed his treatiſe on the lacteal and lymphatic veſſels, which contained the reſult of his inquiries while engaged in the diſpute with Bilſius. In this work he does not deny that the exiſtence of valves in the lymphatic had been noticed before, but he claims the honour of having firſt demonſtrated them, and taught the method of diſcovering them. This ingenious tract immediately procured him reputation; and he was invited, the year after, to the chair of anatomy at Amſterdam; an invitation which he gladly accepted, on account of the great opportunities which it was likely to afford for the proſecution of his favourite reſearches. Anatomy, in fact, both human and comparative, henceforth conſtituted the principal object of his life: he ſpared neither time, labour, nor expence, for the attainment of his purpoſes; he was almoſt continually employed in diſſection, and not only examined with the moſt minute exactneſs every organ of the human body, but deviſed means by which to facilitate the detection and demonſtration of the different parts, and to preſerve and exhibit them thus demonſtrated. If he were not the diſcoverer of the uſe of injections, for the diſplay of vaſcular and other ſtructure, he contributed, together with the ſuggeſtions of De Graaf and Swammerdam, by his own ingenuity and induſtry, to introduce that important practice among anatomiſts. His collection of injected bodies is deſcribed, indeed, as marvellous; the fineſt tiſſue of capillary veſſels being filled with the coloured fluids, ſo as to repreſent the freſhneſs of youth, and to imitate ſleep rather than death. In this way he had preſerved fœtuſes in regular gradation, as well as young and adult ſubjects, and innumerable animals of all ſorts and countries. His muſeum, indeed, both in the extent, variety, and arrangement of its contents, became ultimately the moſt magnificent that any private individual had ever accumulated, and was the reſort of viſitors of every deſcription; generals, ambaſſadors, princes, and even kings, were happy in the opportunity of examining it. The czar Peter, in his journey through Holland in 1698, frequently dined at the frugal table of Ruyſch, in order to ſpend whole days in his cabinet; and in 1717, on his return to Holland, the czar purchaſed it of him for 30,000 florins, and ſent it to Peterſburg. The indefatigable anatomiſt immediately commenced the labour of ſupplying its place by a new collection.

When we conſider the advantages which Ruyſch poſſeſſed, his ingenuity in deviſing the means of minute inveſtigation, and the *improbus labor* by which he manufactured two collections of anatomical preparations, and inveſtigated ſuch a multitude of ſubjects, it will be expected that he muſt have been the author of ſome diſcoveries. He claims, indeed, and probably made many; which, however, were not all unknown to other anatomiſts: for his fault was a neglect of reading, which rendered him often ignorant of the diſcoveries of others; and therefore he ſometimes gave, as new, what other writers had deſcribed. Among other parts which he inveſtigated minutely, were the pulmonary circulation, (in which he claims the diſcovery of the bronchial artery,) the ſtructure of the ear, of the brain, of the lymphatic and glandular ſyſtem.

Ruyſch was appointed profeſſor of phyſic in 1685, a poſt which he filled with honour and reputation until the year 1728, when he unhappily broke his thigh by a fall in his chamber. He was alſo nominated ſuperintendant of the midwives at Amſterdam, in the exerciſe of which office he introduced ſome improvements in the practice of theſe good women; eſpecially the abolition of the habit of ſpeedily extracting the placenta, which he believed to be expelled by an orbicular muſcle at the fundus. He was a member of the Royal Society of London, and of the Academy of Sciences of Paris, having ſucceeded ſir Iſaac Newton, in the latter body, in 1727. In the ſame year he had the misfortune to loſe his ſon, Henry Ruyſch, alſo doctor of phyſic, who, like himſelf, was an able practitioner, well ſkilled in anatomy and botany, and was ſuppoſed to have materially aſſiſted him in his publications, inventions, and experiments. This loſs was the more ſeverely felt, on the occurrence of the accident juſt mentioned, as it deprived him of his beſt aſſiſtance in completing the ſecond collection of rarities, which he was occupied in making. His youngeſt daughter, however, who was ſtill unmarried, and had been initiated into all the myſteries of his anatomical experiments, was fully qualified for the taſk of aſſiſtance which ſhe now undertook, and he proceeded with his new muſeum; retaining his general health until the commencement of the year 1731, when he was carried off by a fever, in the ninety-third year of his age.

Ruyſch was the author of many publications, ſeveral of which were controverſial; for his want of reading, and conſequent differences with ſome of the learned of his profeſſion, led him into frequent diſputes. His firſt work, which originated

ginated in his defence of Sylvius and Van Horne against Bilsius, was entitled "Dilucidatio valvularum in Vasis Lymphaticis et Lacteis, cum figuris æneis," Hague, 1665. His second was "Observationum Anatomico-Chirurgicorum Centuria. Accedit Catalogus rariorum in Musæo Ruyschiano," Amst. 1691; containing some curious facts and engravings. His third publication was an answer to Bidloo, who had attacked several of his doctrines, and was entitled "Responsio ad Godef. Bidloo Libellum, cui nomen Vindiciarum, &c." 1694. In addition to this, he published no less than fourteen controversial works, in answer to professor Gaubius, to C. Wedelius, and others, which were entitled "Epistolæ Anatomicæ Problematicæ, unâ cum Responsionibus," and were printed between the years 1696 and 1700 inclusive, and in many of which considerable acrimony appears on both sides.

In addition to these numerous tracts, Ruysch also published a series of anatomical essays, to the number of twelve, under the title of "Thesaurus Anatomicus primus, secundus, &c." between the years 1701 and 1728, containing the results of his minute investigations into the structure of the different organs and textures of the body, and, in the last, observations on the anatomy of vegetables. He published also "Thesaurus Animalium," in 1710, with plates; three decades of "Adversaria Anatomico-Chirurgico-Medico," in 1717—20, and 23. And a tract "De Fabricâ Glandularum ad Boerhaavium," 1722, in answer to an attack from that celebrated professor. A collection of all his works was printed at Amsterdam in 1721, 4to. entitled "Opera omnia Anatomico-Medico-Chirurgica;" but this is necessarily less complete than the edition of 1737, in five volumes, 4to.

Henry Ruysch, the son of the preceding, who died in 1727, published a "Theatrum universale omnium Animalium, &c. 240 Tabulis ornatum," 1718, in two vols. folio. He is said to have been the sole depositary of the secret of his father, by which those beautiful preparations were made, which retained the appearance of life; and Ruysch was reproached for allowing the contrivance to perish with his family. But the modern improvements in the art of injection do not probably fall short of his expedients, in the demonstration of the vascular structure of the different organs of the body. See Eloy Dict. Hist. de la Med.; Eloge de Fenelon; Hutchinson, Biographia Medica.

RUYSCHIA, in *Botany*, received that appellation from Jacquin, in memory of professor Frederick Ruysch, the celebrated anatomist; another plant, which had borne his name, being referred to *Dracocephalum*. He is noticed by Haller, Bibl. Bot. v. 2. 98, for having directed his anatomical skill to the maceration and dissection of leaves, as well as for his fondness for exotic plants. He appears as the editor, commentator, and translator into Latin, of Commelin's valuable *Hortus Amstelodamensis*.—Jacq. Amer. 75. Schreb. Gen. 144. 823. Willd. Sp. Pl. v. 1. 1116. Mart. Mill. Dict. v. 4. Swartz Ind. Occ. 501. t. 11. Juss. 428. Lamarck Illustr. t. 135. (Souroubea; Aubl. Guian. 244. t. 97. Juss. 428.)—Class and order, *Pentandria Monogynia*. Nat. Ord. uncertain. Juss.

Gen. Ch. *Cal.* Perianth inferior, double; the outermost longest, in three deep unequal segments, coloured; the inner of five roundish, concave, obtuse, converging, permanent leaflets. *Cor.* Petals five, ovate, flattish, obtuse, reflexed, thrice as long as the inner calyx. *Stam.* Filaments five, awl-shaped, flat, spreading, shorter than the petals; anthers oblong, incumbent. *Pist.* Germen superior, roundish-ovate; style none; stigma quadrangular, cruciform, flat, *Peric.* Berry of two cells. *Seeds* numerous.

Ess. Ch. Calyx double; the outer in three deep unequal segments; inner of five leaves. Petals five, reflexed. Style none. Berry of two cells, with many seeds.

Obs. Aublet describes the stigma as of five angles or points, and the germen of five cells.

1. R. *clusiæfolia*. Purple Ruyschia. Jacq. Amer. 75. t. 51. f. 2. Willd. n. 1. Swartz Ind. Occ. 502.—Leaves obovate, obtuse, without transverse veins. Two segments of the outer calyx shorter than the inner one.—Native of the vast boggy forests in the interior parts of Martinico, where Jacquin found it flowering in April. Nobody else seems to have gathered this species. The *stem* is rather shrubby, two feet high, growing parasitically upon trees. *Leaves* alternate, on short stalks, obovate, obtuse, entire, coriaceous, shining, smooth, four inches long, with a solitary mid-rib, and no lateral veins. *Clusters* terminal, quite simple, solitary, erect, many-flowered; cylindrical, nine inches long; the common stalk cylindrical, thick and smooth; partial ones scattered, simple, short, spreading. *Flowers* between the size of a laurustinus and hawthorn blossom, inodorous, with purple petals. *Filaments* also purple, usually five, often seven, sometimes six. Jacquin did not see the ripe *fruit*, but conjectured it to be a berry.

2. R. *Souroubea*. Red and yellow Ruyschia. Swartz Ind. Occ. 504. Willd. n. 2. (Souroubea guianensis; Aubl. Guian. 244. t. 97.)—Leaves obovate, emarginate, with a small point, and many transverse veins. All the segments of the outer calyx longer than the inner one.—Gathered by Aublet, on the banks of the river *du Gallion*, in Guiana, flowering in October. The *stems* are shrubby, but brittle, long and trailing, supporting themselves on the neighbouring bushes, but drooping at the ends; their outer bark ash-coloured, easily peeling off. *Leaves* alternate, on short thick stalks, smooth, fleshy, four inches long, marked with numerous, transverse, not very evident, veins. *Clusters* terminal, solitary, long and drooping, of numerous *flowers*, much larger than those of the first species; their partial stalks an inch long. The *outer calyx*, as we choose to call it, rather than a *bractea*, consists of three divisions, each near an inch long, of a coral red, one of whose segments is a tube, closed at the end, the other two obovate, or spatulate, concave above. *Inner calyx* of five or six yellowish leaves, firm, folding over each other. *Corolla* of a golden yellow, described by Aublet as monopetalous; but Swartz, who examined this author's specimens, says otherwise. *Stamens* yellow. Ripe *fruit* not seen by Aublet. No other person appears to have gathered this plant. The habit of the genus, and in some measure the peculiar conformation of the outer *calyx*, resemble MARCGRAVIA; see that genus, and ASCIUM.

RUYSCHIANA. See TUNICA and EYE.

RUYSDAEL, JACOB, in *Biography*, was born at Haerlem in 1636, and at first studied surgery as his profession, although he had given early proofs of a fine taste in the art of painting; to which, at length, his attention was entirely directed by Nicholas Berghem, with whom he lived in habits of intimacy. He is said by some writers to have improved his taste in Italy, but scarcely a particle of Italian taste is to be found in his works. Nature was the school in which he studied; her pure etherial tints, her peculiar forms, the freshness of the morning, the brilliancy of mid-day, and the spirit-stirring tone of twilight, were the foundation of the principles by which he was governed, and in the contemplation of which he laid the basis of that perfection of locality to which he successfully aspired.

His landscapes are generally scenery in the neighbourhood of his residence, or occasionally taken from the rocky borders of

of the Rhine, varied with cafcades, which he compofed and treated in a manner till then unknown, and till now unrivalled, as mere matters of imitation.

The talents of Ruyfdael were not confined to landfcape, he painted fea-pieces with equal fuccefs; and he has feldom been furpaffed in the truth, the brilliancy, and variety, with which he purfued that branch of the art, particularly frefh breezes and gales of wind.

He frequently obtained affiftance in his figures from the pencils of Oftade, Vander-Velde, and fometimes from Wouvermary, which adds confiderably to the prices obtained for his works, and they are in general of a confiderable magnitude. Indeed a fine fpecimen of this mafter may be regarded as current coin, fuch is the general eftimation of his talent. He died in 1681, at the age of 45.

His elder brother, Solomon Ruyfdael, was alfo a landfcape painter in the fame ftyle, but with indifferent fuccefs. He gained more credit as a decorative artift.

RUYSDAL, in *Geography*, a town of Holland; five miles E. of Naerden.

RUYSSELADE, a town of France, in the department of the Lys, and chief place of a canton, in the diftrict of Bruges. The place contains 5281, and the canton 10,071 inhabitants, on a territory of 65 kiliometres, in two communes.

RUYTER, Michael-Adrian de, in *Biography*, a celebrated Dutch admiral, born at Flufhing in 1607, entered into the naval fervice of his country very early. From the fituation of cabin-boy he rofe through all the commands to the rank of captain, in which he diftinguifhed himfelf both among his own countrymen and foreigners. Much of the early part of his life was fpent in the fervice in the Weft Indies, to which he is faid to have made eight voyages, and two to Brafil. In 1641 he was fent to the affiftance of the Portuguefe, who had thrown off the yoke of Spain, and on this occafion he was raifed to the rank of rear-admiral. His conduct obtained for him the applaufe of the king of Portugal, and he afterwards rendered fome important fervices on the Barbary coaft, entering the road of Sallee in a fingle fhip, although five Algerine corfairs difputed the paffage. When war broke out, in 1652, between the Englifh and Dutch, Van Tromp having been difgraced, De Ruyter was appointed to the command of a feparate fquadron, for the purpofe of convoying home a rich fleet of merchantmen. He fell in with the Englifh admiral Ayfcough, with whom he had an engagement off Plymouth, in the month of Auguft, which lafted two days, and terminated fo far to the advantage of the Dutch, that he brought his convoy fafe into port. In the following October De Ruyter and De Witte had an action with Blake and Ayfcough on the Flemifh coaft, which was feverely contefted; but De Ruyter, being deferted by fome of his captains, found it advifeable to retreat to his own coaft, the lofs having been nearly equal on both fides. Van Tromp was now reftored to the chief command, and De Ruyter had a fquadron under him in the battle of December off Folkftone, in which Blake was obliged to take fhelter in the Thames. De Ruyter likewife diftinguifhed himfelf in the terrible battle of three days, fought in February 1653, between Tromp and Blake, near the mouth of the Channel. In the month of June, Tromp and De Ruyter engaged Monk and Dean off Nieuport; and after a battle of two days, in which the two Dutch admirals fucceffively refcued each other from imminent danger, the Dutch confeffed their inferiority by retiring behind their own fand-banks. The commanders thence fent a warm remonftrance to the States concerning the neceffity of a reinforcement, and at length they were enabled to attack the Englifh under Monk and Lawfon, near Scheveling. In the final battle between the two republics, Tromp was killed; and though De Ruyter made every effort to reftore the day, returning to the combat after he had been obliged to fhift his flag to a frigate, yet he was at length compelled to withdraw his fhattered fhips to the Meufe. The peace with England, which was concluded the following year, gave a refpite to this terrible fervice, and De Ruyter was fent to cruize in the Mediterranean. He was to reinforce Opdam, who was laying fiege to that town, and this fervice being effected, he returned to his ftation. The Dutch trade was at this time much molefted by French privateers, but the vigorous conduct of De Ruyter put an end to this predatory warfare. A difpute with Portugal brought this Dutch admiral again into action, and he exhibited his vigilance, taking feveral Portuguefe fhips at the mouth of the Tagus, and made feveral prizes from the Brafil fleet, till a want of provifions obliged him to return to Holland. War having recommenced between the Swedes and Danes in 1658, De Ruyter was fent with a fleet to the affiftance of the latter. He made a defcent on the ifland of Funen, defeated the Swedes, and forced them to furrender at difcretion in Nyborg, whither they had retired. He then wintered at Copenhagen, where the king of Denmark ennobled him for his good fervices. In 1662 he was fent with a ftrong fquadron to curb the infolence of the Barbary ftates, who had exercifed their piracy upon the Dutch fhipping, and fucceeded entirely to the fatisfaction of his employers. At the commencement of the difputes between Charles II. and the United Provinces, De Ruyter had a command on the coaft of Africa, where he recovered the forts which had been taken from the Dutch by the Englifh, and made prizes of fome merchant fhips. After the defeat of the fleet of Opdam by the duke of York, in 1665, De Ruyter returned, and was raifed to the rank of lieutenant-admiral-general of the Dutch navy. In the parties into which Holland was at this time divided, De Ruyter was confidered as attached to the republican caufe, while the younger Tromp, his rival, was a warm adherent to the houfe of Orange: they, however, went to fea together. The firft fervice of De Ruyter was to convoy home a fleet of merchantmen; and in June 1666, the great fleets of the two maritime powers met in the Downs; the Dutch commanded by De Ruyter and Tromp, the Englifh by prince Rupert (fee his article) and Monk, now the duke of Albemarle. In the three days fight which enfued the Dutch had the advantage, though the valour of the Englifh rendered the contefl very fevere. Both De Ruyter and Tromp were obliged feveral times to fhift their flags from fhip to fhip, and the latter, having borne down to the centre of the Englifh, was reduced to the utmoft extremity, when he was nobly refcued by his rival and political foe. The action was renewed on the fourth day, and in the end the Englifh, who had been the greateft fufferers, withdrew to their harbours.

In the following Auguft the duke of Albemarle and prince Rupert fell in, near the coaft of Effex, with De Ruyter and Tromp, and in the enfuing action, Tromp, eagerly purfuing a defeated divifion of the Englifh fleet, left De Ruyter alone to contend with the main body of the enemy, who, after a long and moft fevere contefl, was obliged to retreat, exclaiming, how wretched he was that not one bullet of fo many thoufands would free him from the difgrace. He gained, however, additional glory by the good order in which he drew off his fhattered fhips, and in no action were his fkill and courage more diftinguifhed.

The year 1667 was memorable for the difgrace which the reign of Charles II. incurred by the triumphant entrance of the Dutch into the Thames. Negociations for peace had been carrying

carrying on at Breda, which De Witte had protracted, while he haſtened the naval preparations. The Dutch fleet appeared in the Thames under the command of De Ruyter, which threw the Engliſh into the utmoſt conſternation. A chain was thrown acroſs the Medway, and ſome new fortifications were added to Sheerneſs and Upnore caſtle: but theſe preparations were unequal to the urgency of the caſe. Sheerneſs was ſoon taken, though defended with the utmoſt valour by ſir Edward Sprague. Having the advantage of a ſpring tide and an eaſterly wind, the Dutch, with ſix men of war and five fire-ſhips, preſſed on and broke through the chain, and burnt ſeveral Engliſh men of war in their courſe: among theſe was the Royal Oak, the commander of which, captain Douglas, periſhed in the flames, though he might readily have eſcaped. "Never was it known," ſaid he, "that a Douglas left his poſt without orders." The peace which ſoon after followed gave ſome repoſe to De Ruyter, till the alliance between Charles II. and Lewis XIV. for the ruin of the Dutch republic, again called him to the defence of his country. With a fleet of 91 ſail, in June 1672, De Ruyter attacked the combined fleets of 130 ſail, commanded by the duke of York, lord Sandwich, and count d'Eſtrées, in Solebay; and after an engagement, which he repreſented as the moſt obſtinate that he ever witneſſed, night parted the adverſaries, each claiming the victory. Lord Sandwich and count d'Eſtrées loſt their lives, and the other loſſes were nearly equal, but De Ruyter kept the ſea, and ſafely convoyed home a large fleet of merchantmen. The French kept aloof, and ſuffered very little.

De Ruyter was now doomed to ſuffer danger from a different cauſe. During the popular fury againſt the oppoſers of the houſe of Orange, which proved fatal to the De Wittes, De Ruyter, as one of the party, notwithſtanding the great ſervices which he had rendered his country, was attacked in the ſtreets of Amſterdam with all ſorts of weapons, but eſcaped without much injury. When William was raiſed to the ſtadtholderſhip, the ſervices of this great admiral were too important to be ſlighted through party diſputes, and in 1673 he was ſent to ſea with a ſtrong fleet in queſt of the combined Engliſh and French, who were on the Dutch coaſt, under the command of prince Rupert. An indeciſive engagement enſued on the 7th of June, in which De Ruyter diſengaged Tromp from the French ſquadron which had ſurrounded him. The battle was partially renewed on the 14th, and in Auguſt, as we have ſeen in the article RUPERT, a more ſevere engagement took place, in which an Engliſh and two Dutch admirals were killed, and both parties claimed the victory. De Ruyter, however, received the thanks of the ſtadtholder for his good conduct on this occaſion. Peace between England and the Dutch ſoon after followed, and never ſince have the two nations conteſted the empire of the ocean with ſuch mighty force, and ſo determined a ſpirit. France, at this time, was riſing faſt to be a maritime power, and Holland, in alliance with Spain, had to contend with her for the ſuperiority. De Ruyter, in 1674, made a fruitleſs expedition to the French Caribbee iſlands. In the beginning of 1676 he was ſent with a fleet to Sicily, which had been encouraged by the French to revolt from the Spaniards. He fell in with the French fleet under the duke de Vironne, and an action enſued, which laſted the whole day, with no deciſive advantage to either ſide. De Ruyter repaired to Leghorn to refit, and then, forming a junction with the Spaniſh fleet, they proceeded towards Meſſina. The French came out to meet them, led on by the celebrated Du Queſne, and a ſecond battle took place on the 21ſt of April. The Spaniards kept at a cautious diſtance, but De Ruyter, like himſelf, ruſhed to the centre, broke the French line, and was in the act of chaſing, when a cannon-ſhot wounded him in the left heel and right leg. A fever ſupervened, which within a week put an end to his life in the port of Syracuſe, at the age of 69, deeply regretted by his country and admired by all Europe. The king of Spain had, only a few days previouſly to this, conferred upon him the title of duke, with a penſion. His remains were magnificently interred at Amſterdam at the public expence, and a ſuperb monument was erected to his memory. Univer. Hiſt. Hume. Campbell's Lives of the Admirals, edit. 1813.

RUZA, in *Geography*, a town of Ruſſia, in the government of Moſcow; 48 miles W.N.W. of Moſcow. N. lat. 55° 46′. E. long. 36° 2′.

RUZASUS, ZAFFOONE, in *Ancient Geography*, a port in the eaſtern part of Mauritania Cæſarienſis, ſituated E. of Ruſcurium.

RY, in *Geography*, a town of France, in the department of the Lower Seine; nine miles E. of Rouen.

RYACOTTA, a town of Hindooſtan, in Myſore, ſtrong, and well furniſhed with guns, ammunition, and proviſion for its defence, but taken by the Britiſh in July 1791; 75 miles S. of Seringapatam. N. lat. 12° 26′. E. long. 78° 5′.

RYADER. See RIADER.

RYAL. See RIAL.

RYAL, a name given to the noble, which, on account of the ſcarcity of gold in the time of Henry V. of England, was diminiſhed in ſize, whilſt it retained its former value, but was reſtored by Henry VI. to its original ſize, and cauſed to paſs for 10*s*. under this appellation. (See ROSE-*noble*.) This ryal of 10*s*., and alſo the angel of 6*s*. 8*d*., with their diviſions of half and quarter, were the ſole gold coins, till, in 1485, Henry VII. publiſhed the double ryal, or ſovereign of 20*s*. accompanied by the double ſovereign of 40*s*. James I. of England iſſued roſe-ryals of 30*s*., and ſpur-ryals of 15*s*.; angels of 10*s*., and angelets of 5*s*.; till his ninth year, when gold was raiſed in the proportion of 1*s*. in 10*s*.

RYALCHERY, in *Geography*, a town of Hindooſtan, in the Carnatic; 10 miles N.W. of Bomrauzepollam.

RYAN, LOCH, an arm of the ſea, which extends itſelf in a S.E. direction into Wigtonſhire, Scotland, forming, with the bay of Glenluce, the peninſula denominated the Rinns of Galloway. It is about ten miles in length from its entrance to Stanraer, which is ſituated at its head, and varies in breadth from two to four miles. On its eaſtern ſide ſtands the little village of Cairn, contiguous to which is a very ſafe and commodious bay, with good anchoring ground, and depth of water ſufficient for ſhips of any burthen. King William's fleet anchored here on their paſſage to Ireland. Oppoſite to this village a ſand-bank runs a conſiderable way acroſs the loch, but few accidents ever happen upon it, and it even contributes to the ſafety of the ſouthern part of the bay, by breaking the force of the tides, which flow ſtrongly in the direction in which it lies. This bank abounds with oyſters of a moſt excellent quality. Beſides Cairn bay, there are ſeveral other excellent anchoring bays in the loch, called Portmore bay, the Wig bay, the bay of Soleburn, and the bay of Dalmennock. In ſhort, the anchoring is good and ſafe in almoſt every part of the loch. For ſome further remarks relative to this arm of the ſea, ſee STANRAER. Sinclair's Statiſtical Account of Scotland, vol. i. 8vo. Edin. 1791. Carliſle's Topographical Dictionary of Scotland, 4to. 1813.

RYANIA, in *Botany*, was named by Vahl in juſt commemoration of John Ryan, M.D. F.R.S., a very active and

and intelligent correſpondent, to whom he was indebted for many ſpecimens of rare plants from the iſlands of Santa Cruz, Montſerrat, &c.—Vahl. Eclog. faſc. 1. 51. Willd. Sp. Pl. v. 2. 1164. Mart. Mill. Dict. v. 4.—Claſs and order, *Polyandria Monogynia*. Nat. Ord. *Tiliaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of five lanceolate, tapering, ſpreading, finely ribbed, coloured, permanent leaves. *Cor.* Petals none. Nectary between the germen and ſtamens, the height of the former, pitcher-ſhaped, very villous. *Stam.* Filaments numerous, about 60, in a double row, awl-ſhaped, a little ſhorter than the calyx, ſmooth, except a few hairs at the baſe; anthers erect, awl-ſhaped, one-third the length of the filaments, pointed, corrugated, naked, finally waved at the edge. *Piſt.* Germen ſuperior, ovate, very villous; ſtyle ſmooth, the length of the ſtamens; ſtigmas four, convex. *Peric.* Berry dry, corky, nearly globular, of one cell, with five longitudinal tuberculated receptacles, from its inner coat. *Seeds* numerous, ovate, nearly globular, brown, beſprinkled with a few minute hairs, and each half encloſed in a membranous tunic, with three double wings.

Eſſ. Ch. Calyx inferior, of five coloured permanent leaves. Petals none. Nectary pitcher-ſhaped, between the ſtamens and piſtil. Berry corky, of one cell, with many tunicated ſeeds.

1. R. *ſpecioſa*. Vahl. Eclog. t. 9.—Found by Dr. Ryan, in the iſland of Trinidad. A *tree*, with aſh-coloured round *branches*, finely downy towards the ends. *Leaves* alternate, ſtalked, elliptic-oblong, pointed, entire, ſmooth on both ſides, except a mealineſs on the mid-rib beneath. *Stipulas* awl-ſhaped, hoary, rather longer than the footſtalk, deciduous. *Flowers* axillary, moſtly ſolitary, on ſhort ſimple ſtalks. *Leaves* of the *calyx* an inch and half long. *Berry* double the ſize of a walnut. *Seeds* rather bigger than thoſe of Coriander. Vahl conceived this genus to be allied to *Laetia*, but diſtinct in the nectary, permanent calyx, four ſtigmas, awl-ſhaped (not round) anthers, and other particulars.

RYCKE, Theodore de, in *Biography*, a learned critic, born at Arnheim in 1640; was firſt an advocate at the Hague, and then profeſſor of hiſtory at the univerſity of Leyden. In 1681 he delivered an oration "De Gigantibus," which, with a diſſertation "De Primis Italiæ Colonis et Æneæ adventu," he added to an edition of Stephanus Byzantinus and Scymmus Chius, Lugd. Bat. 1684. He alſo publiſhed a valuable edition of Tacitus, with notes and illuſtrations, in 1687, in two vols. 12mo. He died in 1690.

RYCQUIUS, Juſtus, was born at Ghent in 1587, and educated at Douay. From this place he travelled into Italy, and was for ſome time librarian to count Lodovico Sahero. Returning to the Low Countries, he was made canon of Ghent, and reſided ſome time at Louvain. In 1624 he was appointed by Urban VIII. to the chair of eloquence in the univerſity of Bologna, where he died in 1627. He publiſhed a number of Latin poems, and other works, but is chiefly known by his treatiſe "De Capitolio Romano," 1617, containing a deſcription of the works of art, ancient and modern, preſerved in that relic of antiquity. This performance obtained for him the title of a Roman citizen. It was reprinted at Leyden by Gronovius in 1696, with notes and plates. Gen. Biog.

RYD, in *Geography*, a town of Sweden, in the province of Upland; 20 miles S. of Upſal.—Alſo, a town of Sweden, in the province of Smaland; 22 miles E.S.E. of Jonkioping.

RYDAHOLM, a town of Sweden, in the province of Smaland; 22 miles W.N.W. of Wexio.

RYDAL Head, a mountain of England, in Weſtmoreland; two miles N. of Ambleſide.

Rydal Water, a lake of England, in Weſtmoreland, which communicates with the Windermere lake.

RYDALL, a river of Wales, which runs into the ſea at Aberyſtwith.

RYDDA, in *Ancient Geography*, a city which the Jews conquered from the Arabians, under Alexander Jannæus. Joſeph. Antiq. lib. xiv. cap. 2.

RYDER, *Sir* Dudley, in *Biography*, was born in the year 1691, and having received a good elementary education, he was brought up to the profeſſion of the law. It may be obſerved, that the family from which the ſubject of this article was deſcended, had been very long eſtabliſhed in Yorkſhire, and took their name from Ryther, in the hundred of Barkſton, in that county, hence the name has been written differently at different periods, as Rythre, Ryther, or Ryder. It appears from Dugdale's Baronage, that William de Ryther was ſummoned to parliament among the barons of the realm, from the 21ſt of Edward I. till the 1ſt of Edward II., and that he was ſucceeded by John de Rythre, governor of Shipton caſtle. Sir Dudley Ryder was appointed ſolicitor-general to his majeſty George II. in 1733; in 1736 he was advanced to the office of attorney-general, and in 1754 he was appointed to the high office of lord chief juſtice of the court of king's bench. In the year 1756 his majeſty, as a reward for his long and very faithful ſervices, determined to advance him to the dignity of the peerage, by the title of lord Ryder, baron of Harrowby in Leiceſterſhire, and a warrant was accordingly ſigned by the king for that purpoſe, on the 24th of May; but ſir Dudley died on the following day, before the patent could be completed. He left a ſon, Nathaniel, the firſt lord who was ſo created in 1776. He died in 1803, and was ſucceeded by his eldeſt ſon, Dudley, the preſent lord.

Ryder, or *Ruyder*, in *Commerce*, a gold coin in Holland. The new ſtand-pennings, or ryders, are fixed by the regulation of 1749 at 14 florins, and the half ditto at 7 florins. The aſſay and value, &c. are as follow:

	Aſſay.	Weight.	Contents in pure Gold.	Value in Sterling.
	car. gr.	oz. dwt. gr.	grains.	L. s. d.
Double ryder	ſtandard.	0 12 21	284.2	2 10 $3\frac{1}{2}$
Ryder -	ditto.	0 6 9	140.2	1 4 10
Half ryder -	ditto.	0 3 $4\frac{1}{2}$	70.1	0 12 5
Ducat -	B. 1 $2\frac{1}{4}$	0 2 $5\frac{3}{4}$	52.8	0 9 4

Impreſſions.—The ryder has on the front, an armed horſeman, with a drawn ſword; the legend expreſſes the province in which it has been coined, thus: MO. AUR. PRO. CONF. BELG. ZELAND, that is, *Moneta aureæ provinciæ confœderationis Belgicæ Zelandiæ* (gold coin of Zeland, a province of the Belgic confederacy), with the arms of the province at bottom: reverſe, the arms of the United Provinces, with 14 Gl. (14 guilders or florins); legend, CONCORDIA RES PARVÆ CRESCUNT (ſmall things increaſe by concord). The half ryder bears the ſame impreſſions, except that it is marked 7 Gl.

The ducat has a foot ſoldier with a drawn ſword, and a bundle of arrows in his left hand; legend, CONCOR. RES PAR. CRES., that is, *Concordia res parvæ creſcunt*, as above, and the letters, HOL. or ZEL. &c. to diſtinguiſh the province: reverſe,

reverſe, a ſquare, with ornaments and the following words in five lines, MO. ORD. PROVIN. FŒDER. BELG. AD LEG IMP.; that is, *Moneta ordinarea provinciarum fœderatarum Belgicarum ad legem Imperii*, (the common coin of the confederated Belgic provinces, according to the law of the empire).

RYDER, or *Rider, to a bill.* See PARLIAMENT.

RYDRAIRE, in *Geography*, a town of Hindooſtan, in Baramaul; 28 miles N. of Namacul.

RYDROOG, a town and fortreſs of Hindooſtan, in Myſore; 128 miles N. of Seringapatam. N. lat. 14° 40′. E. long. 76° 52′.

RYE, in *Botany*. See SECALE.

RYE, in *Agriculture*, a ſpecies of corn much cultivated in ſome of the northern diſtricts. It is a ſort of crop that approaches the neareſt to that of wheat of any that is at preſent in cultivation. There are two varieties of this grain, the *winter* and *ſpring* rye, or what is often diſtinguiſhed into the *black* and *white*, or Dantzic ſort, but the former is the largeſt and the moſt plump and hardy, conſequently the moſt frequently grown by the farmer, however the ſpring kind may often be employed with ſucceſs and advantage. This kind of grain is ſo capable of ſuſtaining the effects of the weather, that when ſown in the autumn it is ſeldom injured by the moſt ſevere winters; it is likewiſe more early in the ſpring than wheat, and though not equally valuable, is more certain of producing a good crop in general than that grain is.

Soil.—This is a ſort of crop which is capable of being grown on moſt kinds of land, but the light dry ſandy ſoils that cannot be converted to the purpoſe of wheat or barley, are probably the only ones on which it can be cultivated to advantage, from being the moſt adapted to it, and from few of them being ſo light or poor as not to afford good crops. It can, of courſe, only be introduced with ſucceſs on ſuch lands as are incapable of producing other ſorts of corn to advantage. And from fowls being leſs fond of it than moſt other ſorts of grain, it may be the moſt proper to be cultivated on thoſe portions of ground that are ſituated cloſe around the farm-houſes and yards.

It is a crop which is moſtly grown after early fed turnips, clover, peas, and other ſimilar products, as well as after naked fallows. In particular caſes, when grown on the cold and heavy kinds of ſoil, the grain is found to be much later in becoming ripe than on ſuch as are dry and light in their quality.

This is alſo a kind of crop which, as in that of wheat, requires the land to be brought into a tolerable ſtate of mellowneſs, and to be perfectly cleared from weeds. In many diſtricts where intended to ſtand for a crop, it is the cuſtom to put it in upon ſome ſort of fallow, but where it is only to be fed off by ſheep, ſeldom more than one ploughing is given, the land being broken up and fallowed for turnips, immediately after the green rye has been ſufficiently eaten down by ſheep or other animals. And it is the practice in ſome places to apply manure immediately for this crop; but where the ſoil is in a ſuitable ſtate of tillage, and has not previouſly been too much exhauſted by the growth of grain crops, it may be more proper, eſpecially where it is not to be fed off, to defer the application of the manure, in order that it may be employed for the turnip or other green crop that is to ſucceed, the uſe of manure being apt to bring up weeds, and render it difficult to be kept clean.

Seed and Sowing.—In reſpect to the time of ſowing this ſort of grain, it is, in general, pretty much the ſame as that for wheat where a crop is intended, but when cultivated for green food for animals, it may be advantageous to ſow it more early, as in Auguſt and September, but it may be ſown in October, and during the winter months, until the beginning of March, in particular caſes, as where the early ſowings have failed, or there is an intention of having a ſucceſſion of this feed for ſheep. In which caſes, according to Mr. Banniſter, it is uſually ſown on one ploughing on a wheat or other ſtubble where the field is to come in courſe for turnips in the following year. And the above writer ſays that the general allowance of ſeed, where the crop is deſigned to remain for grain, is, in moſt ſituations, from about two buſhels to two and a half; but when the intention is to feed it off, three, or even more, may be a better proportion, as the plants, in ſuch caſes, ſhould ſtand conſiderably thicker upon the ground, in order that the largeſt poſſible quantity of green food may be provided for the animals. And as the vegetation of this ſort of crop is rather ſlow, it may be proper to put it into the ground when it is in a tolerably dry condition, otherwiſe much of it may periſh, eſpecially in wet ſeaſons, and where the land is rather heavy.

It is likewiſe ſtated in the Report of Yorkſhire, that it was formerly a prevailing cuſtom to blend ſeveral other ſorts of ſeeds with that of rye, and the practice ſtill continues in ſome diſtricts, in reſpect to wheat and winter tares, but it is by no means either adviſeable or uſeful, in Mr. Donaldſon's opinion, ſince, in the firſt caſe, the rye is in a ſtate fit for reaping long before the wheat, conſequently much loſs muſt be ſuſtained by the farmer, and in the latter it is moſtly in a ſtate to be cut as green food, ſome weeks before the tares, and becomes ripe at much too early a period for them.

And in caſes where wheat is blended with rye, it is often termed meſlin, the proportion of the latter to that of the former being regulated by the nature of the ſoil, and the opinion of the grower, the general principle being that of giving the largeſt proportion of rye to the lighteſt kinds of ground.

After-culture.—In caſes where this crop is grown for the purpoſe of the grain, it will be neceſſary to keep it as clean as poſſible in the early ſtages of its growth by horſe and hand weedings, and hoeings according as it is ſown, when they may appear requiſite; but where the intention is merely that of affording a ſupply of green food, for the uſe of ſheep or other animals in the more early ſpring months, no further culture will be wanted after the crop has been put into the ground. This ſort of crop is known to be ready to cut by the ſtraw of the ſtems becoming of a yellowiſh colour, the ears hanging down in a bending manner, and the grain feeling hard and in a plump and full condition.

On the poor ſandy ſoils of Suffolk good crops of this ſort are ſeldom produced, and on thoſe of a better quality the produce is rarely more than from two to three quarters on the acre. But in the north riding of Yorkſhire it is ſtated, by the author of the Agricultural Report of that diſtrict, to amount to from three to ſix quarters to the acre of land.

In caſes where this ſort of grain is free from weeds, and cut when the weather is fine, it may be ſecured in the ſtack as faſt as the reaping proceeds, without its being endangered by it. And the ſtraw of this ſort of grain is found to be ſuperior to that of wheat, for the purpoſe of thatch, as well as for the uſe of the collar-makers, who require much of it.

The practice of farmers is ſometimes, where rye is intended to ſtand for a crop, to feed it with ſheep in the early ſpring, as in the beginning of March; but this ſhould never be done

except where the crop is very luxuriant, and at ſo early a period as that there may be no danger of deſtroying the new formed ear of the grain. This kind of crop is alſo cultivated in particular caſes, as where the ground is ſufficiently light and dry to be turned down as a manure: where this is the caſe, the crop ſhould always be turned in while in its moſt green and ſucculent ſtate, and when the weather is moderately dry, in order that it may be more quickly reduced by putrefaction into a manure. And, in the more ſouthern diſtricts, it is not unfrequently grown for the purpoſes of the tanners, who have recourſe to it in the preparation of leather.

Application.—The moſt uſual application of this crop is as a green food for ſheep in the early ſpring, before the turnip crops are ready. When grown in this view it is neceſſary, the author of Practical Agriculture ſays, to have attention to different circumſtances, in order to derive the utmoſt advantage from the crops. As this grain begins to ſhoot out, or ſpindle, as it is termed by farmers, much earlier than wheat, care ſhould be taken that the feeding of it down is begun at a ſufficiently early period before the ear is formed in the *hoſe*, as the latter end of February or beginning of March, otherwiſe the ſtem or blade becomes firm and ſticky, and the ſucceſſion of green feed after the firſt eating extremely ſmall. Indeed this may be done earlier than the firſt of theſe periods, in caſes where the ſeaſon is mild and open, and perſevered in till the end of April. In all caſes it is, however, adviſeable to let the crop be ſo advanced in its growth as to cover the ground tolerably before the ſheep are turned in. As this ſort of green food is ſaid to have much effect in promoting the flow of milk in ſuch ewes as have lambs, probably from its ſucculency, and its ſtimulant properties being applied immediately after the ſeverity of the winter ſeaſon, when the bodies of animals are known to be more capable of being excited by the action of ſtimuli, and when there is ſcarcely any other ſort of green feed that can leſſen its operation by being taken along with it, the culture of it muſt be the moſt advantageous, it is ſuppoſed, where ſheep huſbandry is extenſively combined with that of tillage, eſpecially that department of it which relates to the feeding of lambs. As by this means, from the quantity of ſucculent nutritious food that is provided, the lambs are prevented from being ſtinted in their growth while young, which is a matter of the utmoſt importance in their future feeding. And that in thus feeding the crop off by ſheep it will conſtantly be neceſſary to keep the fields properly divided by means of hurdles, as in this way the loſs of food will be much leſs, and ſome parts will become freſh while the others are eating down, which are advantages not to be diſregarded in caſes of this kind.

But Mr. Banniſter thinks, that, notwithſtanding what has been urged in favour of a rye paſture, it is ſcarcely worth the while of any farmer to attempt the cultivation of this grain, who does not keep large numbers of ewes and lambs; for as the ſeed uſually fetches a high price, every advantage attending the crop will be more than balanced by the ſuperior charges in the cultivation, except in the inſtance above-mentioned, where no expence ſhould be ſpared to maintain the lambs in a thriving way, and to prevent their growing hard and ſticky, as the butchers term it; for if lambs once ſink in fleſh, it is beyond the art of man to reſtore them to their former thriving ſtate again.

Rye is, in many parts of the country, uſed for bread, either alone, or mixed with wheat.

Rye is alſo a grain which is much uſed in the diſtilleries, where it can be procured in large quantity, and alſo by the ginger-bread bakers. In the Rural Economy of Yorkſhire it is obſerved, that before the uſe of lime was prevalent, much rye was grown on the lighter lands upon the margin of the vale, and in the moor-lands ſcarcely any other crops than rye and oats were attempted. Now rye is principally confined to the moorland dales; and even there the alteration of ſoils by lime has been ſuch, that wheat is become the more prevalent crop. Nevertheleſs, on light ſandy moorland ſoils, rye is generally more profitable than wheat; and the bread which is made from a mixture of the two grains is here eſteemed more wholeſome to perſons in general, than that which is made from wheat alone.

It is cultivated in many diſtricts as a good ſpring green feed for ſheep, particularly ewes and lambs. This is greatly the caſe on the South Downs, in the county of Surrey. It is there ſown in the late ſummer months, or the very beginning of thoſe of the autumn, the more early the better. When other food is ſcarce in the ſpring and in the lambing ſeaſon, the ewes and lambs are turned upon it, proper portions being hurdled off for the purpoſe.

Some ſuppoſe it prepares well for turnips, and that on many accounts it may be raiſed with much uſe and advantage on open expoſed ſandy ſoils, where wheat crops will not ſucceed, for being fed off, and inſure far better crops of the above roots, than are commonly met with in ſuch ſoils and ſituations. There would, in theſe caſes, it is ſaid, be the benefit of an increaſed quantity of food, and of courſe an increaſe in the number of live-ſtock, which would produce a greater abundance of manure, and, conſequently, of grain crops ultimately. The trouble and expence of adopting ſuch a method of practice would be but trifling, inſomuch as the ground would be broken up only in the autumn inſtead of the ſpring; in return for which ſheep-feed would be procured, and, at the ſame time, the land be well dreſſed for the further crop, which ſhould conſtantly have a full ſupply of manure when the ſeed is put into the land.

This crop, on the whole, deſerves more attention than it has commonly met with, as it forms one of the links in the chain of green food, by which live-ſtock, on arable farms, can be fed and ſupported the whole year round.

In many parts of France there have been certain years in which this grain, from no apparent cauſe, has proved noxious, and ſometimes even poiſonous. M. Perrault travelling through Sologne, was informed that the rye of that province was ſometimes ſo corrupted, that thoſe who eat of the bread that had much of the corrupted grain in it, were ſeized with gangrenes in different parts of the body, which were not preceded by any fever, inflammation, or any conſiderable pain; and that the gangrened parts uſually fell off after a time of themſelves, without the aſſiſtance of chirurgical inſtruments. The grains of rye thus degenerated, are black on the outſide, and tolerably white within; and when they are dry, they are harder and cloſer than the natural good grain; they have no ill taſte, but ſometimes they have a viſcous metallic-like honey hanging to one end of them. They grow longer than the other grains in the ſame ear, and are found from one or two to ſeven or eight in the ſame ear. Some have ſuppoſed that theſe were not the proper ſeeds of the plant, but ſome other extraneous bodies that got in among them; but it is evident, from a cloſe inſpection, that they are really the genuine ſeeds, only altered by ſome accident; the coats, and the furrow, and even the germen for the young plant, being entirely the ſame as in the natural ſeeds.

The places where the rye is found to degenerate in this manner, are all a dry and ſandy ſoil. In theſe places there is ſcarcely any ſoil in which more or leſs of theſe large ſeeds are not found among the others, but where there are but few of them, the ill effects are not perceived. The ſeaſons when the degeneracy is greateſt, and the effects the worſt of

of all, are, when there have been exceſſive rains in the ſpring, and there come on exceſſive heats in the ſucceeding ſummer.

The bread which is made of the rye that holds ever ſo much of this bad corn, is not diſtinguiſhable from other rye-bread by the taſte, and ſeldom produces its ill effect, till ſome conſiderable time after it is taken. Beſide the gangrenes already mentioned, it not unfrequently brings on other bad conſequences, ſuch as drying up the milk of women who give ſuck, and occaſioning ſometimes malignant fevers, accompanied with drowſineſs, ravings, and other dangerous ſymptoms. The part uſually ſeized by the gangrene is the legs, and this often in a very frightful manner. The arms are the next part moſt ſubject; but all the other parts of the body are ſubject to it.

The firſt ſymptom of this approaching gangrene is a ſtupefaction and deadneſs in the part; after this there comes on ſome pain, though not violent, and the ſkin becomes livid; ſometimes the ſkin ſhews no mark of it, but the pain and ſwelling increaſe; and it is neceſſary to make an inciſion into the fleſh, to find the gangrened part. In the more deſperate caſes, the only remedy is, the taking off the part; and if this is neglected, the fleſh is all waſted, and the ſkin becomes black, and clings round the bones, and the gangrene appears again in the ſhoulders.

The poorer people are only ſubject to this diſeaſe; and, as they principally eat the rye-bread, and as thoſe years when there is moſt of this bad grain among the ears of rye, produce moſt of theſe diſorders, it has been judged certain that the rye is the occaſion of it. It may deſerve enquiry, however, whether that grain may not be innocent of the miſchief, and its degeneracy and the diſtemperature attributed to it may not both be the effect of the ſame bad conſtitution of the air. If it proves, on enquiry, that only thoſe who eat of the rye are ſubject to the diſeaſe, it will ſeem a proof of its being really owing to it; and in this caſe the miſchief may be prevented by the ſifting the grain before it is ground, the degenerated grains being ſo long that they will all remain in the ſieve that lets the others through. The experiment has been made on the ſpot, by giving the flour of the corrupted grains alone to animals, and it is ſaid they have been killed by it. Philoſ. Tranſ. N° 130.

Rye-*Graſs*, the common name of a particular ſort of graſs. See Ray-*Graſs*.

It has been obſerved, from the trials made at Wooburn, under the care of Mr. G. Sinclair, that ſheep eat this graſs, when it is in the early ſtage of its growth, in preference to moſt others; but after the ſeed approaches towards perfection, they leave it for almoſt any other kind. A field in the park at the above place was laid down in two equal parts, one part with rye-graſs and white clover, and the other part with cock's-foot and red clover: from the ſpring till midſummer the ſheep kept almoſt conſtantly on the rye-graſs; but after that time they left it, and adhered with equal conſtancy to the cock's-foot during the remainder of the ſeaſon.

Rye, or *Weſt Rye*, in *Geography*, a borough, market-town, and cinque-port, under the title of "ancient port and town," in the hundred of Goſtrow, rape of Haſtings, and county of Suſſex, England, is ſituated on the coaſt of the Britiſh Channel, at the diſtance of 76 miles E. by W. from Chicheſter, and 62 miles S.E. by E. from London. It is of very high antiquity, but its early hiſtory is little known. It ſeems clear, however, that it was one of the original cinque-ports, and is mentioned as a member of them generally, in a charter granted by king Henry III. In the reign of Edward III. the whole town was environed with a ſtrong wall, and guarded by towers, under the ſuperintendance of William d'Ypres, earl of Kent. At that period Rye was ſo conſiderable a port, that it furniſhed no fewer than nine armed veſſels to the royal fleet, when the king undertook the invaſion of France; but it ſuffered materially in the next reign, having been plundered and burnt by the French, who took advantage of the then diſtracted ſtate of the country, to attack ſuch of the coaſt-towns as were leaſt capable of reſiſtance. It ſoon, however, recovered from this diſaſter, and became a port of conſiderable conſequence; but the riſe of others on the ſame coaſt has rendered it for the laſt century comparatively unimportant. The harbour, which lies to the ſouth-eaſt of the town, is at preſent in a neglected ſtate, notwithſtanding it admits veſſels of a large ſize to come quite up to the town-quay, about a mile and a half from its entrance. At ſpring tides the ſea riſes ſo high, and ſpreads itſelf ſo much, that two-thirds of the town are ſurrounded by water. The mackarel and herrings caught here in their ſeaſons are reckoned the fineſt of the kind brought to the London market.

Rye is a borough of itſelf by preſcription, as well as by charters granted in confirmation of its privileges. The corporation conſiſts of a mayor, bailiff, jurats, and freemen. The mayor and bailiff are choſen from among the jurats on the Monday after St. Bartholomew's day, by the votes of a majority of freemen. When a vacancy occurs among the jurats, the mayor nominates a freeman to ſupply it, but he muſt be approved of by the jurats before his appointment becomes valid. Rye ſends two members to parliament, who are oſtenſibly elected by the mayor, jurats, and freemen inhabiting the borough, and paying ſcot and lot; but, in fact, they are returned through the influence of the treaſury, which is paramount in all the cinque-ports. The principal articles of trade here are, hops, wool, timber, kettles, cannon, chimney-backs, and other iron goods, from the works at Bakeley and at Breed. There are two weekly markets, on Wedneſday and Saturday; and two annual fairs, on Whit-monday and the 10th of Auguſt.

The town of Rye occupies a conſiderable eminence, and is, generally ſpeaking, regular and well built. In the centre of the principal ſtreet ſtands the market-houſe, the higher ſtory of which is appropriated as a town-hall, for the uſe of the corporation. The church is conſtructed of ſtone, and is one of the largeſt parochial edifices of the kind in England, but does not otherwiſe claim particular attention. Here is beſides a chapel, which was lately appropriated to the French refugees, who ſettled in the town and its vicinity during the late war; alſo meeting-houſes for Methodiſts, Quakers, and other Diſſenters. Here are likewiſe two free-ſchools, one of which was erected and endowed by a Mr. Peacock in the year 1644; and the other by a Mr. Saunders, at a later period. The only monaſtic eſtabliſhment in Rye was a priory of Auguſtine friars, which exiſted previous to the time of Edward III. and continued to flouriſh till the general diſſolution of religious houſes by king Henry VIII. The church formerly belonging to this monaſtery is ſtill ſtanding, having been converted into a ſtore-houſe for mercantile goods. Some remains of the ancient walls of the town may yet be traced, but the ditches are entirely filled up.

According to the parliamentary returns of 1811, this town and out-liberty contain 476 houſes, and 2681 inhabitants. Camden's Britannia, by Gough, Suſſex, folio, 1789. Beauties of England and Wales. vol. xiv. 8vo.

Rye, a town of Denmark, in North Jutland, formerly important, but now much reduced. The church at Rye, in

in popiſh times, was reckoned to be a very ſacred place; 16 miles W. of Aarhuys.

Rye, a townſhip of New Hampſhire, in America, on the ſea-coaſt of Rockingham county, oppoſite the iſle of Shoals, and 8 miles S. of Portſmouth: incorporated in 1719, and containing 1020 inhabitants.—Alſo, a townſhip of New York, in Weſt Cheſter county, in Long Iſland ſound; 36 miles N.E. of New York city.—Alſo, a townſhip in Cumberland county, Pennſylvania, containing 1356 inhabitants. —Alſo, a townſhip in Cumberland.

RYECHUNGA, a town of Bengal; 13 miles N.W. of Beyhar.

RYEGATE. See Reygate.

Ryegate, the ſouth-eaſternmoſt townſhip of Caledonia county, in the ſtate of Vermont, ſeparated from Bath in New Hampſhire by Connecticut river; containing 812 inhabitants.

RYELAND Sheep, a breed of fine-woolled ſheep, originally met with in the greateſt perfection in a diſtrict of Hereforddſhire, termed the Ryelands. See Sheep.

RYER, Andrew du sieur de Malezais, in *Biography*, was born at Marcigni, in Burgundy. Little is known of his hiſtory, but he became gentleman in ordinary of the king's bed-chamber, and knight of the Holy Sepulchre. He reſided a conſiderable time at Conſtantinople in the king's ſervice, and was conſul for the French nation in Egypt, from which opportunities he derived a knowledge of the Arabic, Turkiſh, and other Oriental languages. He died in France, about the middle of the 17th century. His chief works as a literary man are, "A Turkiſh Grammar;" "A French Tranſlation of the Koran," and another of the "Guliſtan" of Saadi. His verſion of the Koran is in no great eſtimation, as he is ſaid to have mixed the reveries of Mohammedan commentators with the original text.

Ryer, Peter du, a dramatic and miſcellaneous writer, was born of a good family at Paris, in 1605. He procured a place of ſecretary to the king in 1626, which his poverty obliged him to ſell, and he afterwards ſerved in the ſame capacity Cæſar, duke of Vendome. In order to ſupport his family he employed his pen in proſe and verſe. He compoſed nineteen pieces for the theatre, which were ſucceſsful at the time of their appearance. Two or three of his tragedies obtained the applauſe of maturer criticiſm. His "Alcyonèe" ſo much delighted queen Chriſtina, that ſhe had it read to her three times in one day. His "Scævole" ſtill keeps its place on the ſtage. Du Ryer was admitted into the French Academy in 1646. A ſhort time before his death he obtained the office of hiſtoriographer royal, with a penſion. He died in 1658.

RYES, in *Geography*, a town of France, in the department of the Calvados, and chief place of a canton, in the diſtrict of Bayeux. The place contains 650, and the canton 10,510 inhabitants, on a territory of 147½ kiliometres, in 29 communes.

RYEWATER, a river of the county of Kildare, Ireland, which paſſing by Carton, falls into the Liffey, near Leixlip.

RYKOWICZA, a town of Lithuania, in the palatinate of Brzeſc; 25 miles S.E. of Brzeſc.

RYKSDALER, in *Commerce*. See Rixdollar.

RYKSORT, a Daniſh ſilver coin, reckoned at twenty-four ſhillings. See Rixdollar.

RYMABAD, in *Geography*, a town of Hindooſtan, in Myſore; 15 miles E.S.E. of Chinna Ballabarum.

RYMAROW. See Romerstadt.

RYME. See Rhyme.

RYMENAUT, in *Geography*, a town of France, in the department of the Two Nethes, ſituated on the Dyle; five miles E. of Malines.

RYMER, Thomas, in *Biography*, a critic and antiquary, was born in the north of England, and educated at the grammar-ſchool of Northallerton. He was admitted a ſcholar at Cambridge, then became a member of Gray's Inn, and at length was appointed hiſtoriographer to king William, in place of Mr. Shadwell. He wrote "A View of the Tragedies of the laſt Age," and afterwards publiſhed a tragedy named "Edgar." For the office of a critic he was certainly not well qualified, for he wanted candour; nor is his judgment much to be relied on, as he could condemn Shakſpeare with ſuch rigid ſeverity. His tragedy will ſhew, that his talents for poetry were by no means equal to thoſe whoſe poems he has publicly cenſured. But though he has no title to the appellation of poet or critic, as an antiquarian and hiſtorian his memory will long be preſerved. His "Fœdera," which is a collection of all the public tranſactions, treatiſes, &c. of the kings of England with foreign princes, is eſteemed one of our moſt authentic and valuable records, and is oftener referred to by the beſt Engliſh hiſtorians than perhaps any other book in the language. It was publiſhed at London in the beginning of the laſt century, in 17 vols. folio. Three volumes more were added by Sanderſon after Rymer's death. The whole were reprinted at the Hague, in 10 vols. 1739. They were abridged by Rapin in French, and inſerted in Le Clerc's Bibliotheque, a tranſlation of which was made by Mr. Stephen Whatley, and printed in one vol. folio. &c. 4 vols. 8vo. 1731, under the title of *Acta Regia*. Mr. Rymer died the 14th of December 1713, and was buried in the pariſh church of St. Clement's Danes. Some ſpecimens of his poetry are preſerved in the firſt volume of Mr. Nichols's Select Collection of Miſcellaneous Poems, 1780.

RYNABAD, in *Geography*, a town of Bengal; 35 miles S.E. of Moorley.

RYNCHOPS, *the Skimmer*, in *Ornithology*, a genus of birds of the order Anſeres, of which the generic character is, that the bill is ſtraight, the upper mandible is much ſhorter than the under, the latter truncated at the apex; the tail is forked and ſhorter than the wings, noſtrils linear, and the back toe ſmall.

Species.

Nigra; Black Skimmer, or Cut-water. The ſpecific character is blackiſh, beneath white; bill red at the baſe; the lower mandible grooved; the front and chin are white; wings with a tranſverſe white band; the two middle tail-feathers are black, the next edged with white; the legs are red, and it is about twenty inches long. It is found in divers parts of Aſia and America. This bird is ever on the wing, ſweeping the ſurface of the water, dipping its bill, or at leaſt its under mandible, to ſcoop out the ſmaller fiſhes, on which it feeds. In ſtormy weather it frequents the ſhores, and is contented with oyſters, and other ſhell-fiſh. There is a variety of a tawny colour, with a black bill.

RYNNTO, in *Geography*, a ſmall iſland in the gulf of Bothnia, near the coaſt of Finland. N. lat. 60° 37′. E. long. 21° 46′.

RYNOORT, a town of Holland, on the Rhine; ſeven miles E. of Leyden.

RYOTS, the modern name by which the renters of land are diſtinguiſhed in Hindooſtan. In every part of India, where the native Hindoo princes retain dominion, theſe Ryots hold their poſſeſſion by a leaſe, which may be conſidered as perpetual, and at a rate fixed by ancient ſurveys

and valuations. This arrangement has been ſo long eſtabliſhed, and accords ſo well with the ideas of the natives, concerning the diſtinctions of caſts, and the functions allotted to each, that it has been inviolably maintained, in all the provinces ſubject either to Mahometans or Europeans; and to both it ſerves as the baſis on which their whole ſyſtem of finance is founded. In a more remote period, before the original inſtitutions of India were ſubverted by foreign invaders, the induſtry of the huſbandman, on which every member of the community depended for ſubſiſtence, was as ſecure, as the tenure, by which he held his lands, was equitable. Even war did not interrupt his labours or endanger his property. It was not uncommon, we are informed, that while two hoſtile armies were fighting a battle in one field, the peaſants were ploughing or reaping in the next field in perfect tranquillity. (Strabo, lib. xv.) Under a form of government, which paid ſuch attention to all the different orders of which the ſociety is compoſed, particularly the cultivators of the earth, it is not wonderful that the ancients ſhould deſcribe the Indians as a moſt happy race of men; and that the moſt intelligent modern obſervers ſhould celebrate the equity, the humanity, and mildneſs of Indian policy. A Hindoo rajah reſembles more a father preſiding in a numerous family of his own children, than a ſovereign ruling over inferiors ſubject to his dominion. He endeavours to ſecure their happineſs with vigilant ſolicitude; they are attached to him with the moſt tender affection and inviolable fidelity. We can hardly conceive men to be placed in any ſtate more favourable to their acquiring all the advantages derived from ſocial union. It is only when the mind is perfectly at eaſe, and neither feels nor dreads oppreſſion, that it employs its active powers in forming numerous arrangements of police, for ſecuring its enjoyments and increaſing them. Many arrangements of this nature the Greeks, though accuſtomed to their own inſtitutions, the moſt perfect at that time in Europe, obſerved and admired among the Indians, and mention them as inſtances of high civilization and improvement. There were eſtabliſhed among the Indians three diſtinct claſſes of officers, one of which had it in charge to inſpect agriculture, and every kind of country work. They meaſured the portions of land allotted to each renter. They had the cuſtody of the *tanks*, or public reſervoirs of water, without a regular diſtribution of which, the fields in a torrid climate cannot be rendered fertile. They marked out the courſe of the highways, along which, at certain diſtances, they erected ſtones, to meaſure the road and direct travellers. To officers of a ſecond claſs was committed the inſpection of the police in cities; their functions of courſe were many and various; ſome of which only we ſhall ſpecify. They appropriated houſes for the reception of ſtrangers; they protected them from injury, provided for their ſubſiſtence, and, when ſeized with any diſeaſe, they appointed phyſicians to attend them; and, on the event of their death, they not only buried them with decency, but took charge of their effects, and reſtored them to their relations. They kept exact regiſters of births and of deaths. They viſited the public markets, and examined weights and meaſures. The third claſs of officers ſuperintended the military department; but, as the objects to which their attention was directed are foreign from the ſubject of this article, it is unneceſſary to enter into any detail with reſpect to them.

There is ſtill the ſame attention to the conſtruction and preſervation of tanks, and the diſtribution of their waters. The direction of roads, and placing ſtones along them, is ſtill an object of police. *Choultries*, or houſes built for the accommodation of travellers, are frequent in every part of the country, and are uſeful, as well as noble monuments of Indian munificence and humanity.

The preciſe mode, however, in which the Ryots of Hindooſtan held their poſſeſſions, is a circumſtance in its ancient political conſtitution, with reſpect to which gentlemen of ſuperior diſcernment, who have reſided long in the country, and filled ſome of the higheſt ſtations in government, have formed very different opinions. Some have imagined, that grants of land were made by the ſovereign to villages or ſmall communities, the inhabitants of which, under the direction of their own chiefs or heads-men, laboured it in common, and divided the produce of it among them in certain proportions. (Deſcript. de l'Inde, par M. Bernouilli, tom. ii. 223, &c.) Others maintain, that the property of land has been transferred from the crown to hereditary officers of great eminence and power, denominated *Zemindars*, who collect the rents from the Ryots, and parcel out the lands among them. Others contend, that the office of the Zemindars is temporary and miniſterial, that they are merely collectors of revenue, removeable at pleaſure, and the tenure by which the Ryots hold their poſſeſſions is derived immediately from the ſovereign. This laſt opinion is ſupported, with great ability, by Mr. Grant, in an Inquiry into the Nature of Zemindary Tenures in the landed Property of Bengal, &c. This queſtion ſtill continues to be agitated in Bengal, and ſuch plauſible arguments have been produced in ſupport of the different opinions, that although it be a point extremely intereſting, as the future ſyſtem of Britiſh finance in India appears likely to hinge, in an eſſential degree, upon it, perſons well acquainted with the ſtate of India, have not been able to form a final and ſatisfactory opinion upon this ſubject. (Captain Kirkpatrick's Introd. to the Inſtitutes of Ghazan Khan. New Aſiatic Miſcell. N° II. p. 130.) Though the ſentiments of the Committee of Revenue, compoſed of perſons eminent for their abilities, lean to a concluſion againſt the hereditary right of the Zemindars in the ſoil, yet the Supreme Council, in the year 1786, declined, for good reaſons, to give any deciſive judgment on a ſubject of ſuch magnitude.

Mr. Rouſe, in his ingenious and inſtructive Diſſertation concerning the landed property of Bengal, adopts an opinion contrary to that of Mr. Grant, and maintains, with laudable candour and liberality of ſentiment, that the Zemindars of Bengal poſſeſs their landed property by hereditary right. Dr. Robertſon, in his "Hiſtorical Diſquiſition concerning India," ſuggeſts, that the poſſeſſion of land was granted at firſt during pleaſure, afterwards for life, and at length became perpetual and hereditary property. But even under this laſt form, when land is acquired either by purchaſe or inheritance, the manner in which the right of property is confirmed and rendered complete, in Europe by a charter, in India by a "Sunnud" from the ſovereign, ſeems to point out what was its original ſtate. According to each of the theories above-mentioned, the tenure and condition of the Ryots nearly reſemble the deſcription which our author has given of them. Their ſtate, we learn from the accounts of intelligent obſervers, is as happy and independent as falls to the lot of any race of men employed in the cultivation of the earth. The ancient Greek and Roman writers, whoſe acquaintance with the interior parts of India was very imperfect, repreſent the fourth part of the annual produce of land as the general average of rent paid to the ſovereign. Upon the authority of a popular author, who flouriſhed in India prior to the Chriſtian era, we may conclude, that a ſixth part of the people's income was, in his time, the uſual portion of the ſovereign. (Sacontala, act v. p. 53.) It is now known,

known, that what the ſovereign receives from land varies greatly in different parts of the country, and is regulated by the fertility or barrenneſs of the ſoil, the nature of the climate, the abundance or ſcarcity of water, and many other obvious circumſtances. By the account given of it, Dr. Robertſon imagines that, in ſome diſtricts, it has been raiſed beyond its due proportion. One circumſtance with reſpect to the adminiſtration of revenue in Bengal merits notice, as it redounds to the honour of the emperor Akber, the wiſdom of whoſe government has often been conſpicuous. A general and regular aſſeſſment of revenue in Bengal was formed in his reign. All the lands were then valued, and the rent of each inhabitant and of each village aſcertained. A regular gradation of accounts was eſtabliſhed. The rents of the different inhabitants who lived in one neighbourhood being collected together, formed the account of a village; the rents of ſeveral villages being next collected into one view, formed the accounts of a larger portion of land. The aggregate of theſe accounts exhibited the rent of a diſtrict, and the ſum total of the rents of all the diſtricts in Bengal, formed the account of the revenue of the whole province. From the reign of Akber to the government of Jaffeer Ali Cawn, A.D. 1757, the annual amount of revenue, and the modes of levying it, continued with little variation. But in order to raiſe the ſum which he had ſtipulated to pay the Engliſh on his elevation, he departed from the wiſe arrangements of Akber; many new modes of aſſeſſment were introduced, and exactions multiplied. Robertſon's India.

RYOZ, in *Geography*, a town of France, in the department of the Upper Saône; 11 miles N. of Beſançon.

RYPOUR, a town of Hindooſtan, in the circar of Gohud; 10 miles S.S.E. of Gwalior.—Alſo, a town of Hindooſtan, in Bahar; 24 miles S.S.E. of Bahar.

RYPTICS, in *Medicine*. See Rhyptics.

RYR, in *Geography*, a town of Sweden, in Weſt Gothland; ſeven miles N.E. of Uddevalla.

RYS, a lake of Denmark, in Norland.

RYSAGON, in the *Materia Medica*, a name by which ſome authors have called the *caſſumunar root*.

RYSBY, in *Geography*, a town of Sweden, in the province of Samland; 10 miles N. of Calmar.

RYSEMSEH, a town of Norway; 48 miles E.N.E. of Romſdal.

RYSEN, or Ryssen, a town of Holland, in the department of Overyſſel, on the river Regge; 20 miles N.E. of Zutphen.

RYSSADIUM, in *Ancient Geography*, a town and port of Africa, in Mauritania Tingitana, on the coaſt of the Iberian ocean, between Seſtiaria Extrema and the promontory Meſagonites, according to Ptolemy. It is named by Antonine Ruſarder Colonia, and Ruſardir by Pliny, who places it near the promontory "Solis."

Ryssadium, a promontory of Africa, in the Interior Libya, near the promontory Arſinarium, according to Ptolemy.

RYSSADIUS Mons, a mountain of Africa, in the Interior Libya, in which Ptolemy places the ſource of the river "Stachier."

RYSWICK, in *Geography*, a large village in Holland, ſituated between the Hague and Delft, where the prince of Orange had a palace; and remarkable for a treaty concluded here in 1697 between England, Germany, Holland, France, and Spain; 30 miles S.W. of Amſterdam, and two S.E. from the Hague.

RYVES, Thomas, in *Biography*, born in the latter end of the 16th century, and educated at Wincheſter ſchool, from whence he was ſent to Oxford. He became celebrated as a civilian in Doctors' Commons, and in the court of Admiralty. At the acceſſion of Charles I. he was made king's advocate, and was knighted. He died in 1651. He wrote ſeveral works, among which were "The Vicar's Plea;" "Hiſtoria Navalis Antiqua;" "Hiſtoria Navalis Media."

Ryves, Bruno, an Engliſh divine, and near relation of the preceding. At the reſtoration of Charles II. he had the deanery of Windſor conferred on him. He was alſo ſecretary to Garter king at arms. He was author of "Mercurius Ruſticus," or "The Country's Complaint," and divers other works, which were popular in their day.

RYVORDEN, in *Geography*, a ſmall iſland in the North ſea, near the coaſt of Norway. N. lat. 59° 27′.

RZECZYCA, a town of Lithuania, in the palatinate of Minſk, on the Dnieper; 140 miles S.E. of Minſk. N. lat. 52° 10′. E. long. 31° 24′.

RZEMIEN, a town of Poland, in the palatinate of Sandomirz; 36 miles S.S.W. of Sandomirz.

END OF VOL. XXX.

Strahan and Preſton,
New-Street Square, London.

AE
5
R329
v.30

Rees, Abraham
The cyclopaedia

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY

UTL AT DOWNSVIEW
D RANGE BAY SHLF POS ITEM C
39 13 15 09 03 010 0